To: Committee Secretary
Senate Education, Employment and
Workplace Relations Committee
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Dear Committee Secretary,

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

Climate change is an inevitability that renewable energy is tied to. Recent historic events of climate change have made fossil fuels the major drivers for renewable energy are. The American Council of Renewable Energy states that, "the Earth faces severe challenges of environmental degradation and global warming related to our energy supply and demand". Thus a major strategy available for Australia to reduce the impact of climate change and fossil fuels is renewable energy. Reducing our dependence on fossil fuels through the renewable energy industry has major implications for government policy.

It is estimated in 2007 that world-wide investment in the renewable energy industry was US$71 billion (excluding large scale hydro) with 47 percent was in wind power and 30 percent in solar photovoltaic. Investment in large scale hydro was estimated to be a further US$20 billion (REN21 Renewables 2007 Global Status Report). Over the past three years US$300 billion has been invested in renewable energy, by 2030 it is estimated that US$10 trillion for the conversion of the world's energy industry for a low-carbon future (New Energy Futures 2008).

The renewable energy industry requires a highly skilled group of technology and business professionals. These professionals need to be developed across a range of technologies that exist, are emerging and are in the future. These technologies are in wind power, micro, small and large hydro, tidal power, battery technology and other energy storage devices, renewable fuels, wave energy, geo exchange, energy conservation, solar thermal electric, photovoltaic, landfill gas, all electric vehicles, biomass, geothermal electric, municipal solid waste, and ocean thermal. A recent renewable energy survey of position difficult to fill were in Chief Operating Officer, Senior Project Manager, Chief Executive Officer and Senior Technical Officer.

Rapid change with climate change and overly expensive and declining fossil fuels requires urgent attention to renewable energy qualifications in high schools, TAFE Colleges and Universities across Australia.

The types of specialist areas for renewable energy industry include policy makers and analysts, engineers, applied and theoretical researchers, product developers, technology transfer, manufactures, regulators, entrepreneurs, managers, financers, installers and maintainers. For example Policy Recommendations for Renewable Energies 2004 from the International Conference on Renewable Energies, Bonn argued that masters and Ph.D. programmes are needed to bring forward the skilled people needed for the design, construction, and communicating the benefits of renewables (p. 19).

Educational institutions in Australia to be able to meet the rapid changes of climate change and declining dependence on fossil fuels requires an urgent undertaking in major shifts in institutional practices.

The urgent undertaking needs to address the lack of multi-discipline practices of Australian Universities in renewable energy. For instance the institutional practices of Australian Universities of creating inward looking discipline silos. These discipline silos are based more on Feudal fiefdoms than outward looking, highly networked and applied endeavors. Australian Universities requires a major cultural shift in our higher education intuitions. New organizational practices in Australian Universities are required to deliver multi-disciplinary programs in renewable energy. The types of disciplines that need to

participate in the renewable energy industry include engineering, science, law, business, public policy and other fields. Specifically urgent funding is required for the development of curricula and resources for multi-disciplinary education. Along with funding to develop multi-disciplinary education and research centers for renewable energy industry. Increase the funding for higher-education based research and development on renewable energy technology in theoretical, applied and production research and development.

Vital action is required at the national level for analysis of current and future demand and supply of qualifications in renewable energy. For example, a current geographic analysis of Australia for qualifications in renewable energy finds a range of certificates, diplomas, degrees and post-graduate qualifications. These qualifications are in different types of renewable energy technologies. There currently exists a lack of consistency of offerings across Australia. For instance a professional requiring a degree or post-graduate qualification in Northern NSW or SE Queensland would find little or no offering in this region. While other capital cities like Melbourne, Adelaide and Perth have a range of different types of University technology qualifications in renewable energy. In contrast Queensland TAFE is the national leader Advanced Diploma of Renewable Energy is Braken Ridge as this is offered externally.

A critical task is required for national standards for the renewable energy technology training, installation and maintenance. That is currently well addressed in the Trades for photovoltaic installations but is lacking at the University level. For example the Australian Business Council of Sustainable Energy is the accreditation body for photovoltaic installations this role needs to be broadened to all renewable energy technology and Australian Universities offering degrees in renewable energy technology.

A significant enterprise is required for closer working relationship between industry, government and the Australian education sector in the form of public-private partnerships. This network would also address issues relating the research and development alliances, technology transfer, professional development, education and training, promoting renewable energy technologies and informing government policy on the renewable energy industry status and future trends.

A vital activity is required to promote renewable energy as an industry. This promotion needs to target investors, as a career in the professions and trades and for business opportunities in the technology and its application. Investors need to invest in large power generation for base load generation but also for small scale generation at the regional and community levels.

Urgent attention is required in the exporting education, expertise, project implantation and products in renewable energy in developing countries like India and China. These nations will soon be at the top of the list of carbon emitting nations.

This is an overview of the critical activities required for Australia to remain internationally competitive in the renewable energy industry and to be able to address the urgent issues in climate change. The committee is most welcome to contact me for future discussions on these issues.

Yours sincerely

Michael Christie, Phd