

## **Does coal-fired electricity have a future?**

Mark Diesendorf

Coal-fired electricity may have little or no economic future in Australia, even if carbon capture and storage (CCS) becomes commercially available, a new analysis has found. CCS involves capturing the CO<sub>2</sub> emitted by fossil-fuelled power stations, compressing and transporting it by pipeline, and burying it in repositories deep underground.

UNSW researchers modelled [<http://www.ies.unsw.edu.au/about-us/news-activities/2013/08/does-coal-have-future>] a range of fossil fuel scenarios with CCS, and then compared their costs with that of the 100 per cent renewable electricity scenario based on commercially available wind, solar and biomass technologies and previously published [<http://www.ies.unsw.edu.au/our-research/simulation-modeling-100-renewable-energy-australian-national-electricity-market>] by the UNSW team.

The UNSW research group comprises Ben Elliston, a PhD candidate in the School of Electrical Engineering and Telecommunications, and his supervisors – Associate Professor Iain MacGill, of the Centre for Energy and Environmental Markets, and Associate Professor Mark Diesendorf, of the Institute of Environmental Studies.

The researchers used hourly electricity demand and solar and wind data from 2010 to determine the appropriate technology mixes for each scenario that would balance electricity demand and supply to achieve the same reliability as the existing Australian National Electricity Market.

Government estimates of the prices for different generation technologies and fuels in 2030 were used in the analysis, along with a wide range of possible future carbon prices from zero to \$140 per tonne of CO<sub>2</sub>, and carbon capture and storage prices.

The results show that coal with CCS scenarios are likely to struggle to compete economically with 100 per cent renewable electricity in a climate-constrained world, even if CCS is commercialized by 2030. While CCS might become economically competitive in a few rare circumstances – such as for power stations located near potential CO<sub>2</sub> repositories in southern Victoria at a time when the carbon price is low – the majority of Australia's coal-fired power stations are in New South Wales and Queensland, a long way from storage sites. These would have great difficulty in competing economically with 100 per cent renewable electricity.

Even in the unlikely event that the carbon price were to be zero in 2030, electricity generated from coal with CCS would at best be equal in cost to the 100 per cent renewable energy scenario, assuming an average transportation distance for the CO<sub>2</sub>. However, if there were no carbon price, there would be no incentive for bringing CCS to commercial maturity in the first place. Because the onward march of global climate change cannot be slowed by the election of a Coalition government in Australia, it seems likely that by 2030 the climate situation would be desperate and most countries would have a high carbon price.

In summary, the UNSW modelling suggests that, in a future CO<sub>2</sub>-constrained Australia, there would be little role for a domestic coal-fired electricity industry, with or without CCS.

The researchers also compared gas-fired power stations using CCS against 100 per cent renewable electricity. While this gas generation scenario could potentially be competitive at *current* gas prices, the study showed this would not be the case if domestic gas prices reached export parity. Currently gas prices are increasing substantially as more and more gas from eastern Australia is exported.

How can we understand these results when only a few years ago many governments and fossil-fuel industries were claiming that CCS technology would be one of the best options for mitigating emissions from electricity generation?

In practice CCS technology has turned out to be more complicated and expensive than initially appreciated. While some small pilot plants have been built, large-scale CCS systems for electricity generation still haven't been demonstrated and appear to be years – likely decades – from possible commercial deployment. Meanwhile, renewable energy technologies have been advancing rapidly, both within the Australian electricity industry, and globally.

The UNSW research confirms that policies to pursue very high penetrations of renewable electricity, based on commercially available technologies, offer a reliable, affordable and low risk way to dramatically cut emissions in the electricity sector. There is no need to invest in new, expensive, unproven, high-risk, fossil fuel technologies.

What does the change of federal government mean for Australia's renewable energy future? The Coalition's policies include:

- removing the carbon price, which would have been very small post-July 2014 if Labor had been returned to government;
- holding yet another enquiry (the twentieth!) into wind farms, presumably to give more air to the unsubstantiated claims of a 'wind turbine syndrome';

- announcing another enquiry into the Renewable Energy Target, which is further discouraging potential investors into wind farms and large solar power stations;
- terminating the Clean Energy Finance Corporation that is providing venture capital to assist the transition of some renewable energy technologies from the demonstration stage to the early diffusion stage of technological maturity; and
- cutting funding to the Australian Renewable Energy Agency which provides research and development grants.

It is difficult to avoid the interpretation that these five policies taken together amount to a deliberate strategy to stop the further dissemination of renewable energy in Australia. However, while this strategy will slow down investment and associated job creation, especially for wind farms and large-scale solar power stations, it cannot stop it. The price of solar photovoltaic modules continues to decline and the market continues to expand. Contrary to the claims of the deniers of climate science, global climate change is continuing and its impacts will become more and more serious. The growing social movement for renewable energy has already successfully opposed three Australian state governments that attempted to penalise households with solar electricity. Soon people power will give the Australian and US federal governments no choice but to take rapid, effective climate action, whichever party is in power.