Renewable energy to tackle climate change

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Australia has a proud record of leadership in renewable energy technology development and has an excess of renewable energy resources to provide for its own needs. A mixture of solar, hot rock geothermal, wind, wave, tidal, waste biomass sources is easily enough to provide for us, although some further developments are necessary and rapid ramping up of capacity is a serious challenge that increases as it is delayed.

Australia has excelled in the development of technologies for thermosyphon domestic solar water heaters from CSIRO; silicon photovoltaic devices (buried contact solar cell from UNSW; crystalline silicon on glass from UNSW and Pacific Solar; Sliver© solar cell from ANU; semiconductor fingers solar cell from UNSW; laser doped front contact solar cell from UNSW; inkjet printing for solar cells from UNSW; 'Pluto' solar cells from UNSW and Suntech Power); photovoltaic systems design methods from Telecom/Telstra; solar thermal evacuated tube collectors from Sydney University; parabolic dish solar concentrators from ANU; linear parabolic trough solar concentrators from Sydney University; compact Fresnel lens solar thermal concentrators from Sydney University and Solar Heat and Power; photovoltaic concentrators from Solar Systems; wave power turbines from Energetech; wind farm development (Roaring Forties); hot rock geothermal development by multiple institutions; and specialist engineering education at UNSW.

However, this country has not yet taken full advantage of its technical leadership opportunities through implementation of large scale manufacture of renewable energy equipment and nor has it seriously applied renewables in its energy networks. The main reason for the latter situation is probably the difficulty in competing, financially, with suppliers of fossil fuel based energy sources.

On the other hand, Australian renewable energy technology researchers and producers are increasingly interacting positively and having an impact in the world though receptive organisations beyond our borders. Examples include the significant involvement of Roaring Forties in the dramatic expansion of wind farm installations in mainland China, the commercialisation of solar thermal electricity generation by Ausra in California, the contribution of UNSW alumni to technical leadership of the global photovoltaics industry, healthy exports of thermosyphon solar water heaters, manufacture of UNSW-derived photovoltaic technologies in Spain, Germany and mainland China. In addition, UNSW has recently signed important research collaboration and IP agreements with companies in mainland China, Taiwan and Korea and education interactions with four leading Chinese universities.

Energy research at UNSW is being strengthened, integrated, focussed and made more interdisciplinary in the new Centre for Energy Research and Policy Analysis. Major research areas in renewable energy will include photovoltaics, wind, solar thermal and solar hydrogen, biofuels and geothermal hot rock energy. In addition, the centre includes research on carbon capture and storage, distributed energy systems and energy policy, markets and legal frameworks.

Overall, the future for UNSW and Australian research looks promising. For example, the Federal government has offered $100 MM for a new Australian Solar Institute plus $50 MM for general clean energy research and development, including energy efficiency, energy storage technologies and hydrogen transport fuels. Significant additional support has been offered for hot rock energy development.

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