

**Supplementary Submission to the NSW Standing Committee on State
Development**

**Inquiry into the Uranium Mining and Nuclear Facilities (Prohibitions) Repeal
Bill 2019**

**Friends of the Earth Australia
www.nuclear.foe.org.au**

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- 1. Misinformation regarding energy economics presented to the federal and NSW inquiries by nuclear companies and enthusiasts.**
- 2. Information on Australia's renewable energy potential.**

The primary purpose of this submission is to follow up on a question taken on notice during discussion with Mr Latham, regarding Australia's renewable energy potential. But first, we take the opportunity to reinforce the value and importance of an article written by energy expert Giles Parkinson regarding energy costs.

**1. MISINFORMATION REGARDING ENERGY ECONOMICS PRESENTED TO THE
FEDERAL AND NSW INQUIRIES BY NUCLEAR COMPANIES AND ENTHUSIASTS.**

Highly questionable economic claims made by nuclear companies and enthusiasts are addressed in:

- submission #40 by Friends of the Earth Australia¹
- submission #64 by Friends of the Earth Australia, Australian Conservation Foundation, and the Nature Conservation Council of NSW (see esp. sections 3.5 and 3.6)²

A recent article by Giles Parkinson – an energy expert and former business and deputy editor of the *Australian Financial Review* – is particularly helpful in this regard. An excerpt is reproduced below but we encourage members of the Committee to read the full,

¹ <https://www.parliament.nsw.gov.au/lcdocs/submissions/66217/0040%20Friends%20of%20the%20Earth.pdf>

²

<https://www.parliament.nsw.gov.au/lcdocs/submissions/66348/0064%20Australian%20Conservation%20Foundation,%20Nature%20Conservation%20Council%20and%20%20Friends%20of%20the%20Earth%20Australia.pdf>

referenced article. The article is focused on submissions to the federal nuclear inquiry³ but many of the same claims have been presented to the NSW inquiry.

Why the nuclear lobby makes stuff up about the cost of wind and solar

Giles Parkinson, 23 Oct 2019, 'Why the nuclear lobby makes stuff up about the cost of wind and solar', <https://reneweconomy.com.au/why-the-nuclear-lobby-makes-stuff-up-about-cost-of-wind-and-solar-46538/>

It is generally accepted in the energy industry that the cost of new nuclear is several times that of wind and solar, even when the latter are backed up by storage. The GenCost 2018 report from the CSIRO and the Australian Energy Market Operator (AEMO) puts the cost of nuclear at two to three times the cost of "firmed renewables".

The nuclear lobby, however, has been insisting to the parliamentary inquiry that wind and solar are four to seven times the cost of nuclear, and to try and prove the point the lobby has been making such extraordinary and outrageous claims that it makes you wonder if anything else they say about nuclear – its costs and safety – can be taken seriously.

RenewEconomy has been going through the 290-something submissions and reading the public hearing transcripts, and has been struck by one consistent theme from the pro-nuclear organisations and ginger groups: When it comes to wind, solar and batteries, they just make stuff up.

A typical example is the company SMR Nuclear Technology – backed by the coal baron Trevor St Baker – which borrows some highly questionable analysis to justify its claim that going 100 per cent renewables would cost "four times" that of replacing coal with nuclear.

It bases this on modelling by a consultancy called EPC, based on the south coast of NSW, apparently a husband and wife team, Robert and Linda Barr, who are also co-authors of "The essential veterinarian's phone book", a guide to vets on how to set up telephone systems.

The EPC report admits to deliberately ignoring the anticipated cost reductions of wind and solar from AEMO's 2018 integrated system plan. Even worse, the report dials in a completely absurd current cost of wind at A\$157/MWh (before transmission costs), which is about three times the current cost in Australia, and A\$117/MWh for solar, which is more than double.

The costs of wind and solar are not hard to verify. They are included in the GenCost report, in numerous pieces of analysis, and even in public announcements from companies involved, both buyers and sellers. St Baker could have helped out, as his company has signed two big solar contracts (for the Darlington and Vales Point solar farms) and we can bet he won't be paying A\$117/MWh.

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https://www.aph.gov.au/Parliamentary_Business/Committees/House/Environment_and_Energy/Nuclearenergy

Apart from costs, the EPC scenarios for 100 per cent renewables are also, at best, imaginative. For some reason they think there will only be 10GW of solar in a 100% renewables grid and just 100MW of battery storage. Big hint: There is already 12GW of solar in the system and about 300MW of battery storage. But we discovered that assuming wind and solar do not or won't exist, and completely ignoring distributed energy, are common themes of the nuclear playbook.

The delivered cost of energy from wind and solar in the EPC modelling of a 100 per cent renewables grid? A hilariously outrageous sum of A\$477/MWh (US\$330/MWh).

Contrast this with SMR Nuclear Technology's claims about the cost of a modern small modular reactor – US\$65/MWh – even though it admits the technology "has not been constructed", and which leading nuclear expert Ziggy Switkowski points out won't likely be seen for at least another decade. ...

The EPC report also forms the basis of the analysis from the Nuclear Now Alliance, which describes itself as a not-for profit group of Australian scientists and engineers that are passionate about the benefits of nuclear "but have no connection to the industry."

Moltex, which says it is "developing" some sort of fission technology (it says it has a design but hasn't actually built anything) uses the same trick as EPC to paint a daunting picture of renewable and storage costs, in this case by multiplying the cost of batteries by the total amount of electricity consumed in a single day. "Australia consumes 627 Gigawatt hours of electricity per day, and so the battery storage required to cover just one 24 hour period would cost A\$138 billion," it proclaims. It is such an incredibly stupid and misleading claim that it simply takes the breath away. ...

But that's what the nuclear industry feels it needs to do to make its yet-to-be invented technology sound feasible and competitive.

Let's go to StarCore, a Canadian company that says it, too, wants to manufacture small modular reactors, and claims renewables are "seven times" the cost of nuclear, and which also has a fascination with the Nyngan solar farm. It uses the cost of Nyngan to make the bizarre claim that to build 405 of them would cost A\$68 billion, and then compares this to what it claimed to be the "zero upfront capital costs" of one of StarCore's plants.

Say what? Does the nuclear plant appear just like that? Solar and wind farms also usually have long-term power purchase agreements, but they still have to be built and someone has to provide the capital to do so. Nuclear with a zero capital cost? Really, you couldn't make this stuff up.

Down Under Nuclear Energy, headed by a former oil and gas guy and a former professor at the University of Western Australia who specialises in mathematical social science and economics, also bases its solar costs on the Nyngan solar farm and makes this bizarre claim about battery storage: "The precipitous decline in solar technology is highly unlikely to be replicated in batteries, a technology already approaching 150 yrs of maturity," it says.

Hey, here's some breaking news. Costs of battery storage have already mirrored solar's fall, down 80 per cent in last decade and utilities like Transgrid predict another 60 per cent fall over next 10-15 years.

And most large-scale storage batteries use lithium, an abundant resource, and this is battery technology that was actually invented just over 40 years ago by the winners of this year's Nobel Prize for Chemistry. As the Nobel citation says: "(Co-winner Stanley) Wittingham developed the first fully functional lithium battery in the 1970s." Not 1870.

Women in Nuclear and the Australian Workers Union both quote the Industry Super report on nuclear, which we debunked a while back, which puts the cost estimates of wind and solar plants at 10 times their actual cost.

The "capital cost" of the Dundonnell wind farm in Victoria, for instance, is put at A\$4.2 billion (try A\$400 million) according to their bizarre calculations, while the Darlington solar farm is put at \$5.8 billion (try A\$350 million). It's pure garbage and the fact that it is being quoted really does beggar belief. ...

But all the nuclear submissions have one common trait. They assume that the deployment of renewables is stopped in its tracks, either now or sometime soon. It's more wish than analysis, but in that they will have found a willing fellow traveller in federal energy minister, Angus "there is already too much wind and solar on the grid" Taylor, who thought it a good idea to have the inquiry.

But the reality is that the rest of the energy industry wants to move on. They know that the grid can be largely decarbonised within the next two decades from a combination of renewables and storage. That's a simple truth that the nuclear lobby cannot accept, and they've passed up the opportunity to have an open and honest debate by promoting utter garbage about renewables, to the point where it would be difficult to believe much of anything else they say.

2. INFORMATION ON AUSTRALIA'S RENEWABLE ENERGY POTENTIAL

CSIRO energy chief economist: Australians can have zero-emission electricity, without blowing the bill

*6 Dec 2016, Paul Graham – Chief economist, CSIRO energy,
<https://theconversation.com/australians-can-have-zero-emission-electricity-without-blowing-the-bill-69869>*

In a report released by CSIRO and Energy Networks Australia – titled Electricity Network Transformation Roadmap Key Concepts Report – we show that Australia is so far making rocky progress on reducing emissions, maintaining energy security and keeping prices low. But we also show how Australia can regain world leadership, delivering cheap electricity with zero emissions by 2050.

Electricity Network Transformation Roadmap Key Concepts Report:

<https://www.energynetworks.com.au/electricity-network-transformation-roadmap>

Australian Energy Market Operator

A December 2018 report by CSIRO and the Australian Energy Market Operator (AEMO) found that the cost of power from small modular reactors would be more than twice as expensive as power from wind and solar PV with some storage costs included (two hours of battery storage or six hours of pumped hydro storage). At the 29 August 2019 hearing of the federal nuclear inquiry, the AEMO foreshadowed the findings of its upcoming report. Alex Wonhas, AEMO's chief system design and engineering officer, said:

"What we find today at current technology cost is that unfirmed renewables in the form of wind and solar are effectively the cheapest form of energy production. If we look at firmed renewables, for example wind and solar firmed with pumped hydro energy storage, that cost, at current cost, is roughly comparable to new build gas or new build coal-fired generation. Given the learning rate effect that we have just discussed, our expectation is that renewables will further decrease in their cost, and therefore firmed renewables will well and truly become the lowest cost of generation for the NEM."

Bloomberg New Energy Finance: Australia could be at 86% wind and solar by 2050 – on economics only

Giles Parkinson, 10 July 2018, <https://reneweconomy.com.au/australia-could-be-at-86-wind-and-solar-by-2050-on-economics-only-34915/>

Australia could source 86 per cent of its electricity from wind and solar by 2050, based on economics only and regardless of any climate or emissions policy, according to Bloomberg New Energy Finance. The global research and news group says that level of wind and solar could be reached quicker, and will need to in order to match the Paris climate target of 2°C, let alone 1.5°C, but the transition to wind and solar is inevitable.

See also this article in The Age: <https://www.theage.com.au/business/the-economy/renewables-to-account-for-90-per-cent-of-all-australian-power-by-2050-says-new-report-20180619-p4zmcm.html>

Australia could be 100% renewable by 2030s, meet Paris targets by 2025

Sophie Vorrath, 10 September 2018, <https://reneweconomy.com.au/australia-could-be-100-renewable-by-2030s-meet-paris-targets-by-2025-2025/>

Australia could reach the equivalent of 100 per cent renewables for its electricity needs by the early 2030s by doing nothing more than maintaining the current pace of wind and solar development, a new research report has found.

The report – published by a heavy-hitting team of Australian National University researchers, including solar PV and pumped hydro expert Andrew Blakers – says keeping up the current rate of renewable energy deployment would also meet Australia's entire emissions reduction task "for the whole economy" by 2025.

To reach these conclusions, the team analysed data for the federal government's own Clean Energy Regulator, showing that during 2018 and 2019 the nation would install about 10,400MW of new renewable energy.

ANU Energy Change Institute director Professor Ken Baldwin said that at that rate, Australia would eclipse the Renewable Energy Target, reaching 29 per cent in 2020, and by 2025 would reach 50 per cent – a number the federal Coalition likes to say is "recklessly high", even for 2030.

Perhaps even more importantly, staying on the current trajectory would see electricity sector emissions reduced by 26 per cent in 2021, and the Paris economy-wide emissions reductions target of 26 per cent met five years early, in 2025. ...

The ANU forecast compares to recent modelling from the Australian Energy Market Operator⁴, which shows renewables making up 46 per cent of NEM generation by 2030 in their "neutral scenario", and 61 per cent of generation by 2030 in their "fast change" scenario.

Australian National University report: <http://energy.anu.edu.au/news-events/energy-policy-needs-get-board-renewable-energy-train>
and

<http://energy.anu.edu.au/files/Australia%27s%20renewable%20energy%20industry%20is%20delivering%20rapid%20and%20deep%20emissions%20cuts.pdf>

Article by ANU scientists: <https://theconversation.com/at-its-current-rate-australia-is-on-track-for-50-renewable-electricity-in-2025-102903>

100% Renewable Electricity in Australia

Andrew Blakers, Bin Lu and Matthew Stocks (Australian National University), February 2017, '100% Renewable Electricity in Australia',

<http://energy.anu.edu.au/files/100%25%20renewable%20electricity%20in%20Australia.pdf>

Abstract: We present an energy balance analysis of the Australian national electricity market in a 100% renewable energy scenario in which wind and photovoltaics (PV) provides 90% of the annual electricity. The key outcome of our modelling is that the additional cost of balancing renewable energy supply with demand on an hourly basis throughout the year is modest: A\$25-30/MWh (US\$19-23/MWh).

For a summary article see: <https://reneweconomy.com.au/anu-wind-solar-hydro-grid-cheapest-option-australia-87796/>

100 percent renewable energy by 2030

November 2017, <https://renew.org.au/research/100-percent-renewable-energy-by-2030/>

100% Renewable Grid by 2030 paper: https://renew.org.au/wp-content/uploads/2018/08/Renewable_Grid_by_2030.pdf

Australia can have an electricity grid entirely run by renewable energy by 2030, according to a new research paper by Renew, formerly the Alternative Technology Association (ATA). The paper, 100% Renewable Grid by 2030, says the target can be achieved by accelerating the installation of wind and solar power by 80% backed up by pumped hydro energy storage facilities and extra transmission lines.

Lead author Andrew Reddaway, energy analyst at Renew, said reaching full renewable energy by 2030 was cheaper and less risky than building new coal-fired power stations. Renew's forecasts towards a fully renewable grid in the national electricity market are based on recent research by the Australian National University. The paper considered recent trends and developments in projects such as Snow Hydro 2.0

A summary article is posted at <https://reneweconomy.com.au/100-renewables-cheaper-less-risky-building-new-coal-ata-96227/>

⁴ <https://reneweconomy.com.au/bad-news-for-coal-huggers-renewables-at-50-by-2030-2030/>

Powering Progress: States Renewable Energy Race

Climate Council of Australia, 16 October 2018, <http://apo.org.au/node/197341>

The renewable energy boom is accelerating in Australia, and across the world. In the absence of meaningful commonwealth government leadership, state and territory governments are leading Australia's electricity transition from fossil fuels to renewable energy and storage. This report rates states and territories based on their performance across a range of metrics. These include each state's percentage of renewable electricity, the proportion of households with solar and policies that support renewable energy.

New report shows 100% renewable by 2030 can save Australia money

Giles Parkinson, 19 April 2016, RenewEconomy, <https://reneweconomy.com.au/new-report-shows-100-renewable-by-2030-can-save-australia-money-93765/>

A new report from the Institute for Sustainable Futures in Sydney says a rapid transition to a 100 per cent renewable energy system can save Australia money – with avoided fuel costs to quickly offset the extra capital expenditure of building wind, solar and other renewable energy installations.

"The transition to a 100 per cent renewable energy system by 2050 is both technically possible and economically viable in the long term," the report says. And by 100 per cent renewable, it means all energy use, including transport and heating.

The report canvasses two renewable energy scenarios, one based on a high level of renewable energy in the electricity grid, but with transport largely reliant on fossil fuels. The second is the Advanced Renewables scenario, which canvasses a totally renewable electricity system by 2030 and a fully renewable energy system by 2050.

Pathways to Deep Decarbonization in Australia

ClimateWorks Australia, 2014, 'Pathways to Deep Decarbonization in Australia'.

Report webpage: <https://www.climateworksaustralia.org/project/national-projects/pathways-deep-decarbonisation-2050-how-australia-can-prosper-low-carbon>

Report PDF: http://deepdecarbonization.org/wp-content/uploads/2015/09/AU_DDPP_Report_Final.pdf

Australian Energy Market Operator, July 2013, '100 Per Cent Renewables Study – Modelling Outcomes'

The modelling undertaken presents results for four selected cases, two scenarios at two years, 2030 and 2050. The first scenario is based on rapid technology transformation and moderate economic growth while the second scenario is based on moderate technology transformation and high economic growth. The modelling includes the generation mix, transmission requirements, and hypothetical costs for each.

<http://www.environment.gov.au/climate-change/publications/aemo-modelling-outcomes>

University of New South Wales Simulation Study (2012)

Ben Elliston, Mark Diesendorf and Iain MacGill, 2012, 'Simulations of scenarios with 100% renewable electricity in the Australian National Electricity Market', Energy Policy, vol. 45, pp.606-613

Abstract

As a part of a program to explore technological options for the transition to a renewable energy future, we present simulations for 100% renewable energy systems to meet actual

hourly electricity demand in the five states and one territory spanned by the Australian National Electricity Market (NEM) in 2010. The system is based on commercially available technologies: concentrating solar thermal (CST) power with thermal storage, wind, photovoltaic (PV), existing hydro and biofuelled gas turbines. Hourly solar and wind generation data are derived from satellite observations, weather stations, and actual wind farm outputs. Together CST and PV contribute about half of total annual electrical energy supply.

A range of 100% renewable energy systems for the NEM are found to be technically feasible and meet the NEM reliability standard. The principal challenge is meeting peak demand on winter evenings following overcast days when CST storage is partially charged and sometimes wind speeds are low. The model handles these circumstances by combinations of an increased number of gas turbines and reductions in winter peak demand. There is no need for conventional base-load power plants. The important parameter is the reliability of the whole supply-demand system, not the reliability of particular types of power plants.

Highlights

We simulate 100% renewable electricity in the Australian National Electricity Market.

The energy system comprises commercially available technologies.

A range of 100% renewable electricity systems meet the reliability standard.

Principal challenge is meeting peak demand on winter evenings.

The concept of 'base-load' power plants is found to be redundant.