Senate Standing Committee on Education, Employment and Workplace Relations

Inquiry into the Effects of Climate Change on Training and Employment Needs

ATN Response

The Australian Technology Network (ATN) welcomes the opportunity to respond to the Senate Inquiry into the effects of climate change on training and employment needs. This submission will address some key issues surrounding the challenges facing the nation in skilling for this emerging and critical area and in so doing, bring to the attention of the Committee a greater understanding of current and future training and employment needs. The ATN as a network notes that individual ATN members may make their own more detailed submissions to the Inquiry.

Executive Summary

- An emissions trading scheme will lead to a new "green economy" giving rise to a "green collar" workforce.
- Employment is set to rise from 2.6 to 3.3 million in the next 20 years but more than 3 million workers will need to be retrained to adapt to the new economy.[1]
- High environmental impact industries such as mining, manufacturing, transport, agriculture and construction will need a workforce skilled in green capability to drive the transformation from "brown" to "green" energy.
- As the government defines its emission's trading scheme, it is imperative that industry work closely with government in preparing for the consequential changes to the labour market.
- Industry has a major role to play in fuelling a "green" education and research agenda and we support the view that Australia can improve its economic performance and secure its future prosperity by skilling a more creative workforce and facilitating more innovation in the Australian economy.
- There exists a primary role for higher education in partnering with government and industry in developing the academic programs and undertaking the research required to ensure a pipeline of skilled graduates capable of delivering a sustainable green economy.

[1] *Growing the green collar economy*, CSIRO (2008)

- There is a fundamental role for higher education institutions in building social, economic, scientific and cultural development in the community. Universities are an integral part of local, regional, national and international networks influencing the political, social, scientific cultural and economic climate. They act as catalysts for positive change and development
- Australia has committed to an education revolution as an investment in Australia's future. Attention to tertiary education is vital because of its role in development of new knowledge, encouragement of innovation and building the capabilities on which professions, services and industries depend.
- There are currently significant skills shortages in many fields, and demographic projections suggest that without major investment and new strategies those skill shortages will be more acute in the coming decade.
- The university sector, through its pivotal knowledge creation role, plays an important and unique role in Australia's innovation system. Not only does it educate the research workforce and produce skilled graduates, but it is also engaged in extensive knowledge transfer and research activity.
- As a nation approaching climate change via the development of an emission's trading scheme, Australia is well placed to assist its neighbours in transforming to this new economic paradigm

Introduction

The Federal Government's decision to move Australia to a carbon constrained economy from 2010 has created an immediate focus for business and industry on the critical issue of emissions management, and in particular the capacity to build urgently needed capability in this new regulatory environment. It is an environment that requires such skills to be available and utilised from day one and it is an environment within which poor skills can have immediate and immense ramifications. It is predicted that the development of this new "green economy" and resultant "green collar" workforce will see employment rise from 2.6 to 3.3 million in the next 20 years. Critically, more than 3 million workers will need to be retrained to adapt to the new economy.[2] Workers in high environmental impact industries such as mining, manufacturing, transport, agriculture and construction are most likely to be effected as these sectors make the transformation from "brown" to "green".

[2] ibid

With almost 20 percent of Australia's student population attending one of the five universities of the ATN, we seek to ensure that the policy debate continues to support higher education in Australia that is relevant in meeting the needs of the nation. Within the context of climate change, the issue is therefore two-fold:

- Ensuring Australia produces world-class researchers who can deliver innovative solutions that address the effects of climate change – locally, nationally and globally.
- Ensuring Australia has the necessary human capital – from the factory floor to the boardroom – to respond flexibly and competitively to a carbon constrained environment.

In this, universities have a primary role; it is core business. However, extending beyond its island state, there too is a role for Australian institutes of higher learning to contribute to the capacity of our Asian-Pacific neighbours in building their economic and environmental sustainability.

The ATN makes the following comments in relation to the Terms of Reference.

1. The ability of universities and other research and training institutions to meet current and future demand for climate change professionals

Meeting the new world demand: Research and research training

In its broadest terms, maintaining the quality of our research must be at the forefront of any consideration to ensure the nation competes at the cutting edge of innovation. There is a seemingly direct relationship between the scale of research and development undertaken as a nation and the scale of innovation. Australia's research agenda must be supported by not only world-class national stock of research infrastructure but critically, a highly skilled research workforce if we are to increase our international competitiveness in key areas of research and innovation.

While striving for innovation and investing significant funds into the innovation system is a worthy goal, there begins to be diminishing returns if the research workforce does not exist to drive that innovation. A key issue for the future of Australia's innovation agenda is that of building our research workforce to meet the challenges of the future. Thus, it is critical that research workforce planning be taken into account when considering our future innovation capacity. Australia's HDR system is one which should be positioned to meet *future national needs* and not be linked to historical measures of performance in discipline areas of diminishing relevance to that future. Research training is a critical element in this context. Australia must have a system which recognises that the future of the PhD in Australia requires greater alignment with the

innovation agenda (industry placements, co- supervision by external partners, extension of the CTS, etc). Innovation and better economic and social outcomes for Australia can only be achieved by building our national intellectual capacity.

The university sector continues to play a significant role as a training ground for researchers. In 2006 there were 49,467 students enrolled in research higher degrees in Australia of which 15% were enrolled at ATN universities. Approximately 50% of ATN PhD students were enrolled in fields of study related to science and engineering. While this is a significantly worthy contribution to addressing climate change, there is an increasingly emerging recognition of the effects of climate change across the whole societal spectrum. Universities must work in conjunction with Government and industry to ensure that PhDs in *all* disciplines and professions receive more effective preparation to undertake the new roles that go with contemporary innovation systems, workplaces, and career paths - including those in academia.

Australian universities face challenges in training, recruiting and retaining high quality research graduates and staff

The single biggest issue confronting the sector over the next decade will be the attraction and retention of quality staff. The issue will be exacerbated by an explosion in worldwide demand for English language academics, the retirement, worldwide, of a whole generation of academics, the low production of Australian postgraduate research students and higher investment by other countries into their tertiary sectors.

No higher education system can operate without the most critical element of all - a skilled workforce. Underpinning our research effort must be the capacity to build our skills base, both in terms of our graduate output and our research training. A key issue for the future of Australia's innovation agenda is that of building academics and a research workforce to meet the challenges of the future. Urgent action is required to renew the nation's academic workforce. Over the next decade it is expected that 40% of the academic workforce will retire. With the average time of 7-10 years required to support researchers through their PhD studies this means that effectively a whole generation of potential academics has been "lost". Compounding the crisis is the high rate of employment of bachelor degree graduates with 85% obtaining fulltime employment (many in their final year of study) and a further 10% engaged in part-time employment[3]. This represents the strongest graduate employment rate since 1990. Additionally, this

[3] GCA GradStats December 2007

strong employment factor has been supported by an increase of 5.4% in the median commencing graduate salary of $43,000 (up from $40,800) for those aged under 25, in the period 2006-2007. Traditionally, post graduate research degrees are favoured by those intending to pursue a career in research and in the context of this report, an academic career within a tertiary institution. Yet, in 2006[4] of those graduates with a PhD or masters by research degree only 38% were cited as employed in academic or research institutions. More significantly is the downward trend from 2005 where 42.6% of graduates were employed in higher education. Thus, the competition for PhD graduates, coupled with the ageing workforce is a significant barrier in the capacity for universities to adequately produce the highly skilled research workforce in the numbers required to compete in a knowledge intensive global economy.

Attention must be given to the expansion of our research base from undergraduate to trained researcher. There is currently a lack of interest in key disciplines for the innovation sector at a secondary school level. Physics, mathematics and chemistry, the traditional precursors for science and engineering studies at a university level, are suffering negative perceptions within schools and this affects their uptake by undergraduate students. Increasing the flow of students into SET courses within universities will be crucial if Australia is to build its research capacity for the future **as well as** its workforce for the future.

In Australia, individual universities and networks are all struggling with these issues and attempting to address them. The ATN, for example, is currently trying to change the perception of careers in the sciences/engineering and examining alternate pathways into these degrees. We have also developed the ATN Graduate Certificate in Commercialisation to assist those who see research as a profession.
However major attention at a national level needs to be focused to address these issues, as they are systemic and can only be addressed in a relatively minor way by individual institutions. This current lack of demand, combined with the ageing workforce within universities, has the potential to create significant shortages in many fields.

Postgraduate students are not only active participants in today's research, but they also constitute the next generation of researchers necessary to build Australia's research and innovation capacity both inside and outside the higher education system. The ATN believes that the current financial support is not adequate to attract and retain the number of postgraduate students that will be required to deliver the nation's innovation agenda, and recommends that the Government **increase the postgraduate stipend from**

[4] GCA Postgraduate Destinations Survey 2006

$19,616 to a minimum of $25,000 per year. Further, we recommend a rationalisation of government policy that addresses the disadvantage PhD students currently operate under by **removing the assessment of part-time APA Scholarships as assessable income for both PAYE and recipients of income support under the Social Securities Act**.

The potential impact on PhD students' completion times also needs to be addressed at Government level, leading to

- Extension of the duration of all Commonwealth-funded HDR scholarships by 6 months, including those funded through ARC, NHMRC and all other national funding agencies or programs
- Scholarship supplement increased in line with this extension.

University-Industry partnerships

Industry also has a major role to play in fuelling our education, research and innovation agenda and this applies to climate change. We support the view that Australia can improve its economic performance and secure its future prosperity by skilling a more creative workforce and facilitating more innovation in the Australian economy.

In 2007, the number of PhD/Doctorate enrolments across the ATN was 5,546. The majority of these (almost half) were in the field of Engineering, Science and Computing. A significant proportion was also in the area of Humanities, Education and Social Sciences. In its 2007 position paper, ***Skill Build-Nation Build – an Industry Connected Support Programme for Australia's PhD Students*** the ATN proposes an industry-supported PhD Placement programme to ensure that, by working in partnership with industry, we can enhance Australian research capability in areas of national priority, such as climate change, and enhance the 'connectivity' between industry and university research via research students.

The key elements of the proposal are outlined below:

- To enhance industry R&D by boosting the number of PhD educated personnel in the Australian economy employed by industry.
- To enhance the 'connectivity' between industry/enterprises and university research by employment of recently graduated PhDs
- 50:50 co-investment between government and enterprise for employment of recently graduated PhD candidates as 'innovation catalysts'

- The government component is linked to the award of a postgraduate scholarship but must be expended for the purpose of facilitating the transfer of the PhD candidates into enterprises as 'innovation catalysts'
- Evaluation of whether enterprises gain value from employment of innovation catalysts and hence will commit to longer term employment of candidates with a view to enhance innovative capacity and expenditure on R&D in the long term

A PhD Placement programme such as the one outlined will enhance employment of PhDs in business and lead to increased innovative capacity and R&D investment in Australian firms. In turn Australian firms will become more competitive through the delivery of advanced and competitive products while more students will be attracted to PhD studies because of better career prospects.

Meeting the new world demand: academic programs for a skilled workforce

Governments (local, state and Federal) have a role in fostering adaptation strategies to climate change to ensure that society, and in particular, vulnerable communities can make the transition to a carbon constrained environment.

> *"Adaptation means taking action to reduce the negative consequences of climate change and to take advantage of any opportunities climate change presents."*[5]

Universities are an able partner in assisting with that adaptation to a sustainable green economy. However, in the context of meeting market needs, forecasting the demand for labour (and consequent education requirements) beyond a few years into the future, is extremely difficult. At the same time, the effects of climate change are requiring that businesses undergo significant change responding to new technology, governmental policy, competitive environments and consumer preferences and need a workforce that is equally responsive. In addition, in an economy that is enjoying unprecedented low levels of unemployment, we are seeing high levels of mobility by workers. More than ever the environment is one that sees employees moving in and out of occupations, learning new skills and demanding greater flexibility in working conditions. There no longer exists a simple direct relationship between education and a single lifetime occupation. Many have qualifications that they do not utilise in their current job, hence the rise of the 'portfolio' worker.

[5] *A Climate of Opportunity*. Discussion paper from the Victorian Climate Change Summit 2008

Further, in predicting future educational requirements for a productive workforce the current strong labour market allows the focus to turn to what people *want* to study, (rather than what future employers are anticipated to need) based on where the future job opportunities lie. While these factors present challenges for development of a skilled green economy, they also present opportunities across the workforce for new careers as green collar workers.

ATN universities have an established reputation in linking with industry to ensure that academic programs are relevant to those required in contemporary society. For example, the five universities in responding to feedback from the energy sector are collaborating to develop a Graduate Certificate in Carbon Management that will equip managers and senior staff to competitively sustain their operations in a carbon regulated environment. Building on established curriculum existing within the Network's universities and in preparation for implementation of the government's emissions trading scheme, this will be Australia's first and largest nationally delivered mid-career professional development program in this field, and one that can be easily adapted to a range of businesses.

2. Measures to assist understanding climate change in the Asia-Pacific region, including provision of training and skills assistance.

Climate change remains the biggest long-term threat to Pacific nations**.** The 2007 International Panel on Climate Change assessment highlighted their special vulnerability to climate change, with changing rainfall patterns, increases in temperature, the potential for an increase in extreme weather events, and, most worryingly in the longer term, rising sea levels. Pacific island leaders—through the Pacific Islands Framework for Action on Climate Change—have identified the need to adapt to avoid the worst impacts citing that training and resettling of affected communities may be required.[6]

By ratifying the Kyoto Protocol in 2007, the Federal government demonstrated its commitment to fully supporting international efforts to address the issue of climate change and its effects on regional economies. To this end the government's new Adaptation to Climate Change initiative will invest $150 million over three years, to meet high priority climate adaptation needs in vulnerable countries. Within

[6] *Pacific economic survey: connecting the region*, Australian Agency for International Development (AusAID) Canberra, March 2008

the AusAid programme, the primary geographic emphasis of the Initiative will be our near neighbours of the Pacific Island Countries and East Timor with the aim of improving the Asia-Pacific region's capacity for responding to the effects of climate change. Also within the AusAid program under the Education theme is the government's commitment to improving the region's vocational and technical training. With the obviously strong connect between both themes, the ATN sees a core role for the Australian higher education sector in contributing to the effectiveness of the AusAid program thereby strengthening the region's capacity to meet the challenges of climate change.

Conclusion

Building workforce capacity to support the new green economy remains a challenge for the entire population, across all sectors, and no less within the tertiary sector.

Australian higher education brings significant economic, social and cultural benefits to the Australian community. Higher education is at the core of who we are and what we can become. With a commitment to providing high quality professional and vocational education, research oriented towards the needs of industry and the community, and a genuine focus on international education, the Australian Technology Network (ATN) of universities is a major partner in delivering those benefits.

We will continue to work in partnership with government and industry to increase the skills base of our workforce, believing that innovation and better economic and social outcomes can only be achieved by building our intellectual capacity and a focus on the relevant education of our people.

A strong commitment for the next decade is required from all stakeholders – government, industry the professions and universities – to build that capacity in adapting to a carbon constrained economy.

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