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Skills for Sustainability

Second edition



NEW SOUTH WALES
DEPARTMENT
OF EDUCATION
AND TRAINING



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Foreword

Climate change is now a headline issue, demanding urgent attention from State and federal governments, industry and consumers.

In 2005, the NSW Board of Vocational Education and Training (BVET) had the foresight to recognise that the skills policy response to climate change would become a pressing issue. In January of that year it commissioned the Workplace Research Centre (WRC) to investigate the skills required for sustainable business development in NSW. That major work informed the first edition of *Skills for Sustainability*, the ground-breaking report released by the BVET in 2007.

Since then, the NSW BVET has continued to take the lead in initiatives to strengthen the development of sustainability skills in NSW.

In particular, in March 2008, the NSW BVET approved the *NSW Green Skills Strategy*, to be implemented by the NSW Department of Education and Training over the period 2008 - 2010. The Strategy is helping to develop relevant workforce skills for business in an environmentally constrained world. It includes: providing training in priority industries, professional development to build training capacity, demonstration projects and information provision.

The NSW BVET has also continued to support broader innovative responses to skills needs (including sustainability skills) in key NSW industries. For example, in late 2008, the Board provided funding to identify, develop and assess training service models for skills

development that will best meet the unique innovation requirements in the financial services, logistics and creative industries sectors.

Through these and related initiatives considerable progress has been made in implementing the recommendations of the 2007 *Skills for Sustainability* report. We recognise, however, that more needs to be done. This second edition of the report brings together the most up-to-date Australian and international research, and is informed by recent national developments such as the Garnaut Climate Change Review, 2008. It builds on the work commenced in 2007 and takes NSW's response to the challenge of sustainability to the next level through a range of proposed new initiatives.

I would like to acknowledge the Strategic Planning and Regulation portfolio within the NSW Department of Education and Training, which managed the original *Skills for Sustainability* research project and composed and updated this report.

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Bert Evans
Chairman
NSW Board of Vocational Education and Training



1.0 Skills for Sustainability

... companies in the fledgling green economy are struggling to find workers with the skills needed to perform the work that needs to be done. Indeed, there are signs that shortages of skilled labor could put the brakes on green expansion...There is thus a need to put appropriate education and training arrangements in place.

*Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World.
United Nations Environment Programme 2008*

1.1 The Challenge of a Sustainable Future

When the first edition of this report was published in 2007 it was not long after the release of the Stern Review on the Economics of Climate Change. This was a landmark review that posed the challenges and opportunities of a sustainable future.

Since then, there have been many commissioned reports on climate change and it is now well accepted that the effects of greenhouse gas emissions pose a serious long term threat to the economic and physical wellbeing of all societies.

Given the significance of this threat, the global response to climate change will be one of the most important drivers of economic changes during this century. The ability to adapt to these fundamentally changed circumstances will be a central determinant in the success of the NSW economy in the future.

Climate change is already causing a shift in the economic behaviours of nations. Major economic blocs (notably the European Union) are setting the pace with both Governments and industry making the transformation to a carbon-sensitive economy. This includes Government regulation (such as trading schemes and mandatory abatement measures) and industry responses (investment in new technology and processes and changes in capital markets and investment).

As the world's major economies become more carbon sensitive, it is evident that this is triggering a kind of new industrial revolution that, like the nineteenth- and twentieth-century revolutions, will have big implications for jobs and skills.

With increasing recognition of the urgency of the problem, the responses by Governments and industry are becoming more rapid and more far-reaching. Most

countries, including Australia, now acknowledge carbon constraints and carbon schemes will be an inevitable feature of the economy.

In 2007, the Commonwealth, State and Territory Governments commissioned Professor Ross Garnaut to undertake a Climate Change Review, with the final report being presented on 30 September 2008. The Review examined the impacts of climate change on the Australian economy, and recommended medium to long-term policies to improve the prospects for sustainable prosperity, including changes to the education and training system.

The Australian Government ratified the Kyoto Protocol soon after being elected, and in October 2008 launched 'Australia's Low Pollution Future – The Economics of Climate Change Mitigation'. This report contained detailed modelling of the costs and opportunities of meeting the challenge of climate change.

At the national level, workshops have been held on the Carbon Pollution Reduction Scheme across Australia, and the Government has announced a 20 per cent Renewable Energy Target and new 'Solar Credits' and the \$500 million Renewable Energy Fund has been brought forward to invest in cutting edge renewable energy projects over 18 months from December 2008.

Internationally, Australia has advocated global action on climate change at the Major Economies Meeting Leaders' Summit held at the 2008 G8 meeting in Japan and at the United Nations Climate Change Conference in Poznan. Bilateral agreements have been signed with Indonesia, Papua New Guinea and China on issues including approaches to lowering emissions from deforestation and reducing forest degradation, clean energy and clean technologies.

Given the significance of these developments, the challenge for NSW is twofold: firstly, to play our part

in global efforts to reduce greenhouse gas emissions; and secondly, to position the NSW economy to gain strategic advantages in the new economic climate. NSW has responded to these challenges by developing the Climate Change Action Plan, intended to be finalised by mid 2009, which will focus on economic opportunities associated with climate change and which coordinates a whole of government approach to addressing challenges.

With innovation a key to successful adaptation to climate change, the Low Carbon Innovation Project is also being developed to investigate processes to lower the costs of greenhouse gas abatement, to facilitate adjustment by business to a carbon-constrained economy and to realise economic opportunities in markets for low carbon technologies, services, products and processes.



Given that the global carbon market is expected to be worth billions of dollars, investors will be expecting more companies to develop strategies to harness opportunities from this emerging market.

Carbon Disclosure Project Report 2008 – Australia and New Zealand

1.2 Business reaction to climate change

While climate related issues topped a recent Lowy Institute poll on possible threats to the vital interests of Australia, the survey reported a slight drop in the urgency with which Australians perceived the problem and their willingness to pay for it. This may be related to the belief in some quarters that policies that address climate change will have negative effects on the economy as a whole and on jobs in particular.

Yet many Australian firms are readily embracing sustainability policies to drive their national and international business growth and the evidence demonstrates job growth and economic opportunities.

A 2008 study by the CSIRO, commissioned for the Dusseldorp Skills Forum, estimated that while a rapid transition to sustainability would have varying degrees of effect on particular industry sectors, there would be little or no overall impact on total national employment figures over the next two decades. Projected increases in employment would remain in the order of 2.5 million to 3.3 million jobs over the next two decades. Included in this number, around 230,000 to 340,000 new jobs could be added in the transport, construction, agriculture, manufacturing and mining sectors in addition to normal employment turnover.

Recent modelling by the Australian Treasury of the effects of an emissions trading scheme indicates that the renewable energy sector could be 30 times bigger by 2050 than at present, with significant investment in wind power. While some firms and regions could expect structural adjustment, the report estimates that carbon capture and storage will create new employment opportunities as a result of changing industrial outputs requiring new technologies and processes, with growth expected mainly in low emission, labour intensive industry sectors.

An analysis commissioned by the Australian Conservation Foundation and the Australian Council of Trade Unions

in 2008 found that Australia could have more than 500,000 new jobs over the business-as-usual baseline by 2030 if the Government implements greenhouse policies to create strong domestic markets in industries such as renewable energy, energy efficiency, sustainable water systems, biomaterials, green building and waste and recycling. The study found the greatest potential for job creation was in the retrofitting of green buildings (230,000 jobs by 2030) and in renewable energy (375,000 jobs).

International evidence bears this out. An October 2008 University of California study demonstrated that climate action can create jobs, particularly when innovations improve efficiency. In fact, California's energy efficiency programs have already resulted in more than one million jobs being created since 1972.

In September 2008 the Western Climate Initiative followed California's lead in announcing a regional carbon-reduction strategy which will spur growth in new technologies. The seven US states and four Canadian provinces that make up the Western Climate Initiative represent 73% of Canada's economy and 20% of the US economy.

The University of California study found that new energy efficiency and greenhouse emission reduction measures would increase real household incomes and create as many as 403,000 new jobs in that state alone. The report noted that while energy, fuel and carbon capped sectors could experience important downward adjustments, these would be offset by expansion elsewhere, including services, construction, and consumer goods.

Technological change and innovation were both found to be critically important to these predictions, as both permit the economy to reduce energy dependence more cost effectively. This compounds the benefits of the climate policies by either increasing the energy savings per dollar of adaptation cost or, for the same energy saving investment, freeing money for other demand.

The imperative to act now to grow the green economy

".....investing in the clean energy jobs and industries of the future must be part of our response to the global financial crisis. The work of the Treasury and Professor Ross Garnaut demonstrates that the longer we wait to take action on climate change, the more it will cost.

Furthermore, the Treasury has advised that taking responsible action on climate change will, at most, cost the economy one tenth of one percent of GDP growth measured against no policy change. Treasury modelling estimates that taking responsible action on climate change will see the renewable energy sector alone grow to 30 times its current size by 2050, creating thousands of new jobs.

If Australia is to be a leader in the new clean energy industries, we need to build a low pollution, clean energy economy..... Acting now will enable us to develop the skills base, trial the new technologies, and refine the business models that will help Australia become a leader in the low pollution industries of the future."

Prime Minister Kevin Rudd, Launch of Australian Government's White Paper on the Carbon Pollution Reduction Scheme, 15 December 2008

In Australia as elsewhere, major companies are now taking up the challenge presented by climate change, recognising that sustainability as a core business strategy is in their interests. Key drivers behind these shifts include:

- Rising economic costs associated with climate change – for example, several large insurers now list climate change as a top risk along with terrorism and intellectual property threats
- New markets growing around greenhouse gas emissions, from carbon credit trading to countless new technologies and processes
- Capital markets directing funds toward sustainable businesses and redefining fiduciary responsibilities for corporate boards
- Global supply chains responding to changing regulatory requirements and purchasing demands
- Response to consumer demand and companies (and nations) seeking to capture first mover competitive advantage by developing, deploying and selling low emission services and products.

The Australian Business Roundtable on Climate Change was convened in 2006 to participate in and lead discussions on climate change strategy. Comprised of IAG, BP Australia, Origin Energy, Swiss Re, VISY, Westpac and the Australian Conservation Foundation, the Roundtable recommended that business and governments work together to frame policies on three fronts:

- Design a "long, loud and legal" framework to establish a price signal, including a national market-based carbon pricing mechanism
- Encourage innovation and investment in emerging and breakthrough technologies
- Build national resilience to the impacts of climate change.

According to the Roundtable, "...carbon is becoming a tradable commodity, allowing companies to hedge their risks, profit from new assets and turn this new discipline into a competitive advantage ... Australian business cannot afford to be locked out of market opportunities such as this."

In 2007 the Australian Industry Group, in their study of environment practices among 810 Australian companies in the manufacturing and commercial construction industries, confirmed that climate change issues have already had a profound impact on business. The study found that the vast majority of companies believed they had a responsibility to contribute to a reduction in carbon emissions, even if it adds some costs to the business. Companies also identified a range of significant business opportunities including:

- introducing new products
- promoting the company as carbon neutral
- developing new technologies
- becoming more competitive and developing offshore markets
- gaining energy efficiencies
- benefiting from a carbon trading scheme
- securing a reputation for social responsibility.

Half of the surveyed companies already employed an individual with responsibility for environment management, with actions including planning to adopt new practices, tracking emissions, undertaking research and collaboration with other firms, investing in new technology and processes, and fully offsetting emissions.

The study reported that large firms had a heightened sense of business opportunities, and were particularly attuned to the potential for developing new technologies and products for customers.

The Australian and New Zealand Investor Group on Climate Change (IGCC), representing 36 institutional investor members, representing over \$550 billion in investment funds prior to the 2008 global financial crisis, ensures that the risks and opportunities associated with climate change are incorporated into investment decisions.

IGCC supports the Carbon Disclosure Project (CDP) along with Goldman Sachs JBWere and Catholic Super. Every company in the ASX100 that completed the 2008 CDP questionnaire identified some risks from climate change. In particular, 91% of these respondents considered their company to be exposed to regulatory risks – much higher than the global average of 70% of respondents.

Australia positioned to export innovations in sustainability

“Australia is a global leader in the wide range of skills and technologies that are relevant to high performance in the resource industries. Businesses with headquarters functions in Australia are playing major roles in development of the resource sectors in all inhabited continents. In addition, Australia is a major exporter of engineering, management, financial and legal services related to the resources sector.

The skills and capacities that are important in the resources sector, more than others, will be crucial to the global transition to a low-emissions economy. The development in Australia of low-emissions technologies in the energy and agriculture sectors in particular will provide a basis for Australian businesses to play leading roles in innovation associated with the low-emissions transition in many countries, and especially in the Asia and the Pacific.”

Garnaut Climate Change Review 2008

While the large majority of companies indicated they had undertaken action to manage the general and regulatory risks, it was notable that only a very small number of companies mentioned actions they had taken to adapt to the physical risks that had been identified – a potential concern to large long-term investors.

However, the CDP report noted that the majority of Australian and New Zealand respondents are actively pursuing emissions reduction in their company, recognising that the balance sheet of every company will be impacted either directly through a cost on emissions or indirectly through increased costs for energy and energy intensive inputs.

On a global scale, ten Australian organisations are also signatories to the United Nations Environment Programme Financial Institutions Initiative (UNEP FI). In 2008, the Initiative had around 177 signatories globally to a voluntary agreement that aims to promote best practice environmental performance within financial institution operations.



Business is responding to the new conditions

IAG

IAG has announced its intention to become carbon neutral across its global operations by 2012. The company has already identified its existing emissions profile and will look at areas of the business where further emission reduction can be achieved.

Wesfarmers

A number of significant environmental programs are being developed and implemented, including initiatives to promote greater energy efficiency, renewable energy sourcing and carbon offsets, significant pollution abatement and prevention, reductions in greenhouse and energy footprints within the Resources division, and successful waste reduction and recycling programs.

During 2007/2008, Wesfarmers commissioned an internal report on carbon emissions and mitigation opportunities for the Group, with the Board endorsing the preparation of internal carbon emission targets.

Westpac

The Dow Jones Sustainability Index, which measures economic, social and environmental sustainability, named Westpac as the number one global bank between 2003 and 2007. In adopting the Equator Principles, the bank provides loans only to those projects whose sponsors can demonstrate that projects are developed according to sound environmental management practices.

The bank has also introduced the Westpac Landcare Term Deposit. For every dollar customers invest, the bank ensures that an equivalent amount is lent to Landcare farmers who develop sustainable farming ventures and practices.

HSBC

The HSBC Climate Partnership is a five year partnership between HSBC and The Climate Group, Earthwatch Institute, Smithsonian Tropical Research Institute and WWF. HSBC's US\$100 million investment aims to combat the urgent threat of climate change by inspiring action by individuals, businesses and governments worldwide. HSBC Holdings plc (the parent company) is listed on the FTSE4Good index which measures company performance in the areas of environmental sustainability, stakeholder relations and support for human rights.

LendLease

Lend Lease announced in November 2008 that it had partnered with the Clinton Climate Initiative to work together on opportunities to significantly reduce the environmental impact of buildings by accelerating retrofits to maximise energy efficiency and reduce greenhouse gas emissions. The Initiative's Energy Efficiency Building Retrofit Program brings together many of the world's largest cities, real estate firms, financial institutions, and energy service companies in a landmark effort to reduce energy consumption in existing buildings across the municipal, private, commercial, educational, and public housing sectors.

In addition to the construction and energy sectors, areas of potential employment change include transport, agriculture and a range of services. Many of these jobs will be in industry subsectors that barely exist today and some that lie within the imagination of farsighted entrepreneurs.

The need to supply appropriately skilled people for these jobs is in addition to the need to develop new knowledge and skills in existing roles and sectors around the issues that emerge from the implementation of climate change policies. There will be few sectors left untouched.

The Garnaut Climate Change Review 2008

1.3 Importance of Skills Policy

Much of the focus for environmental solutions has been through policy, regulatory and market mechanisms, measurement targets, technology and innovation. In 2007, when the first edition of this report was published, the role of skills had been largely overlooked.

To better understand how skills policy and the VET sector can contribute to reducing greenhouse gas emissions, in 2005 the BVET commissioned specific research addressing the latest developments in skills and sustainability. The research was undertaken by The Workplace Research Centre (WRC) at the University of Sydney. The WRC report considered the role of skills policy in the broader environmental policy mix and how skills policy needed to accommodate changing global economic circumstances.

Since the release of BVET's first edition of *Skills for Sustainability*, the role of skills has gained more prominence in policy responses to climate change. This has been confirmed in recent reports, including the *Garnaut Review on Climate Change*, research by the United Nations Environment Programme, research by the Australian Conservation Foundation and Australian Council of Trade Unions, and research by CSIRO for the Dusseldorp Skills Forum.

The Ministerial Council for Vocational and Technical Education (MCVTE) affirmed the importance of "Green Skills" to Australia and established the National VET Sector Sustainability Action Group in 2008. NSW is participating in this group, which will identify the scope of national policy and action for sustainability in the VET sector and conduct a scan of sustainability actions across Australia.

During 2009, the National Quality Council will develop flexible and responsive training products that include embedding sustainability in all training packages, sustainability skill sets and customised short accredited courses. The Council will also develop appropriate standards as part of the Australian Quality Training Framework for voluntary certification of Registered Training Organisations as providers of Green Skills.

In NSW, responses by business to major initiatives such as the Climate Change Action Plan and the Low Carbon Innovation Project will be supported by the introduction of the NSW Green Skills Strategy 2008-2010 and TAFE NSW's Education for Sustainability Action Plan 2007-2010 (see detail below).

This body of work and subsequent responses confirms that, as the main provider of industry and workforce skills, the vocational education and training sector plays an important role in transforming the skills basis of the labour market to adapt to an economy geared for sustainability.

Enhancing the capability of the VET sector to provide skill solutions to sustainability issues will greatly enhance the capabilities of communities, workplaces and businesses to adapt to the new economic reality.

Skills are central in driving and enabling environmental sustainability on four fronts:

- Leadership – industry and enterprise leadership is required to develop innovative business culture and practice under new commercial and legislative imperatives, using new management skills to ensure that responses to environmental drivers are examples of best practice and will bring competitive advantage to business.

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- Innovation – new ways of thinking about business models, production and processes and the delivery of excellence in new products and services.
 - Processes – more efficient production, supply chain management, marketing and delivery of goods and services
 - Technical application – the provision of new technology by management requires a workforce with knowledge and skills ready to embrace new processes, install and maintain new technology.

These categories of skills are inter-connected. For example, demand for low emission residential estates and commercial buildings relies on a comprehensive skill approach, including: knowledge of sustainable building products with both low-embedded energy use (that is, the energy it took to produce it) and low ongoing emissions impact; skills in the design of energy efficient buildings with renewable energy and water treatment technologies; tenant education programs; skills in property management processes that optimise usage and technical capability for installation and maintenance; and the skills of salespeople to promote the sales of such estates.

1.4 Aims of this report

Based on research and the latest thinking on skilling for sustainability, this report builds on previous work and sets out renewed momentum and directions for skills policy that will support sustainable business development in NSW. Specifically, the report advises on skills policies and implementation that will have the best potential to support the reduction of greenhouse gas emissions in a sustainable economy.

New Skills for Existing Workers

The Master Plumbers Association of NSW represents some 6,000 plumbers and has developed Enviroplumber™ – an educational program for plumbing contractors to create greater awareness of sustainability and environmental management of water and energy resources.

Together with representatives from representatives from EPA, TAFE NSW, Sydney Water, SEDA and the Association, the Association contracted TAFE NSW to draft a course – Sustainable Plumbing Practices – at Certificate III/IV level, which can be delivered by an RTO under licence from the Master Plumbers Association of NSW.

The course is of 15 hours duration made up of 9 hours of theoretical training and a 6 hour Assessment and Exhibition Day. Over and above the completion of the Sustainable Plumbing Practices Course, plumbing contractors need to complete an accreditation program through the Master Plumbers Association of NSW to trade as an Accredited Enviroplumber™.

Professional plumbing contractors can now participate in a VETAB accredited course that covers regulatory requirements, environmental management and the new world of sustainable plumbing, offering their clients detailed and professional advice on how to make a contribution to a more sustainable environment for the long term.

Enviroplumber™, Master Plumbers Association of NSW



2.0 Acting for Sustainability

“Training and education have positive benefits to society and support the use of available information. Even if individuals have access to information regarding established technologies and practices, they, or commercial agents supplying services to them, may require new skills or a wider body of knowledge to use that information (Consumer Affairs Victoria 2006). Given the wide range of technical issues associated with energy efficiency, gaps in the skill sets of specialists such as engineers or tradespeople could prevent the uptake of these options across a range of sectors.”

Garnaut Climate Change Review 2008

The skill of Australia’s workforce will make a difference to greenhouse gas emissions. The way skills are developed and deployed and the capability of the VET sector to train will determine whether enough of the right skills are available.

Skills will be needed at all levels and across existing and emerging industries. This requires training which covers practical skills for trades in installation and maintenance of low-emission, energy-saving and recycling equipment, as well as programs which provide the skills required of managers in planning, energy and carbon management and reporting. Others such as retailers and those in the property market will require information and raising of awareness of issues related to product sourcing and land use. No one will be unaffected.

2.1 New Green Jobs

Training for green jobs will form an important part of the skills policy response to climate change. There is job growth in renewable energy technologies, waste management and recycling, water and waste water treatment, land remediation and treatment of hazardous waste.

‘Green jobs’ will be created in the new ‘eco industries’ of solar, wind, biofuels and other renewable power sources. The supply of qualified labour will be vital to the growth of renewable energy and recycling systems that are an essential part of a low-carbon economy. A shortage of skilled workers in these industries would be a significant barrier to NSW’s adaptation to a carbon sensitive global economy.

The vocational education and training sector will play an essential role in ensuring a supply of skilled labour that can support renewable energy technology and other environmentally-friendly technologies.

“For renewable energy to gain and maintain a substantial and secure foothold in the energy supply market place there is a need for high quality, practical, flexible renewable energy training of engineers, architects, technicians, trades people, builders, salespeople and the users themselves” (Lund et al in WRC 2007).

As a relatively small economy in a geographically isolated location, Australia has often relied on innovation to maintain a competitive advantage and match or exceed the productivity growth of much larger economies. Just as carbon emissions are a by-product of the last wave of technological change, the adaptations needed to address the carbon challenge will also require technological change and innovation.

Notably the innovations in technology are in areas underpinned by VET skills.

Skill Shortages a Barrier to Sustainability

- The Intergovernmental Panel on Climate Change established that by 2030 the residential and commercial building sector can reduce emissions by 30% (compared to business-as-usual scenarios) by increased application of existing technologies. This transition needs to be supported by sufficient numbers of skilled installers for insulation, energy efficient fittings and intelligent lighting and ventilation systems.

Climate Change 2007: Mitigation of Climate Change, IPCC (2007)

- Double glazed windows can cut heat loss by nearly 30% but that drops to 5% if they are mistakenly installed by unskilled tradespeople in standard aluminium frames.
- The WRC report noted that the solar hot water heater manufacturer Solarhart estimates the installation and operation of 200,000 new solar hot water heaters would prevent the need for a coal fired power plant – however, there are currently insufficient numbers of skilled installers to undertake such a task.

2.2 Greening Old Jobs

While the “green jobs” sector is rapidly growing and has significant potential, traditional industries have a large, established position within the NSW economy. Making them more environmentally friendly has the greatest immediate potential for reducing greenhouse emissions. For this reason the NSW Green Skills Strategy is focusing its efforts on sectors such as manufacturing, electricity, gas and water, construction, agriculture, forestry, fishing and land management, wholesale and retail trade, transport and storage, property and business services and government administration.

The NSW Government has recognised the importance of developing clean coal technologies, having set itself the target of becoming a world centre of research in clean coal technology (NSW Government Statement on Innovation 2006). There are a number of projects that indicate the growing importance of this sector:

- The Government is a partner in the Coal21 National Action Plan which will identify technologies that might reduce or eliminate emissions from coal, including the capture of carbon dioxide from power stations and its storage in underground geological structures.
- The Government’s Exploration NSW and New Frontiers’ exploration initiative which identified potential geological formations for the disposal of CO₂.
- The 2008 NSW Clean Coal Summit at which initiatives were announced including two clean coal projects, a pilot carbon capture plant and a research scale Post Combustion Capture pilot.

As traditional industries such as the coal sector react to a carbon-constrained economy, jobs within these industries will require new skills, or an extension or reorientation of existing knowledge and skills, particularly in sectors such as the built environment and manufacturing.

Skills policy cannot focus merely on the development of green jobs; sustainability principles will need to be diffused throughout all sectors of the economy that influence greenhouse emissions. This may involve a life-cycle approach, from schools through universities and TAFE through to life-long learning and retraining.

2.3 Industry Sectors

The WRC report concluded that, while other industry sectors are important to climate change, the sectors where skills policy has the greatest potential to contribute to reducing greenhouse gases are the building and energy sectors.

Added to these are the nine priority sectors mentioned above, identified by the NSW Green Skills Strategy as having the greatest potential for VET to make a difference in the skill response to environmental sustainability.

2.3.1 The Built Environment

The Australian Greenhouse Office reports that the major contributor to greenhouse gas emissions is stationary energy (at almost 50%). The major users of this energy are buildings and manufacturing. Construction and building alone represents less than 10% of GDP, but Australian buildings and their occupants create 23% of our greenhouse gas emissions, making this a key sector for reducing greenhouse gases.

Energy consumption figures include the operating energy used in buildings, which account for almost all the energy used in the commercial and services sectors of the economy. The property and business services industries as well as wholesale and retail trade and government administration therefore also have great potential for implementing actions which reduce energy use.

Key regulatory shifts like BASIX, requiring an average greenhouse gas reduction for all building types across NSW of 36%, are driving big changes in product innovation and building design. Effective voluntary industry standards are also being developed. The Green Building Council of Australia has introduced the Green Star rating system for buildings, supported by the Property Council of Australia.

Further, building is a major source of employment in NSW. It is also an industry where VET has a central role in skill formation.

Australia at Forefront of Innovation in Sustainability

Australian innovation is producing hundreds of world leading environmental technologies and processes. Here are just a few:

- World's first major solar-powered telecommunications link
- Use of membranes to purify water rather than energy-intensive traditional methods
- Scanning technology to select and sort timber, cutting waste and energy use
- New technology to capture energy as a truck slows down, instead of wasting it as heat in the brakes
- Special roof coatings and paint that reflect heat
- Wine casks which comprise lightweight packaging from recycled paper and very little plastic, using less energy in production and transport and increasing packing density.

Innovation and Energy Efficiency 2005

Three areas shape energy consumption in the built environment:

- The design and operational efficiency of existing and new buildings
- The embodied energy in building materials
- The spatial organisation of cities, and transport linkages between recreational, household and production locations (WRC 2007).

Developments in each of these areas will necessitate new skills formation which the VET sector needs to address. Important skill domains include:

- Building design and drafting capacities to enable 'design-in' sustainability
- Compliance with regulations, codes and voluntary standards
- Knowledge of sustainable building products and how best to use them

Substantial opportunities for change

Putting a price on emissions drives a structural shift in the economy, from emission-intensive goods, technologies and processes, towards low-emission goods, technologies and processes. As a result, growth in emission-intensive sectors slows, and growth in low and negative-emission sectors accelerates.

Australia's Low Pollution Future – Commonwealth of Australia (2008)

Australian businesses are particularly well positioned to succeed in the following six key markets:

- Renewable energy
- Energy efficiency
- Sustainable water systems
- Biomaterials
- Green buildings
- Waste and recycling

In these six key industries, the creation of strong domestic markets supported by strong climate change and other policies could result in an additional 500,000 jobs in Australia by 2030 above a business-as-usual baseline.

Green Gold Rush – Australian Conservation Foundation and Australian Council of Trade Unions (2008)

New training capacity and upskilling in particular for facilities managers, HVAC operators, plumbers, electricians, builders and solar water heating installers will contribute significantly to the skills policy response to climate change. 991,200 people are employed in the construction industry and another 191,500 in property services – making a substantial opportunity for emissions and cost savings, new jobs and new skills.

Employment figures from Australian Bureau of Statistics (2008)

- Knowledge of sustainable construction techniques
- Installation and maintenance of new technologies
- Effective management of increasingly complex facilities and related infrastructure
- Knowledge of sustainable building principles for sales promotion
- Knowledge of resource management (including waste minimisation and recycling).

The energy performance of buildings can be dramatically enhanced through improvements to heating, ventilation and air conditioning (HVAC) systems. Greenhouse gas emissions contribute substantially to the rising summer peak.

Key opportunities for training and upskilling relate to new buildings and to the retrofitting of existing buildings and infrastructure and to 'changing how we use resources and behave within the built environment'. There are many occupations which require training for skill upgrades including:

- Supervisors and managers to ensure efficient use of resources & infrastructure, waste management
- Facilities management and asset maintenance including cleaning operations
- Building & construction trades including bricklaying, carpentry and joinery, wall and floor tiling, plumbing, gas fitting and draining (particularly for grey water, water tanks, solar hot water), painting and decorating
- Civil construction
- Engineering
- Managers
- Road plant workers
- Town planners
- Surveyors

Environmental awareness is required across the workforce at operator, supervisor and manager level and in the community (for the specifiers and end users of building products and services). Significantly, the majority of these occupations are those reliant on VET qualifications for initial training and ongoing skill development.

2.3.2 Transport

Transport contributes 15% of total NSW emissions (NSW Greenhouse Office, 2005). This represents a significant area for potential reduction of greenhouse gases. Most of the emissions come from road transport, including cars, trucks and buses. If left unabated, the latest projections indicate that emissions from the transport sector could rise by 76% between 1990 and 2010 (Australian Greenhouse Office, 2008).

There are particular challenges for the transport industry in Australia. The transport sector operates in a harsh climate, over a large land mass and with a relatively small population. These factors put stress on the reliance of transport to get people to places and goods to market – impacting on fuel consumption and emissions.

A number of initiatives are being developed to reduce emissions from the transport industry. These involve fuel consumption and emission targets, use of alternative fuels (natural gas and liquefied petroleum gas); heavy vehicle technologies that limit energy use; travel demand management; urban transport planning to minimise road use; and transport system software to manage efficient traffic flow.

The technology of diesel engines, fuel and emissions control from transport systems is undergoing rapid change in Australia, with more efficient engines and materials and improved fuel technologies.

Transport is an area where it will be crucial for old jobs to be “greened.” Vehicle maintenance workers and automotive and heavy vehicle mechanics will need to be retrained, for example, to work on the increasing numbers of environmentally-friendly and hybrid vehicles.

Some important skills for a sustainable transport sector include:

- Production skills for the production of alternative fuels
- Mechanical and repair skills for the conversion of fuel systems for alternative fuels
- Updated skills for mechanics in servicing and repair of hybrid vehicles
- Panel repair and painting with new technologies

- Technical skills for the installation, repair and service of motor vehicle technologies in vehicles – for example, energy efficient brake systems in heavy vehicles
- Software development and application skills in transport traffic flow software
- Planning and urban design skills in environmental transport management
- Application of eco-efficient business processes in transport logistics and supply chain management.

The VET sector needs to keep pace with these changes, to ensure that the level of skill and knowledge in the vehicle repair and maintenance industry can support the new technologies.

2.3.3 Manufacturing

The manufacturing sector accounted for \$33 billion (12%) of the NSW economy in 2004-05 and contributes 42% of NSW’s Stationary Energy Emissions based on a breakdown of national figures (NSW Greenhouse Office 2005).

Manufacturing as a production process can make a significant difference in environmental sustainability across a number of industry sectors – by producing eco-friendly products and applying eco-efficient processes in production and through supply chain management.

It is in the manufacturing sector where the concept of eco-efficiency can be most applied and it fits with the application of lean manufacturing. Eco-efficiency is a management practice that promotes environmental and economic performance. By using innovation in production processes and business systems, eco-efficiency in manufacturing can involve:

- doing the same task with less energy or waste
- using the same amount of energy to produce more product
- redefining the task to use less energy or waste.

Cleaner production processes have been applied in the manufacturing sector by:

- minimising waste at its source
- re-using, recycling and reprocessing waste
- reducing the use of raw materials, energy and water

Industry Response

VISY

Visy's approach to greenhouse gas reduction is to be more energy efficient, to operate renewable energy facilities, to divert waste from landfill and recycle more and, where appropriate, pursue offsets. Visy operates a long-term tree-planting program to offset greenhouse gases, with around 12,000 trees already planted by 2007.

BP

The company's efforts to promote a better understanding of climate change and emissions control include developing alternative fuel and lubricant products that enable customers to limit their emissions; minimising their own emissions; and research into technological solutions to curb emissions.

BHP Billiton

The resources giant has introduced emissions quotas throughout its operations, and uses contractual relationships to impose similar expectations on its suppliers, contractors and partners.

Manufacturing Skills Australia (MSA) recognises the need for skills

"As the skills and creativity of our workforce will play an important role in the changing of behaviours and practice, it is imperative for us to view a sustainable operation in a broad sense and look to empower and skill workers at all levels.

Enterprises vary significantly in terms of how they allocate and define the responsibilities of their workforce. Whether they are production workers, trades people, technicians or managers, all have some form of responsibility for sustainability and environmental protection and compliance."

Sustainable Manufacturing: Manufacturing for Sustainability – MSA 2008

- reducing the use of hazardous materials
- introducing or transferring new technology to manage waste and pollution
- applying energy use measurement in the production process to encourage better management of energy
- applying software applications to monitor optimal energy use at different stages of production.

Applying these methods in the manufacturing sector can achieve both economic and environmental outcomes.

Eco-efficiency focuses on performance and cost – re-designing processes and waste streams. While this method can achieve efficient outcomes, the manufacturing sector can also achieve growth in business. Products with extended durability, enhanced material recyclability and reduced material content combined with brand management, complementary services and customer management strategies can support expanded market share and enhanced sustainability.

Skills that are important in supporting an environmentally sustained manufacturing sector include:

- Skills for innovative eco-friendly product design
- Business and system skills to apply cleaner production processes in tandem with lean manufacturing processes, to develop, implement and monitor environmentally sustainable workplace policy and procedures and to identify and minimize environmental hazards
- Technical skills for the installation, operation, maintenance and replacement of technologically eco-enhanced equipment and machinery
- Software skills in the application of IT solutions in the production process
- Skills that raise the awareness of employees in waste minimisation, hazardous waste management and disposal
- Skills in service development and support, product branding and customer management.

As in other sectors, environmental awareness is required not only for particular occupations, but across the workforce at all levels to ensure environmentally sustainable work practices.

2.3.4 Renewable Energy

The development of renewable energy sources has already led to demand for new skills, and this trend will only increase as renewable energy becomes more important within the NSW and Australian economy. The Worldwatch Institute estimates that the global wind power industry, for instance, grew at a rate of 27% in 2007. NSW enjoys some competitive advantages – the Research Institute for sustainable Energy reports that the Sydney-based BP Solar PV manufacturing plant is one of the world's largest, exporting around 52% of its modules. In 2006 the BP Solar-led consortium was awarded \$15 million in Australian Government funding to deliver the Blacktown Solar City project in western Sydney, which will see the installation of over 1MW of solar in the project area over a six-year period.

The development and implementation of renewable energy technologies means that new skills will be needed in installation, repair and maintenance, at production, transfer and consumption points.

The renewable energy sector is adopting a new approach to training. Although a relatively new sector, it is already experiencing an increased demand for skilled workers because it is recognised by governments as important for reducing the national carbon footprint.

For example, in one industry sector, the ElectroComms and Energy-Utilities Industry (EE-Oz) Industry Skills Council now estimates more than 12,000 electricians will need to be re-trained nationally as government incentive schemes drive a rapid rise in installation requirements. TAFE NSW alone in 2007, enrolled in excess of 8,000 students in the electrical trade course, and is therefore well placed to deliver a significantly large proportion of this required retraining.

VET courses are already available in areas such as:

- sustainable energy solutions for energy reduction in domestic premises
- natural refrigeration
- assembly and installation of photovoltaic apparatus in domestic dwellings including grid connections
- installation and problem-solving for wind energy conversion systems and micro-hydro systems.

Risks of Technological Failure – A Skill Solution

Renewable energy technology works, is available, and for a rapidly increasing number of applications is affordable. But if the customer buys the wrong technology for their needs or if the system is not designed, installed and maintained to reliably meet their needs it will be perceived as a failure. The failure of renewable energy systems to live up to users expectations can lead to an ingrained mistrust of renewable energy technologies and diminish their competitiveness in a competitive energy market place. For renewable energy to gain and maintain a substantial and secure foothold in the energy supply market place there is a need for high quality, practical, flexible renewable energy training of engineers, architects, technicians, trades people, builders, salespeople and the users themselves.

Lund et al in WRC (2007)

Other areas requiring skill development include the application and diffusion of wave power and water technologies and the production and conversion for alternative energy sources such as the use of bio-mass from food processing plants.

The depth and breadth of the transformation (of the economy) carry significant implications for human resource requirements. The transformation will be evolving as the economy in general, and the resources sector in particular, is suffering from an acute skills shortage in engineering, management, finance, and a range of trades. Maintaining strong investment in appropriate education and training will be an important element in the success of the transition to a low emissions Australian energy sector.

Garnaut Climate Change Review 2008

2.3.5 Agriculture

According to the Australian Greenhouse Office, greenhouse gas emissions from agricultural production represented approximately 16% of total national emissions in 2006. The agriculture sector is Australia's largest source of methane and nitrous oxide emissions. These emissions stem primarily from:

- Enteric fermentation in livestock (methane)
- Inefficient use of nitrogen in agricultural soils (nitrous oxide)
- The burning of savannas (methane and nitrous oxide)
- Smaller contributions from manure management, rice cultivation and the field burning of agricultural residues.

New land and crop management processes and technologies developed to help reduce emissions will require the development of new skills in the supporting labour base. New cropping and livestock feeding methodologies; new, more environmentally friendly fertilisers; and new, more efficient irrigation systems, for example, will require an upskilling of farming labourers.

Skill needs have been identified particularly in irrigation and water management, such as:

- chemical applications
- water use efficiencies
- organics
- resource management.

Units within training packages are already available in a number of areas such as water quality and environmental monitoring, environmental audit, irrigation related environmental protection and environmentally sustainable work practices.

2.4 Strategies to support sustainability in NSW

NSW has developed a suite of programs and initiatives to help business and communities make significant changes to meet greenhouse reduction targets, conserve water and move towards a more sustainable society.

Innovative programs include those which secure conservation outcomes and biodiversity together with land development, energy and water reduction targets for buildings through building sustainability indices for both domestic and commercial buildings, the NSW Climate Change Fund and the Climate Change Action Plan which focuses on the economic opportunities of climate change, initiatives to assist businesses in water saving practices, management of Government energy efficiency and emissions, standards for renewable energy products in this State, and Sustainability Advantage – a program to ensure that companies manage environmental risk, use resources more efficiently, and integrate environmental strategies with business planning to become employers of choice.

2.4.1 Green Skills NSW

Recognising the critical importance of skills to economic development, the NSW Board of Vocational Education and Training initiated *Green Skills NSW*, a package of measures to be implemented by the Department of Education and Training over the period 2008-2010.

Green Skills NSW includes a range of initiatives for business, workers and training organisations. It focuses on nine industries, based on their level of greenhouse emissions and in some cases water use: manufacturing; electricity, gas and water; construction; agriculture, forestry, fishing and land management; wholesale and retail trade; transport and storage; property and business services; and government administration (especially local government).

Green Skills NSW delivers accredited training for sustainability skills to support industry needs. Funding and projects focus on the needs of job-seekers, trainees and apprentices, and the existing workforce for whom up-skilling and new learning opportunities are required.

It also delivers professional development for training providers to ensure NSW has the capacity to deliver quality sustainability education and training where and when people need it.

Many of the initiatives are well underway. In 2009-10 the NSW Government will finalise new measures to encourage businesses to train their workforce in green skills and to provide substantial support for targeted training to improve energy efficiency in NSW.

The Green Skills NSW Summit, held in Sydney in February 2009 with an invited audience of leaders and experts from business, unions, industry and the environment, examined the skills that are needed to grow the green economy, the challenges in growing those skills and solutions that can address those challenges.

Implementing Green Skills NSW is well underway

The Green Skills NSW Summit in February 2009 gathered ideas from experts in a wide range of fields about how to grow green skills. The Summit examined the challenges and opportunities for growing green skills and looked at what has already been tried and what could be implemented in training agencies and in industry.

Proposals from the summit will be translated into a plan of action by the newly established Green Skills NSW Taskforce. The Taskforce will report back to the Government by June 2009 with a recommended plan of action.

\$20 million over four years will be available for energy Efficiency Training, supporting trades and professional people to gain green skills in areas from plumbing and electrical installations to facilities management and energy auditing.

\$500,000 has been committed over two years for environmental training under the Strategic Skills Program. From 2009, this will train up to 800 workers in the nine priority industries.

NSW is the first to offer workshops in Green Skills in vocational education and training, together with a resource guide for training organisations to deliver environmental training. By October 2008, 60 training organisations had already attended with further workshops scheduled.

Nine 'lighthouse' projects have been funded with industry to demonstrate how 'green' workforce capability can improve environmental outcomes and productivity in critical occupations. By early 2009, 8 new projects had commenced and an initial pilot project was completed.

Together with the Green Workforce Business Guide, a Green Course Finder will make it easy to find suitable training, and help develop the green training market.

TVET graduates will play a crucial part in inventing and implementing practical solutions to sustainability problems such as poverty, environmental degradation and access to safe water and hygienic sanitation. Working as they do at the interface between nature, technology, economy and society, they have a key role to play in helping society respond to environmental and development issues.

*UNESCO International Centre for Technical and Vocational Education and Training,
Orienting TVET for Sustainable Development*

The Summit presented the NSW Government with high level proposals to identify priority actions for the green economy. These proposals will be developed into a plan of action to address the challenges of growing green skills to support the NSW economy.

The body charged with developing this action plan is the newly established Green Skills Task Force, announced at the Summit. The Taskforce, comprising representatives from government, business, training agencies, unions, environmental advocates, academics and young people, will report back to the NSW Government within four months of its establishment on recommended measures to be undertaken by all stakeholders to grow green skills.

At the Green Skills NSW Summit, the NSW Government also announced a further \$20 million over four years for Energy Efficiency Training. This will fund short courses to upskill tradespeople and professionals and will support the NSW Energy Efficiency Strategy. Courses will improve green skills for electricians, energy auditors, green plumbers, local government employees and contractors, building assessors, facility managers and will build teacher capacity to train.

2.4.2 The role of TAFE and other training providers

Enhancing the capacity of vocational training providers to deliver training in skills for sustainability is critical to support sustainable business development.

This is brought about by:

- Professional development programs to keep teaching staff up-to-date on latest environmental practices, technologies, systems and techniques – particularly in the industry sectors where there are high emissions
- Change management programs with teaching staff to instil the important role of environmental sustainability and management across all facets of vocational training – similar to the treatment of employability skills
- The ability to develop centres of expertise through partnerships with research organisations and companies to support design, system and technology solutions and the diffusion of those technologies
- The ability to be able to provide customised skill solutions for leading edge environmentally advanced companies
- The ability to distil what is learnt from leading edge practice into mainstream activities
- Embedding generic environmental management and sustainability practices into teaching materials and industry specific competencies as core (rather than elective) requirements.

As Australia's largest training provider, TAFE NSW plays a crucial role in skills policy to support sustainable business development, while recognising that there are a number of challenges for TAFE nationally.

The WRC report argued that TAFE resources nationally were diffused too widely across too many institutes to develop sustainable, effective training capacity for renewable energy (in NSW resources are spread across ten institutes).

However, since the first edition of *Skills for Sustainability*, changes have occurred. The size of TAFE NSW, its reach and its broad network of skilled teachers mean that TAFE NSW is able to respond to fluctuations in student numbers and meet the training needs for rural and remote students.

Achieving the transition to a low carbon sustainable economy will require a massive mobilisation of skills and training – both to equip new workers and to enable appropriate changes in practices by the three million workers already employed in these key sectors influencing our environmental footprint. Current approaches do not appear sufficient for meeting these challenges.

Growing the Green Collar Economy: Skills and labour challenges in reducing our greenhouse emissions and national environmental footprint – Report to the Dusseldorf Skills Forum

For example, TAFE NSW delivers training flexibly using online technologies, has partnerships with Catchment Management Authorities and a National Environment Centre in the Riverina.

Responding to the need to enhance the professional development that allows TAFE teachers to continue to stay at the forefront of teaching skills for sustainability, TAFE NSW has developed its Education for Sustainability Action Plan 2007-2010. This focuses on environmental education, building partnerships in education for sustainability; improving access to sustainability training, upskilling training providers, educational research and participation in a sustainable future.

TAFE is not the only source of skills, however. Indeed, because much of the sustainability market is emerging rather than widespread, niche training providers, in-house training and industry-designed skills workshops are filling many of the skills gaps.

They drafted an assessment tool of our current workforce, wrote some modules, and geared those modules to how to bring the entire workforce up to scratch. It's two days a week... It's on site which is good for us...A TAFE guy comes out here two days a week to run it.

Wind power manufacturer quoted in WRC (2007)



2.4.3 Training Packages

Because they are developed by industry in response to the training needs of specific industries or industry sectors, national Training Packages will be particularly important in the development of skills for sustainability. As demand for new skills arises in the move towards a carbon-constrained economy, it will be crucial to ensure that training adheres to the kinds of nationally endorsed standards and qualifications developed in a Training Package.

Training Packages are being adapted in line with sustainability requirements. For example Manufacturing Skills Australia stated in its 2008 report on Sustainable Manufacturing that "All of our qualifications will include units of competency that support sustainability and MSA will provide specific advice on how these can best be used."

A comprehensive report has been published by the National Centre for Sustainability on competencies for environmental management and/or sustainability. In addition, a national project managed by the Centre has developed three guideline competency standards for sustainability, which can be taken up by any industry sector. These standards address the need for education and training at the operator, supervisor/front-line manager and senior manager levels.

As of September 2008, customised units based on these standards are available in construction and property services, innovation and business services, the seafood industry, in manufacturing and in electrotechnology.

Units of competence for environmental sustainability across nine industries have been identified in the NSW Green Skills Strategy and funding has been allocated in 2009 and 2010 to increase the delivery of training in these areas in NSW.



3.0 Next steps

The Board of Vocational Education and Training has built on the work that commenced with the first edition of this report in 2007.

The NSW Green Skills Strategy and the TAFE NSW Sustainability Strategy are implementing measures that will build the capability of the NSW workforce to respond to climate change and environmental sustainability. They are practical measures that enhance the capability of the vocational training system.

These initiatives are a kick-start but more can be done to consolidate the skills response to environmental sustainability. There is a need to stimulate business demand for green skills and help business to gain easy access to relevant training. There is an ongoing need to work closely with industry to develop tailored responses and solutions to address workforce sustainability skills.

System barriers in the vocational training system need to be addressed with innovative models of training delivery that overcome the issues of fragmented demand for sustainability skills in emerging sectors.

Finally, dedicated training funds are needed in priority areas to train more people in sustainability skills.

In the next phase of the *Skills for Sustainability* project the BVET will give priority to these issues, and concentrate on projects that model best practice in the development of sustainability skills and enable this knowledge to be shared widely. Specific actions may include:

- Dedicating resources to train more employees, jobseekers and apprentices in green skills
- Encouraging industry and business networks to work with government to address the anticipated skill needs associated with a shift to more sustainable forms of production and consumption

- Ensuring that the knowledge from industry solutions for sustainability skills are integrated back into the formal VET system for wider benefit
- Diffusing the knowledge gained from the research and lighthouse demonstration projects to stakeholders
- Supporting professional development initiatives within the VET sector to enhance the capability of teaching staff to provide sustainability skill solutions.

There is no question that the challenge of sustainability is an economic reality that is already demanding new skills. Sustainability is a new, core literacy that is now being embedded within all aspects of skills policy, not merely tacked on as a small or discardable addition.

All organisations relevant to skills policy – industries, educators, regulators – have a responsibility to ensure that the necessary skills are developed. Lead agencies have an important role in enabling, stimulating and supporting such development. And all such organisations have an obligation to model good policy in skills for sustainability.

Skills policy must also be integrated into forward planning by governments because public programs in themselves can often trigger strong demand for skills.

4 Recommendations

In the past few years, NSW has shown leadership in sustainability skills policy development and implementation, with many of the recommendations in the first edition of Skills for Sustainability 2007 already achieved. The following recommendations build on this base and are designed to position NSW at the forefront of innovation in relation to green skills.

1. **That NSW further enhance its training effort and take-up by business of sustainability skills by:**
 - earmarking additional funding for business vouchers to stimulate training demand
 - developing an implementation plan to deliver sustainability skills training in the energy sector, with priority areas informed by this report.
2. **That NSW support the take-up of careers and jobs in green vocations by:**
 - establishing apprenticeships and traineeships in green skills occupations
 - promoting 'green' apprenticeships and trades to school students
 - ensuring that school-based apprenticeships and other VET in schools courses offered by government schools, including Trade Schools, and non-government schools incorporate sustainability skills;
 - developing diploma, advanced diploma and graduate courses in green trade and professional occupations.
3. **That NSW increase green skills capacity in the vocational education and training system through:**
 - more comprehensive professional development programs for teachers and trainers in public and private registered training organisations
 - supporting new credentials and qualifications for green skills careers, including a Graduate Certificate and Diploma in teaching for sustainability.
 - showcasing best practice in green skills training.
4. **That NSW provide better information on sustainability skills training through:**
 - providing business, especially small and medium business, with easy access to information and support so that they can train their employees in green skills
 - developing a green course finder to make it easier for workers to find suitable training
 - developing information for households to assist them in selecting green tradespeople
5. **That TAFE NSW establish centres of excellence in sustainability practice in key industries**
6. **That NSW raise demand for green skills by:**
 - Incorporating sustainability skill training for apprentices and existing workers within NSW Government capital projects;
 - Ensuring NSW Government apprentices employed through its whole-of-government apprenticeship strategy can access training in the latest sustainability skills – particularly in the energy and water sectors;
 - Locating and constructing school and TAFE facilities based on optimum standards of sustainability.
7. **That the NSW government demonstrate its ongoing leadership in green skills by convening a high-level summit involving industry, training organisations and policy makers to identify additional, specific, whole-of-government actions to extend sustainability skills in the public and private sectors.**
8. **That NSW work to ensure that green skills training is a priority under the Commonwealth Productivity Places Program**
9. **That the NSW Department of Education and Training report annually on the outcomes of all green skills initiatives.**

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6.0 Appendix A:

Climate Change and Global Market Growth

Market Value of Emissions Trading

The World Bank Carbon Finance Unit estimates that the carbon market grew in value to US\$21.5 billion in the first three quarters of 2006, more than doubling in value over 2005. (World Bank Carbon Finance Unit 2006b)

European Union Emission Trading Scheme (EU ETS)

– Established in January 2005 the EU ETS is the world's largest carbon market. Participating countries develop a National Allocation Plan (NAP) that specifies caps on greenhouse gas emissions for facilities such as power plants. To comply with the caps, facilities can either reduce emissions or purchase allowances from other facilities that have an excess allowance. The scheme sets up time periods which will have progressively tightening caps, thus leading to a reduction in emissions over time.

“New Industrial Revolution” – On 10 January 2007 the European Commission announced a series of measures which it hopes will “set the pace for a new global industrial revolution.” The key proposal is a target to cut the EU's greenhouse gas emissions by 20% by 2020 compared with 1990 levels. The Commission stated that the proposal should be pursued unilaterally if there is no international agreement on emission reduction when the Kyoto targets expire in 2012.

Other specific proposals include:

- a 20% target for renewables in the EU's overall energy mix
- an obligation for each member state to have 10% biofuels in their transport fuel mix by 2020
- saving 20% of total primary energy consumption by 2020

- aiming towards “a low CO2 fossil fuel future” with support for ‘clean coal’ technology, using carbon capture and storage deep underground
- developing a European Strategic Energy Technology Plan to focus R&D efforts on low carbon technologies.

US – The world's largest economy is moving closer to large-scale climate change strategies with several bills addressing global climate change and green collar jobs initiatives introduced so far in 2007 and 2008, with more predicted. Energy efficiency remains a strong theme of the Obama administration.

California will set up a state-based emissions trading scheme by 2012. The emissions trading scheme is part of the state's wide-ranging plan to reduce greenhouse gas emissions which includes:

- Targets for significant reductions in greenhouse emissions:
 - Cut emissions to 2000 levels by 2010
 - Cut emissions by 25% reduction by 2020
 - Cut emissions to 80% below 1990 levels by 2050.
- Stringent vehicle emission standards introduced in 2009, to be fully implemented by 2016. (Sydney Morning Herald 2007).

Silicon Valley investment in clean technology – such as solar panels, hybrid cars and the use of nanotechnology to solve environmental problems – jumped from \$34 million in the first quarter of 2006 to \$290 million in the third quarter, according to a report from Joint Venture: Silicon Valley Network. The New York Times quotes the chief executive of SunPower, a solar technology company saying clean technology is “the hottest area of investment right now.” (New York Times 2007)

China – China is working with the United Nations to set up a carbon trading exchange in Beijing, which could position the city as an important centre for the international trade in carbon credits. The exchange would be the first in the developing world and would compete with private sector carbon exchanges in Europe and the US. The UN expects China to account for 41% of all carbon credits issued by the UN in 2012 (Financial Times 2007).

Climate change and energy efficiency were the focus of the first round of talks in January 2007 on an agreement to expand co-operation between the EU and China. The EU wanted to help China reduce its carbon dioxide emissions by offering clean coal and power plant technology.

China plans to more than triple its wind power generation capacity by 2010, becoming the world's largest wind power producer by 2020 and make existing buildings more energy efficient by 2020. In addition, it will also subsidise solar power, bio diesel and ethanol projects.

Germany – In September 2006 the German government presented the results of a research study on employment in the renewable energies sector. The study showed that renewable energies will provide a lasting impetus for exports, economic growth and employment. The positive impact of renewable energies on the job market should outweigh any possible negative trends.

The German Federal Environment Ministry has also highlighted the increasing importance of renewable energies for energy markets and the economy. According to recent data, the share of renewable energies in total electricity consumption in Germany increased to 10.2 percent in 2005, compared with 9.5 percent in the previous year. The renewable energy sector also currently provides 170,000 jobs, a figure that is expected to rise.

7.0 Appendix B:

Expected Impacts on Workforce Skills by Reducing Greenhouse Emissions

Greenhouse Intervention	Expected Skill Impact
<i>Economy-wide/multi-sector energy efficiency</i>	Upgrading or additional audit and engineering consultancy skills
<i>Renewable energy generation (primarily electricity)</i>	Significant increase in number and levels of technical design, assessment and installation skills
<i>Reduced greenhouse intensity of fossil fuel generation</i>	Significant increase likely in gas turbine generation skills. Also significant increase in geo-sequestration system skills (petroleum and chemical engineering) if technology is proven commercially
<i>Residential scale renewable energy</i>	Significant upgrading of existing electrician and plumbing skills required, but limited numbers unless the scale of funding for the measures is increased
<i>Retail appliance and commercial equipment energy efficiency</i>	Specialised skills at design stage but fall within skill range of existing designers. Limited number of manufacturers with design in Australia
<i>Improved residential housing energy/greenhouse performance</i>	Upgrading of design, building and rating skills to meet increasingly stringent requirements
<i>Improved commercial building energy/greenhouse performance</i>	Significant increase in skill levels across all building disciplines but currently low activity
<i>Biofuels (bio-ethanol, biodiesel)</i>	Significant additional chemical engineering skills. Limited number of manufacturers
<i>Fuel efficient vehicle technologies</i>	Significant upgrade of mechanic skills for conversions and CNG buses but low level of activity. Potential increase in new auto-electrical skills with increased hybrid-electric vehicle uptake
<i>Carbon sinks (reforestation)</i>	Low

Source: WRC (2007)

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