NUCLEAR POWER – NO SOLUTION TO CLIMATE CHANGE

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

1. Introduction

Support for nuclear power in Australia has nothing to do with energy policy – it is instead an aspect of the 'culture wars' driven by conservative ideologues (examples include current and former politicians Clive Palmer, Tony Abbott, Cory Bernardi, Barnaby Joyce, Mark Latham, Jim Molan, Craig Kelly, Eric Abetz, and David Leyonhjelm; and media shock-jocks such as Alan Jones, Andrew Bolt and Peta Credlin). With few exceptions, those promoting nuclear power in Australia also support coal, they oppose renewables, they attack environmentalists, they deny climate change science, and they have little knowledge of energy issues and options. The Minerals Council of Australia – which has close connections with the Coalition parties – is another prominent supporter of both coal and nuclear power.

In January 2019, the Climate Council, comprising Australia's leading climate scientists and other policy experts, issued a policy statement concluding that nuclear power plants "are not appropriate for Australia – and probably never will be". The statement continued: "Nuclear power stations are highly controversial, can't be built under existing law in any Australian state or territory, are a more expensive source of power than renewable energy, and present significant challenges in terms of the storage and transport of nuclear waste, and use of water".

Friends of the Earth Australia agrees with the Climate Council. Proposals to introduce nuclear power to Australia are misguided and should be rejected for the reasons discussed below (and others not discussed here, including the risk of catastrophic accidents).

2. Nuclear Power Would Inhibit the Development of More Effective Solutions

The latest Lazard report on levelized costs of energy shows that nuclear power is considerably more expensive than renewables:

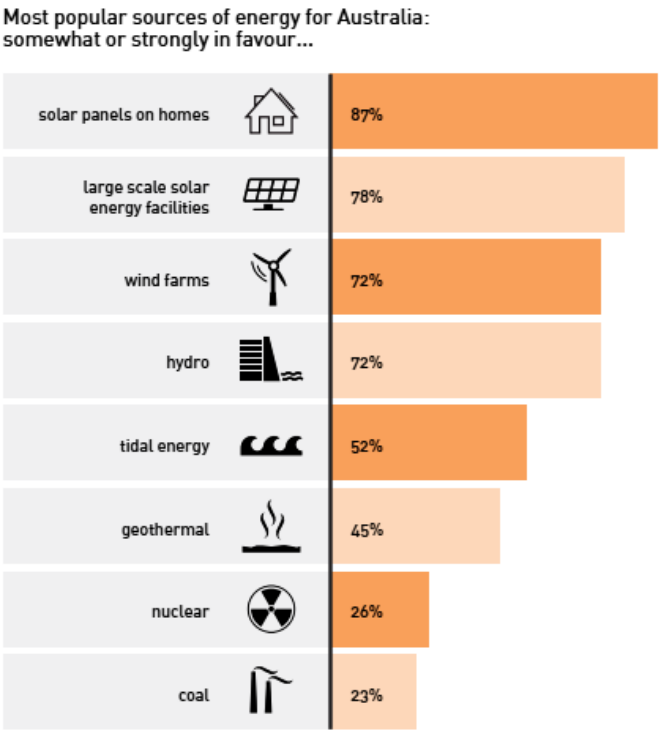
	US$ / MWh
Nuclear	118–192
Wind power	28–54
Solar PV utility scale	32–44
Solar thermal with storage	126–156
Geothermal	69–112

Renewables coupled with storage are cheaper than nuclear. Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) provides these estimates in a 2020 report (with the Lazard figure included for comparison):

	Low and high estimates (2020) A$/MWh
Nuclear – small modular (CSIRO)	258–338
Nuclear – Lazard (US$118–192)	169–275
Wind + 2 hrs battery storage	84–107
Wind + 6 hrs pumped hydro storage	92–117
Solar PV + 2 hrs battery storage	88–133
Solar PV + 6 hrs pumped hydro storage	101–151

Likewise, a 2018 report by CSIRO and the Australian Energy Market Operator concluded that "solar and wind generation technologies are currently the lowest-cost ways to generate electricity for Australia, compared to any other new-build technology."

Thus the pursuit of nuclear power would inhibit the necessary rapid development of solutions that are cheaper, safer, more environmentally benign, and enjoy far greater public support. A 2015 IPSOS poll found that support among Australians for solar power (78–87%) and wind power (72%) is far higher than support for coal (23%) and nuclear (26%).



Source: IPSOS Poll, 2015.

Renewables and storage technology can provide a far greater contribution to power supply and to climate change abatement compared to an equivalent investment in nuclear power. Peter Farley, a fellow of the Australian Institution of Engineers, crunched the numbers and concluded that Australia can get equivalent renewable power plus backup power (e.g. pumped hydro storage or batteries) for one-third of the cost of nuclear power, in one-third of the time.

Dr. Ziggy Switkowski – who led the Howard government's review of nuclear power in 2006 – noted in 2018 that "the window for gigawatt-scale nuclear has closed", that nuclear power is no longer cheaper than renewables and that costs are continuing to shift in favour of renewables.

The trajectories of renewables and nuclear power could hardly be more striking. Global nuclear power capacity fell by 4.5 gigawatts in 2019 while renewable capacity increased by a record 201 gigawatts. Global renewable electricity generation has doubled over the past decade and costs have declined sharply. Renewables accounted for an estimated 27.3% of global electricity generation by the end of 2019. Conversely, nuclear costs have increased four-fold since 2006 and nuclear power's share of global electricity generation has fallen from its 1996 peak of 17.6% to its current share of 10%.

As with renewables, energy efficiency and conservation measures are far cheaper and less problematic than nuclear power. A University of Cambridge study concluded that 73% of global energy use could be saved by energy efficiency and conservation measures. Yet Australia's energy efficiency policies and performance are among the worst in the developed world.

3. The Nuclear Power Industry is in Crisis

The nuclear industry is in crisis with lobbyists repeatedly acknowledging nuclear power's "rapidly accelerating crisis", a "crisis that threatens the death of nuclear energy in the West" and "the crisis that the nuclear industry is presently facing in developed countries", while noting that "the industry is on life support in the United States and other developed economies" and engaging each other in heated arguments about what if anything can be salvaged from the "ashes of today's dying industry".

It makes no sense for Australia to be introducing nuclear power at a time when the industry is in crisis and when a growing number of countries are phasing out nuclear power (including Germany, Switzerland, Spain, Belgium, Taiwan and South Korea).

The 2006 Switkowski report estimated the cost of electricity from new reactors at A$40–65 / MWh. Current estimates are four times greater at A$169–275 / MWh. In 2009, Dr. Switkowski said that a 1,000 MW power reactor in Australia would cost A$4–6 billion. Again, that is about one-quarter of all the real-world experience over the past decade in western Europe and north America, with cost estimates of reactors under construction ranging from A$17–24 billion per reactor (while a twin-reactor project in South Carolina was abandoned after the expenditure of at least A$13.3 billion).

Thanks to legislation banning nuclear power, Australia has avoided the catastrophic cost overruns and crises that have plagued every recent reactor project in western Europe and north America. Cheaper Chinese or Russian nuclear reactors would not be accepted in Australia for a multitude of reasons (cybersecurity, corruption, repression, safety, etc.). South Korea has been suggested as a potential supplier, but South Korea is slowly phasing out nuclear power, it has little experience with its APR1400 reactor design, and South Korea's 'nuclear mafia' is as corrupt and dangerous as the 'nuclear village' in Japan which was responsible for the Fukushima disaster.

4. Small Modular Reactors

The Minerals Council of Australia claims that small modular reactors (SMRs) are "leading the way in cost". In fact, power from SMRs will almost certainly be more expensive than power from large reactors because of diseconomies of scale. The cost of the small number of SMRs under construction is exorbitant. Both the private sector and governments have been unwilling to invest in SMRs because of their poor prospects. The December 2018 report by the CSIRO and the Australian Energy Market Operator found that even if the cost of power from SMRs halved, it would still be more expensive than wind or solar power with storage costs included (two hours of battery storage or six hours of pumped hydro storage).

The prevailing scepticism is evident in a 2017 Lloyd's Register report based on the insights of almost 600 professionals and experts from utilities, distributors, operators and equipment manufacturers. They predict that SMRs have a "low likelihood of eventual take-up, and will have a minimal impact when they do arrive".

Even nuclear power advocates acknowledge the dim prospects for SMRs. Academic Barry Brook – best known for insisting that there was no risk of a serious accident at Fukushima even as multiple nuclear meltdowns were in full swing – wrote this about SMRs in September 2020:
"Difficult to licence, especially in Western markets. This is why the designs for the first-of-a-kind deployments will resemble small versions of monolithic light water reactors, whilst still embracing some of the innovations that come with being, well, small. NuScale is the current front-runner. SMRs are currently uneconomic, being caught in a Catch-22 situation. In theory, they might be cheaper and faster to build than large LWRs, if one settled on a standard design and made them in a tooled-up factory. But until the bulk orders are flowing, such factories are hard to justify and finance. Unfortunately, everyone wants to build the second one."

Only one SMR is operating – Russia's floating power plant, which is powering fossil fuel mining operations in the Arctic. About half of the small number under construction have nothing to do with climate change abatement – on the contrary, they are designed to facilitate access to fossil fuel resources in the Arctic, the South China Sea and elsewhere. Worse still, there are disturbing connections between SMRs, nuclear weapons proliferation and militarism more generally.

5. Nuclear Weapons Proliferation and Nuclear Winter

"On top of the perennial challenges of global poverty and injustice, the two biggest threats facing human civilisation in the 21st century are climate change and nuclear war. It would be absurd to respond to one by increasing the risks of the other. Yet that is what nuclear power does." – Australian academic Dr. Mark Diesendorf

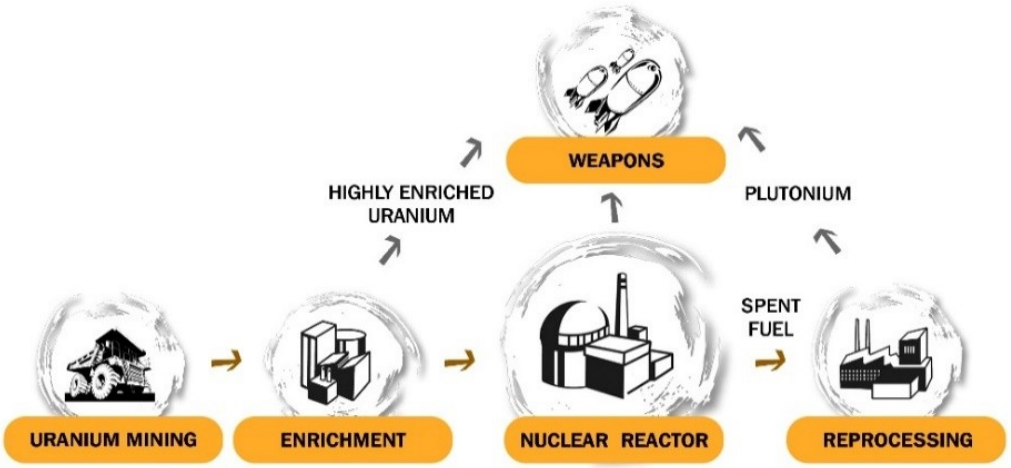
Nuclear power programs have provided cover for numerous covert weapons programs and an expansion of nuclear power would exacerbate the problem. After decades of deceit and denial, a growing number of nuclear industry bodies and lobbyists now openly acknowledge and even celebrate the connections between nuclear power and weapons. They argue that troubled nuclear power programs should be further subsidised such that they can continue to underpin and support weapons programs.

For example, US nuclear lobbyist Michael Shellenberger previously denied power–weapons connections but now argues that "having a weapons option is often the most important factor in a state pursuing peaceful nuclear energy", that "at least 20 nations sought nuclear power at least in part to give themselves the option of creating a nuclear weapon", and that "in seeking to deny the connection between nuclear power and nuclear weapons, the nuclear community today finds itself in the increasingly untenable position of having to deny these real world connections."

Former US Vice President Al Gore has neatly summarised the problem:
"For eight years in the White House, every weapons-proliferation problem we dealt with was connected to a civilian reactor program. And if we ever got to the point where we wanted to use nuclear reactors to back out a lot of coal ... then we'd have to put them in so many places we'd run that proliferation risk right off the reasonability scale."

Running the proliferation risk off the reasonability scale brings the debate back to climate change. Nuclear warfare − even a limited, regional nuclear war involving a tiny fraction of the global arsenal − has the potential to cause catastrophic climate change. The problem is explained by Alan Robock in *The Bulletin of the Atomic Scientists*:
"[W]e now understand that the atmospheric effects of a nuclear war would last for at least a decade − more than proving the nuclear winter theory of the 1980s correct. By our calculations, a regional nuclear war between India and Pakistan using less than 0.3% of the current global arsenal would produce climate change unprecedented in recorded human history and global ozone depletion equal in size to the current hole in the ozone, only spread out globally."

Nuclear plants are also vulnerable to security threats such as conventional military attacks (and cyber-attacks such as Israel's Stuxnet attack on Iran's enrichment plant), and the theft and smuggling of nuclear materials. Examples of military strikes on nuclear plants include the destruction of research reactors in Iraq by Israel and the US; Iran's attempts to strike nuclear facilities in Iraq during the 1980–88 war (and *vice versa*); Iraq's attempted strikes on Israel's nuclear facilities; and Israel's bombing of a suspected nuclear reactor site in Syria in 2007.



6. A Slow Response to an Urgent Problem

Expanding nuclear power is impractical as a short-term response to climate change. An analysis by Australian economist Prof. John Quiggin concludes that it would be "virtually impossible" to get a nuclear power reactor operating in Australia by 2040.

More time would elapse before nuclear power has generated as much as energy as was expended in the construction of the reactor. A University of Sydney report states: "The energy payback time of nuclear energy is around 6.5 years for light water reactors, and 7 years for heavy water reactors, ranging within 5.6–14.1 years, and 6.4–12.4 years, respectively."

Taking into account planning and approvals, construction, and the energy payback time, it would be a quarter of a century or more before nuclear power could even begin to reduce greenhouse emissions in Australia ... and then only assuming that nuclear power displaced fossil fuels.

7. Climate Change & Nuclear Hazards: 'You need to solve global warming for nuclear plants to survive.'

"I've heard many nuclear proponents say that nuclear power is part of the solution to global warming. It needs to be reversed: You need to solve global warming for nuclear plants to survive." – Nuclear engineer David Lochbaum.

Nuclear power plants are vulnerable to threats which are being exacerbated by climate change. These include dwindling and warming water sources, sea-level rise, storm damage, drought, and jelly-fish swarms.

At the lower end of the risk spectrum, there are countless examples of nuclear plants operating at reduced power or being temporarily shut down due to water shortages or increased water temperature during heatwaves (which can adversely affect reactor cooling and/or cause fish deaths and other problems associated with the dumping of waste heat in water sources). In the US, for example, unusually hot temperatures in 2018 forced nuclear plant operators to reduce reactor power output more than 30 times.

At the upper end of the risk spectrum, climate-related threats pose serious risks such as storms cutting off grid power, leaving nuclear plants reliant on generators for reactor cooling.

'Water wars' will become increasingly common with climate change − disputes over the allocation of increasingly scarce water resources between power generation, agriculture and other uses. Nuclear power reactors consume massive amounts of cooling water − typically 36.3 to 65.4 million litres per reactor per day. The World Resources Institute noted last year that 47% of the world's thermal power plant capacity – mostly coal, natural gas and nuclear – are located in highly water-stressed areas.

By contrast, the *REN21 Renewables 2015: Global Status Report* states:
"Although renewable energy systems are also vulnerable to climate change, they have unique qualities that make them suitable both for reinforcing the resilience of the wider energy infrastructure and for ensuring the provision of energy services under changing climatic conditions. System modularity, distributed deployment, and local availability and diversity of fuel sources − central components of energy system resilience − are key characteristics of most renewable energy systems."

8. Nuclear Racism

The nuclear industry has a shameful history of dispossessing and disempowering Aboriginal people and communities, and polluting their land and water, dating from the British bomb tests in the 1950s. The same attitudes prevail today in relation to the uranium industry and planned nuclear waste dumps and the problems would be magnified if Australia developed nuclear power.

To give one example (among many), the National Radioactive Waste Management Act dispossesses and disempowers Traditional Owners in every way imaginable:

- The nomination of a site for a radioactive waste dump is valid even if Aboriginal owners were not consulted and did not give consent.
- The Act has sections which nullify State or Territory laws that protect archaeological or heritage values, including those which relate to Indigenous traditions.
- The Act curtails the application of Commonwealth laws including the Aboriginal and Torres Strait Islander Heritage Protection Act 1984 and the Native Title Act 1993 in the important site-selection stage.
- The Native Title Act 1993 is expressly overridden in relation to land acquisition for a radioactive waste dump.

9. Nuclear Waste

Decades-long efforts to establish a repository and store for Australia's low-and intermediate-level nuclear waste continue to flounder and the current plan to dump in SA is being fiercely contested by Barngarla Traditional Owners – who are unanimous in their opposition – and many others. Establishing a repository for high-level nuclear waste from a nuclear power program would be far more challenging as Federal Resources Minister Matt Canavan has noted.

Globally, countries operating nuclear power plants are struggling to manage nuclear waste and no country has a repository for the disposal of high-level nuclear waste.

The United States has a deep underground repository for long-lived intermediate-level waste, called the Waste Isolation Pilot Plant (WIPP). However the repository was closed from 2014–17 following a chemical explosion in an underground waste barrel. Costs associated with the accident are estimated at over A$2.9 billion. Safety standards fell away sharply within the first decade of operation of the WIPP repository and those declining standards were directly responsible for the chemical explosion – a sobering reminder of the challenge of safely managing nuclear waste for millennia.

10. More Information

- Don't Nuke the Climate website https://dont-nuke-the-climate.org.au/
- Climate Council, 2019, 'Nuclear Power Stations are Not Appropriate for Australia – and Probably Never Will Be'
- WISE Nuclear Monitor, June 2016, 'Nuclear power: No solution to climate change'
- Friends of the Earth Australia nuclear power, nuclear/climate, renewable energy