

# **Zero Carbon Options: Seeking an economic mix for an environmental outcome**

Preview Introduction

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## 1. Introduction

This report provides a multi-criteria comparison of nuclear power and renewable technologies. The comparison is based upon proposed solutions from each form of technology performing the same electricity generation task— replacing South Australia’s aging Northern and Playford coal-fired power stations.

The purpose of this report is to build the sophistication of the discussion regarding reducing greenhouse gas emissions from electricity generation in Australia. We propose to achieve this by expanding the range of zero-carbon technologies considered beyond non-hydro renewables to include nuclear power.

Australia's economic competitiveness is, to a large extent, dependant on cheap and abundant energy resources. With around 80% of Australia's eastern states' electricity generation coming from coal power plants, per capita greenhouse gas emission levels have reached 27.3 tons of carbon dioxide equivalent (tCO<sub>2</sub>e) per annum<sup>1</sup> – which is over double the European Union average and more than three times the global average<sup>2</sup>. But without nuclear in Australia’s low-emission energy mix, it is questionable whether this nation will be able to continue to compete in a carbon-constrained global environment with both its Asian neighbours, who are currently leading in the deployment of new nuclear power plants, and OECD counterparts who are planning to extend their nuclear fleet. By contrast, greenhouse gas emissions from the electricity sector in Australia have grown 18% since 1998<sup>3</sup>, the year of nuclear prohibition in Australia, as Australia has continued to invest in coal and gas-fired electricity generation.

The issue of whether to include nuclear power in our low-emission base-load electricity is not a trivial matter. It may ultimately determine the level of affordable greenhouse gas emission reductions, industry competitiveness and household energy affordability. This is a concern that continues to be raised by both industry and academics.

The University of Queensland, in its submission to the Australian Government’s Draft Energy White Paper, argued that "any informed debate and analysis of Australia's energy future, is incomplete and sub-optimal if nuclear power is excluded". This position has been echoed by international economists including Professor Jeffrey Sachs<sup>4</sup> and Professor Paul Collier<sup>5</sup>. A recent study released by the Center for Policy Studies, *The Atomic Clock: How the Coalition is gambling with Britain's energy policy* (2012), finds that the delay in supporting new nuclear build in the UK is potentially increasing fuel poverty and damaging the economy, particularly energy intensive industries.

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<sup>1</sup> Australian Government 2011, p.12

<sup>2</sup> Garnaut, R. 2011, p.43

<sup>3</sup> Australian Greenhouse Emissions Information System (AGEIS) accessed via <http://ageis.climatechange.gov.au/>

<sup>4</sup> As reported in The Guardian (2012), "We won't meet the carbon targets if nuclear is taken off the table"

<sup>5</sup> Collier, P. (2010), p181

With the introduction of the Australian Government's Clean Energy Future legislation, debate has intensified on how to best achieve this environmental target at a competitive cost. For Australia to remain competitive with its trading partners in a carbon-constrained global economy it will need to ensure it does not arbitrarily omit any low-emission electricity sources from its energy portfolio. Nuclear power is already deployed as a baseload electricity source in many of Australia's largest trading partners. This is set to further increase with China and India planning to increase their capacity up to around 200GW and 60GW by 2030 respectively<sup>6</sup>. For Australia, a small trade-exposed nation already suffering from the tyranny of distance compounded by an economic system highly dependant on cheap but carbon-intensive energy, the inclusion of nuclear power may become a matter of economic survival in a low-emission global trading environment. This report intends to not only dispel the myth that nuclear power is unaffordable, but further argues that it may actually become a vital component of any future economically competitive low-emission energy portfolio in Australia.

The Australian Government has taken steps to reduce domestic emissions by putting a price on greenhouse gas emissions, introduced in July 2012. Initially at a fixed price of \$23 per tCO<sub>2</sub>e, with a floating price based on traded certificates linked to the EU to be introduced from July 2015. Australia needs to consider how this market-based solution will interact with an energy market that excludes from consideration nuclear power -the world's largest provider of near zero-carbon electricity. The role of nuclear power in this regard has been well documented by the Australian Government. In 2006 the following remarks were made to the Parliament of the Commonwealth of Australia<sup>7</sup> :

*Worldwide, nuclear power plants currently save some 10 per cent of total carbon dioxide (CO<sub>2</sub>) emissions from world energy use. This represents an immense saving of greenhouse gas emissions that would otherwise be contributing to global warming. If the world were not using nuclear power, emissions of CO<sub>2</sub> would be some 2.5 billion tonnes higher per year.*

In light of such knowledge, legislating to reduce greenhouse emissions while prohibiting nuclear power<sup>8</sup> seems an exercise in contradiction. But this may be changing. Policymakers recently acknowledged in the Australian Government's Draft Energy White Paper (2011) that nuclear power may become a necessary component of Australia's electricity sector if other low-emission technologies are not able to achieve the required emission reductions on their own. While this represents welcome progress in a country that barely discusses nuclear power, this approach brings risks. On these grounds, just *beginning* adequate consideration of the use of nuclear power is contingent on the manifestly demonstrated failure of other zero-carbon energy sources to deliver. An arguably more responsible approach would exclude nuclear power from consideration only if and

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<sup>6</sup> World Nuclear Association 2012 , country briefings for China and India, available via <http://www.world-nuclear.org/>

<sup>7</sup> House of Representatives Standing Committee on Industry and Resources 2006, pg xv

<sup>8</sup> Section 10 of the ARPANS Act (1998) *Prohibition on certain nuclear installations*; Section 140A of the *Environmental Protection and Biodiversity Conservation Act (1999)*, *No approval for certain nuclear installations*

when alternatives are *comprehensively demonstrated to be both adequate and superior*. This report demonstrates that, far from nuclear power being unnecessary, its inclusion may be vital in an energy strategy that can both maintain reliability and achieve deep cuts in greenhouse gas emissions.

Under its current policy, the Australian Government ambitiously seeks to reduce around half of its emissions through the purchase of foreign carbon offsets, with the remainder of its emission reductions to be achieved mainly through renewables and carbon capture storage. By 2050, it is estimated that this cumulative offset purchase commitment will have cost \$716 billion<sup>9</sup>. This cost could be substantially reduced, and a superior emissions outcome achieved, through the inclusion of nuclear power in Australia's electricity generation portfolio<sup>10</sup>. Recently published findings confirm that nuclear power in Australia can offer lowest cost electricity and remain cost competitive with the lower cost renewable technologies out to 2050<sup>11</sup>. Yet modelling undertaken by SKM and MMA<sup>12</sup> for the Australian Government's carbon pricing mechanism assumed that beyond coal and gas there is "no other viable thermal power alternative". It would appear that "viable" is a political construct, not an economic or technical one.

The intent of this report is not to argue that nuclear power removes the need for renewable energy sources in Australia altogether. Renewables are, under certain conditions, more economic and logistically feasible for certain end-uses. Already, wind generation plays a significant part in the electricity supply of South Australia. This outcome was achieved quickly in response to a favourable investment environment for a relatively mature technology that could assist in meeting the Renewable Energy Target. Meanwhile falling prices for household-scale solar PV, combined with rising electricity costs, means the financial case for the average household and, increasingly, commercial premises will be maintained or improve even as subsidies are trimmed and withdrawn<sup>13</sup>.

Instead, this report argues that a mix of renewables and nuclear, deployed according to their respective advantages, will in fact balance out the higher average costs of renewables in order to allow Australia to achieve critical dual goals:

1. Retaining its place in the global economy as an energy competitive trading nation.
2. Achieving deep and rapid cuts in greenhouse gas emissions.

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<sup>9</sup> Nicholson 2011

<sup>10</sup> Ibid 2011

<sup>11</sup> Bureau of Resources and Energy Economics 2012, pg 6

<sup>12</sup> SKM & MMA 2011, pg 22

<sup>13</sup> AEMO 2012a