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The Political Economy of Renewable Energy Generation in Australia

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Abstract

As concerns about climate change escalate (IPCC, 2013), and the need for caution over management of natural resource scarcity and energy security becomes more evident, it is increasingly apparent that renewable energy generation must be utilised to a far greater extent if well-being is to be enhanced within planetary boundaries. It is not surprising, therefore, that questions are starting to emerge around how this sustainable future might be realised, and what roles and responsibilities must be taken by various actors within the political economy to provide the most effective means of managing this transition. This paper makes the case for energy resilience; one focusing not solely on the capacity to absorb shocks, but on the capacity for re-organisation, and for innovation and development.

Keywords

renewable energy; climate change; political economy; energy resilience

The Taxonomy of Climate Change

At a press briefing in February 2002, the United States Secretary of Defense, Donald Rumsfeld, uttered the following words that earned him the 2003 ‘Foot in Mouth Award’ presented each year by the Plain English Campaign for a baffling comment made by a public figure:

> Reports that say that something hasn't happened are always interesting to me, because as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say, we know there are some things we do not know. But there are also unknown unknowns; the ones we don't know we don't know.

Coming at the height of the controversy surrounding weapons of mass destruction (WMD) in Iraq (or lack thereof), Rumsfeld was roundly criticised for this seeming abuse of the English language, and what was deemed to be deliberate obfuscation of the facts. Whether his choice of words was motivated by political expediency or not, this style of communication is not likely to win many admirers among the media or the general public at large. As a taxonomy for categorising information, however, it is quite serviceable, especially when contemplating the knowns and unknowns about climate change.

Anthropogenic Global Warming: A Known Known

While the climate science community has been quite resolute in its stance that global warming has been accentuated by human activity in the post-industrial era – the so-called Anthropocene – one could be forgiven for thinking that the jury is still out given the way this subject is presented in the popular media. The notion that there is some controversy over human-induced climate change flies in the face of the received wisdom. Indeed, a number of academic surveys of climate scientists and the scientific literature have consistently shown there to be a resoundingly large consensus on the existence of anthropogenic global warming (AGW) including, for example, Anderegg *et al.* (2010), Doran and Zimmerman (2009), and Oreskes (2004), all of whom cite figures in excess of 95 per cent. More recently, Cook *et al.* (2013) surveyed the abstracts of 11994 scientific papers between 1991-2011 – the largest peer-reviewed study to date – and of those who stated a position on the causation of global warming (around one third), more than 97 per cent endorsed the view that humans are to blame.

In Rumsfeldian terms, AGW is a known known. Some might continue to claim that it is a known unknown, but when there is such a resounding majority of scientists in agreement, any rational and objective observer would consider this position untenable. Indeed, in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, there is 95% confidence that human-emitted greenhouse gases are responsible for climate change (IPCC, 2013). This is the same level of certainty that scientists have about cigarettes causing cancer. Who, for example, on being advised by a medical professional that they have cancer, would get 94 more opinions, all of which confirm this diagnosis, only to accept the opinion of the 96th doctor who advises that they are perfectly healthy?

Far too much time has been wasted debating the existence of human-induced climate change, to the point where urgent action is now required. To continue to deny AGW would be to identify with a fourth category not acknowledged by Rumsfeld; *viz.* the unknown known, that which we intentionally refuse to acknowledge that we know (Žižek, 2004).

The Carbon Budget: A Known Known

Perhaps the most significant known known to emerge in recent years is the carbon budget. Commencing with the work of Meinshausen *et al.* (2009), it was determined that in order to limit global warming to 2°C above pre-industrial levels – the agreement adopted at the United Nations Climate Change Conference in Cancun, Mexico, in 2010 – then the global carbon budget for 2000-2050 must not exceed 886Gt of CO_2 if the chances of going over 2°C were to be reduced to 20% (see Figure 1, reproduced from reneweconomy.com). However, deducting emissions from the first decade of this century leaves a budget of only 565Gt of CO_2.

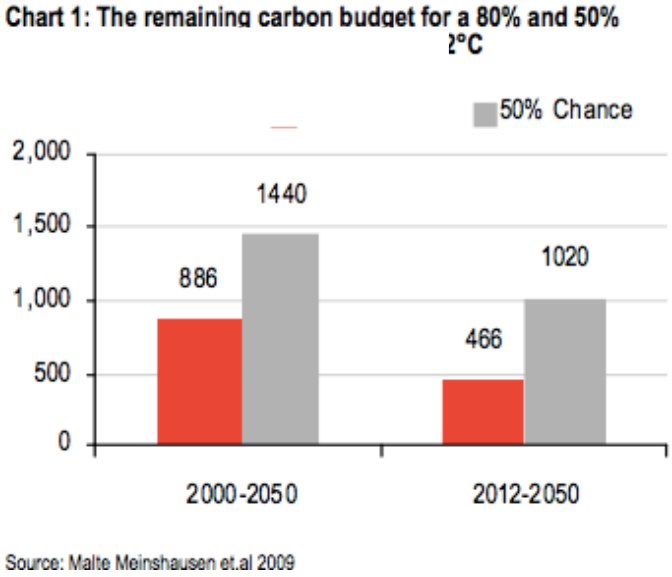

Figure 1. The remaining carbon budget for an 80% and 50% probability of keeping warming to below 2C

Campanale and Leggett (2011) took this analysis a step further when they calculated that the declared reserves of fossil fuel companies around the world are equivalent to 2795Gt of CO_2. What this means, as Bill McKibben pointed out in his now famous article in *Rolling Stone* magazine, is that fossil fuel companies have five times more carbon in their reserves than even the most conservative governments think would be safe to burn (McKibben, 2012). Put simply, to stay within 2°C warming, 80 per cent of fossil fuel reserves cannot be used.

One of the most significant things about this turn of events is that no one is disagreeing with Meinshausen and his colleagues. Published in *Nature*, one of the most respected scientific journals, the paper is in the top 0.1% of cited environmental papers in the world, and its results are widely accepted by the scientific community. Most telling of all is the complete silence from the fossil fuel industry.

The financial community, on the other hand, has not been so quiet. The HSBC bank in London has warned of the 'bursting of the carbon bubble' that could nearly halve the value of coal assets on the London exchange, and reduce the value of oil and

gas companies by three-fifths. In Australia, John Hewson, the former leader of the Liberal Party, has launched the Asset Owners Disclosure Project (AODP), and has pointed out that the average pension fund invests about 55 per cent of its portfolio in high-carbon intensive industries and only 2 per cent in their low carbon counterparts, meaning they are ill-equipped to manage the risk of catastrophic climate change going forward (Green, 2013). Lending support to his argument, a group of 70 global investors in the United States and Europe managing more than US$3 trillion of collective assets has launched a coordinated effort to cajole 45 of the world's top fossil fuel and energy companies to assess the financial risks that climate change poses to their business plans.

This represents a watershed in the policy debate about climate change because the environmental movement has found important allies within the mainstream. Aside from the investment community, even those closely connected with the fossil fuel industry are speaking out. A former chairman of the Australian Coal Association, Ian Dunlop, has accused the fossil fuel industry of 'stuffing up' effective action on climate change, and has argued that there needs to be an urgent transition away from carbon-intensive fuels (Milman, 2013).

In May 2013, a grim milestone was reached when, for the first time in at least 800,000 years, atmospheric concentrations of CO_2 reached 400 parts per million (ppm) (Gillis, 2013). Bill McKibben and 350.org campaign for what they consider the safer option of 350ppm. The governments signing up to the Cancun Agreement have accepted a limit of 450ppm which according to Meinshausen *et al.* (2009), provides only a 50% chance of climate stabilisation at 2^oC warming.

Acknowledging known knowns on climate change seems to present a problem for some governments around the world, not least the recently elected Coalition government in Australia whose leader, Tony Abbott, once dismissed climate change as 'absolute crap'. Mr Abbott has softened his position since but the early signs are that the new government will wind back many of the initiatives taken by the previous government to combat climate change.

While this may be worrying for some, the weight of evidence will inevitably prove too overwhelming even for the most recalcitrant of governments, and when this happens, market forces will take over. Indeed, there are signs this is happening already. Analysis from research firm Bloomberg New Energy Finance (BNEF) has concluded that electricity from unsubsidised renewable energy is already cheaper than electricity from new-build fossil fuel-fired power stations in Australia. As Figure 2, illustrates the price of photovoltaic cells has dropped dramatically. Companies such as Ratch Australia, which owns coal, gas and wind projects, has indicated that the cost of new build solar PV is already around $120-$150/MWh and falling at such a rate that it is considering replacing its ageing coal-fired Collinsville power station with solar PV. Wind power, meanwhile, according to modelling from BNEF, is already significantly cheaper than fossil fuel generated power, with new wind farms

supplying electricity at a cost of $80/MWh, compared with $116/MWh for new build gas-fired generation and $143/MWh for new build coal-fired plant. Removing the carbon tax closes the margin, but wind still remains 14% cheaper.

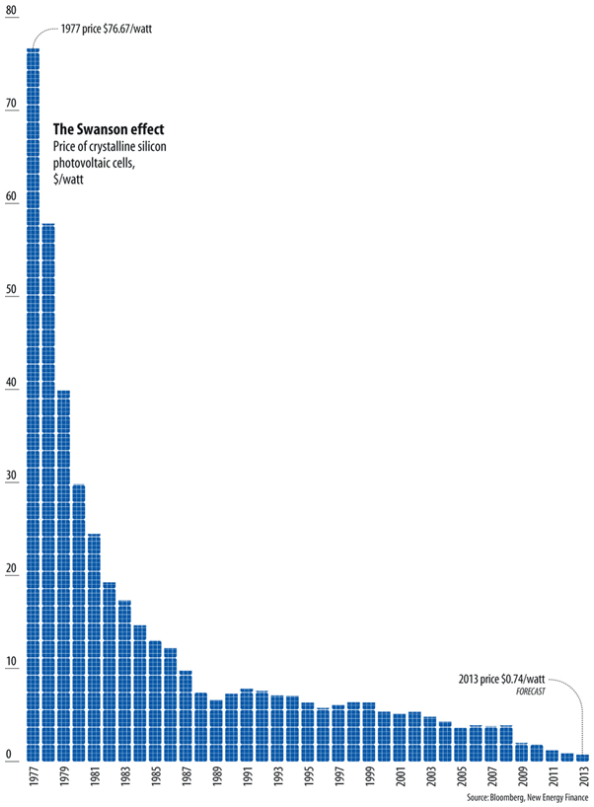

Figure 2. Alternative energy will no longer be an alternative, Source: *The Economist*, 21 November 2012

In the United States, companies are going a step further, and actually unplugging from the grid to generate their own power. Writing in *The Wall Street Journal*, Smith & Sweet (2013) reports that the number of electricity-generation units at commercial and industrial sites has more than quadrupled since 2006, from around 10,000 to 40,000. The falling price of solar panels is one factor, but so is the fear of power outages because of the increasing frequency of major storms. The chief executive of American Electric Power (AEP), a large Ohio-based utility, is quoted and not wanting to end up as “a caretaker of a museum”, and AEP is getting in on the business of helping customers install their own generating facilities. On-site generation still accounts for less than 5 per cent of total US electricity production but some of the companies are close to the point where they will have ‘grid parity’, where power would be as cheap to make as to buy from a utility.

Australia’s Clean Energy Future

In the Australian context, public policy to encourage the uptake of renewable energy is obviously highly desirable given the dwindling carbon budget, and the Clean Energy Future (CEF) package introduced in November 2011 was a step in the right

direction in this regard. The CEF plan outlined a set of measures designed to reduce Australia's green house gas (GHG), and to encourage the development of a more sustainable energy sector. The central components of this package included introducing a price on carbon dioxide emissions, encouraging energy efficiency, creating opportunities in the land sector to reduce GHG emissions, and promoting innovation and investment in renewable energy. This package was widely viewed as representing an opportunity for a fundamental transition towards a low carbon economy, most notably in the electricity industry (Commonwealth of Australia, 2011).

With the election of the Coalition government in September 2013, elements of the CEF are in the process of being dismantled including the Clean Energy Finance Corporation and, in all likelihood, the price on carbon. The new government's plan is Direct Action which, to date, has not won too many plaudits from economists who typically favour market-based instruments to induce behaviour change. Instead, Direct Action uses taxpayer funds to pay polluters to start reducing emissions and to finance other initiatives such as forestry, carbon capture, and recycling. This kind of government interventionism has not been in vogue – particularly on the conservative side of politics – for quite some time as free market economics has been the dominant ideology.

It remains to be seen, however, just how interventionist the government is prepared to be. If the transition to renewables does not progress quickly enough for Australia to stand by its international commitments to restrict global warming to 2^0C, will the Direct Action policy become more command-and-control and force fossil fuel energy generators to limit their emissions? This, for the time being, is a known unknown.

Issues relating to climate change policy are typically 'wicked problems' (Rittel & Webber, 1973) in that they are commonly multi-dimensional and an effort to solve one component of the problem can cause other problems to arise. Thus, in acknowledging the intractability and ubiquity of the problem, those charged with solving them can be prompted to change their approaches. This phenomenon has been observed in a recent case study analysis of the CEF package (Williams, 2013).

In this study it is suggested that if there is to be an expansion of renewable energy beyond some minimum threshold, further efforts are required to focus on the existing barriers that are institutional and socio-cultural in nature. In the words of the IPCC, 'barrier removal includes correcting market failures directly or reducing the transactions costs in the public and private sectors by, for example, improving institutional capacity, reducing risk and uncertainty, facilitating market transactions, and enforcing regulatory policies' (IPCC, 2007: 77). Few advocates of the CEF package would disagree with this, but while efforts to remove the aforementioned barriers would likely make CEF more effective in the expansion of renewable energy, in keeping with the nature of wicked problems, the scope of the CEF plan in 2011 was not as broad as it needs to be in 2013. In the intervening period, the consensus among climate scientists has grown stronger, and the nature of the problem has

become more quantifiable in that the issue of the carbon budget now demands inclusion in the policy debate as data analysis has become more refined.

Discussion of how subsequent policies might be designed to remove barriers limiting the effectiveness of renewable energy initiatives in the future must therefore not just focus on the barriers themselves, but how quickly these barriers can be removed in order to meet a renewable energy target (RET) consistent with a carbon budget that meets Australia's international obligations of managing climate change. In short, Williams (2013) suggests that if global warming is to be contained there is a need for business to function within a safe operating space of a two-degree pathway.

A Future for Renewable Energy Generation

Future policy design however, also needs to consider another known unknown; the question of what the future energy mix will look like. Current trends indicate that although we come from an inflexible energy past, we are now moving towards a flexible energy future. This sentiment lends support to the position that policy responses need to adopt a more adaptive approach, consistent with a carbon budget that meets Australia's international obligations of managing climate change. In this respect, there would appear to be a strong case for building flexibility into the structures and processes of institutions (Folke *et al.*, 2005).

In keeping with an adaptive approach to energy governance, it would be prudent to maintain an energy portfolio that is resilient and naturally equipped to adapt to shocks. Most asset portfolios are subject to fairly high degrees of uncertainty, yet businesses have developed strategies to maximise the benefits derived from these assets (Costanza *et al*., 2000). An energy portfolio can be achieved through a diverse range of energy generation. To manage risks appropriately within a rapidly changing market, each technology is assessed on its costs, benefits and uncertainties. Each technology has different energy characteristics to meet demand. For example, coal is well equipped to accommodate base load generation, yet it requires 15 years of operation before there is a return on investment (Parkinson, 2013a). By comparison, solar is fast to deploy, cost efficient, has a low distribution cost, and also deals with demand side management. However, at this point in time, the conventional wisdom is that it is not so well equipped to deal with base load, due to intermittency in supply. The likes of Elliston *et al.* (2012) would likely contest this view.

Parkinson (2013b) notes that the International Energy Agency (IEA) has indicated that liberalised energy markets like the National Electricity Market (NEM), should be able to encourage a 'significant decarbonisation' of the energy mix. A problem hindering such decarbonisation is the configuration of the current energy markets where the energy grid infrastructure favours the incumbent centralised fossil fuel generators over more decentralised renewable energy generation. This arrangement is not conducive to the delivery of the necessary energy transition required to stay

within 2°C warming, and for Australia to meet its international obligations that it was signatory to at the United Nations Framework Convention on Climate Change in Cancun, Mexico in 2012. Part of the problem, Parkinson (2013b) explains, is that these markets are designed to allow base load fossil fuel generation to continue at little to no cost, in order to ensure that demand is met.

Radchik *et al.* (2013) offer an approach to deal with this challenge drawing on the concept of the 'Virtual Generator'; a contractually joined entity that is able to guarantee reliable base load generation. This means that geographically separated intermittent generators like a solar powered generator and a wind powered generator, can be linked to a non-intermittent generator, such as a gas-fired power station, and are treated collectively as a base load generator. The centrally controlled Virtual Generator requires the intermittent generators to provide power where possible and the gas generator compensates to accommodate for any shortages in output due to a lack of wind, nightfall and random clouds blocking sunlight (Radchik *et al.*, 2013). In order to ensure a fast transition towards a decarbonised energy sector, this approach could be complemented with a national feed-in-tariff (FIT) to provide an incentive for transition, as well as to create a guarantee in the initial stages of implementation, that these Virtual Generators will receive a premium for the energy generated.

The challenge now, is how to speed up the transition, and do this efficiently and effectively, minimising the likelihood of economic and social disruption. Centralised institutions constrained by short-term political cycle and adopting a top down approach to policy are ill suited in addressing emissions reduction for wicked problems such as climate change (Folke et al., 2005).

Mitigation needs to be responsive to change and uncertainty regarding future developments (Nursey-Bray, 2010), including, for example, being responsive to technological innovation and development. Although a lot of work on resilience has focused on the capacity to absorb shocks and maintain function, attention also needs to be paid to another aspect of resilience; that concerned with the capacity for re-organisation and development (Gunderson & Holling, 2002). In a resilient system, disturbances have the potential to create opportunity for new things, for innovation and for development. Moreover, a system may need to change its fundamental behaviour quite suddenly. This is an important consideration if Australia is to stay within a 2°C pathway.

Biography

Jemma Williams recently completed a Bachelor of Development Studies at the Fenner School, Australian National University, graduating with First Class Honours.

Jeremy Williams is Professor and Director of the Asia Pacific Centre for Sustainable Enterprise in the Griffith Business School at Griffith University.

References

Anderegg W.R.L. (2010). Expert credibility in climate change. *Proceedings of the National Academy of Sciences. 107,* 12107–12109.

Campanale, M. & Leggett, J. (2011). Unburnable carbon – Are the world's financial markets carrying a carbon bubble? *Carbon Tracker Initiative*. Retrieved from http://www.carbontracker.org/wp-content/uploads/downloads/2011/07/Unburnable-Carbon-Full-rev2.pdf

Commonwealth of Australia (2011). Securing a clean energy future: The Australian government's climate change plan. Canberra: Department of Climate Change and Energy Efficiency. Retrieved from http://www.cleanenergyfuture.gov.au/wp-content/uploads/2012/06/CleanEnergyPlan-20120628-3.pdf

Cook, J., Nuccitelli, D., Green, S.A., Richardson, M., Winkler, B., Painting, R., Way, R., Jacobs, P., & Skuce, A. (2013). *Environmental Research Letters* 8(2). Retrieved from: http://iopscience.iop.org/1748-9326/8/2/024024/pdf/1748-9326_8_2_024024.pdf

Costanza, R., Daly, H., Folke, C., Hawken, P., Holling, C. S., McMichael, A. J., Pimentel, D., & Rapport, D. (2000). Managing out environmental portfolio. *Bioscience, 50*(2), 149-155.

Doran P. & Zimmerman, M.K. (2009). Examining the scientific consensus on climate change. *Eos Transactions American Geophysical Union, 90*(3), 22-23.

Elliston, B., Diesendorf, M. and MacGill, I. (2012). Simulations of scenarios with 100% renewable electricity in the Australian National Electricity Market. *Energy Policy, 45*, 606-613.

Folke, C., Hahn, T., Olsson, P. & Norberg, J. (2005). Adaptive Governance of Social Ecological System, *Annual Review of Environment and Resources*, 30: 441-473.

Gillis, J. (2013) Heat-trapping gas passes milestone, raising fears. *New York Times*, 10 May. Retrieved from: http://www.nytimes.com/2013/05/11/science/earth/carbon-dioxide-level-passes-long-feared-milestone.html?_r=0

Green, M. (2013). Bursting the carbon bubble. *The Age*, 15 February. Retrieved from: http://www.theage.com.au/business/carbon-economy/bursting-the-carbon-bubble-20130214-2efob.html#ixzz2LGNA1QGy

Gunderson, L., & Holling, C. (Eds.) (2002). *Panarchy: Understanding Transformations in Human and Natural Systems*, Washington, DC: Island Press.

Intergovernmental Panel on Climate Change (IPCC) (2007). Causes of change. In Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.). Summary for

Policymakers. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Print version: IPCC, Geneva, Switzerland.

Intergovernmental Panel on Climate Change (IPCC) (2013). Climate change 2013: The physical science basis. Working Group I contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Retrieved from http://www.ipcc.ch/report/ar5/wg1/#.Ulc2kWTk9vZ

McKibbin, B. (2012). Global warming's terrifying new math. *Rolling Stone,* 19 July. Retrieved from: http://www.rollingstone.com/politics/news/global-warmings-terrifying-new-math-20120719

Meinshausen, M., Meinshausen, N., Hare, W., Raper, S.C.B., Frieler, K., Knutti, R., Frame, D.J. & Allen, M.R. (2009). Greenhouse-gas emission targets for limiting global warming to 2^{o}C. *Nature*, *458*, 1158-1162. Retrieved from https://www1.ethz.ch/iac/people/knuttir/papers/meinshausen09nat.pdf

Milman, O. (2013). Coal executive turned climate change activist fights for seat on BHP board. *The Guardian*, 17 October. Retrieved from: http://www.theguardian.com/business/2013/oct/17/coal-executive-turned-climate-change-activist-fights-for-seat-on-bhp-board

Nursey-Bray, M. (2010). Local governance for local governments: A framework for addressing climate change. *Commonwealth Journal of Local Governance*, 7 (November), 168-186.

Oreskes, N. (2004). Beyond the ivory tower—the scientific consensus on climate change. *Science, 306*, 1686.

Parkinson, G. (2013a). Renewable energy now cheaper than coal and gas in Australia. RenewEconomy. Retrieved from http://reneweconomy.com.au/2013/renewables-now-cheaper-than-coal-and-gas-in-australia-62268

Parkinson, G. (2013b). How wind and solar broke the world's electricity markets. RenewEconomy. Retrieved from http://reneweconomy.com.au/2013/how-wind-and-solar-broke-the-worlds-electricity-markets-84505

Radchik, A., Skyrabin, I., Maisano, A., Novikov, A., & Gazarina. T. (2013). Ensuring long term investment for large scale solar power stations: Hedging instruments for green power. *Solar Energy,* 98, Part B, December, 167-179.

Rittel, H.W.J. & Webber, M.M. (1973). Dilemmas in a general theory of planning. *Policy Science*, *4*: 155-169.

Smith, R. & Sweet, C. (2013). Companies unplug from the electric grid, delivering a jolt to utilities. *Wall Street Journal*, 17 September. Retrieved from http://online.wsj.com/news/articles/SB10001424127887324906304579036721930972500

Williams, J. V. (2013). *Public Policy for a Low Carbon Economy: A Case Study Analysis of the Australian Clean Energy Future Package in the Australian Capital Region.* (Unpublished Honours Thesis). Australian National University, Canberra

Žižek, S. (2004). What Rumsfeld doesn't know that he knows about Abu Ghraib. *In These Times*. Retrieved from: http://www.lacan.com/zizekrumsfeld.htm