Hot Politics: the case against nuclear power in Australia

A Friends of the Earth Australia and ACF snapshot: November 2025

INTRODUCTION

The possible introduction of nuclear power to Australia was the subject of intense debate in the two years leading up to the May 2025 federal election. The Liberal/National Coalition pledged to use taxpayer funds to build nuclear power plants at seven closed or closing coal power sites in five states.

The Coalition's nuclear power policy was strongly rejected by Australian voters – it may have cost the Coalition around 11 seats at the May 2025 election. The policy "definitely cost us votes, and anyone who says otherwise is kidding themselves," one Liberal MP told the ABC.

The fact that senior Coalition MPs repeatedly described the May 2025 election as a 'referendum' on nuclear power heightened expectations that the unpopular policy would be dropped in the aftermath of the election – just as it was in the aftermath of the 2007 election lost by the Howard government.

Yet the Coalition continues to promote nuclear power. Shadow energy minister Dan Tehan said in October 2025: "There is overwhelming agreement on the Coalition side that nuclear needs to be part of our energy mix."

Despite being comprehensively rejected by the Australian people in the federal election nuclear power promotion continues. Following the formal rejection of Net Zero by both the National and Liberal parties the nuclear debate is likely to remain a consistent theme.

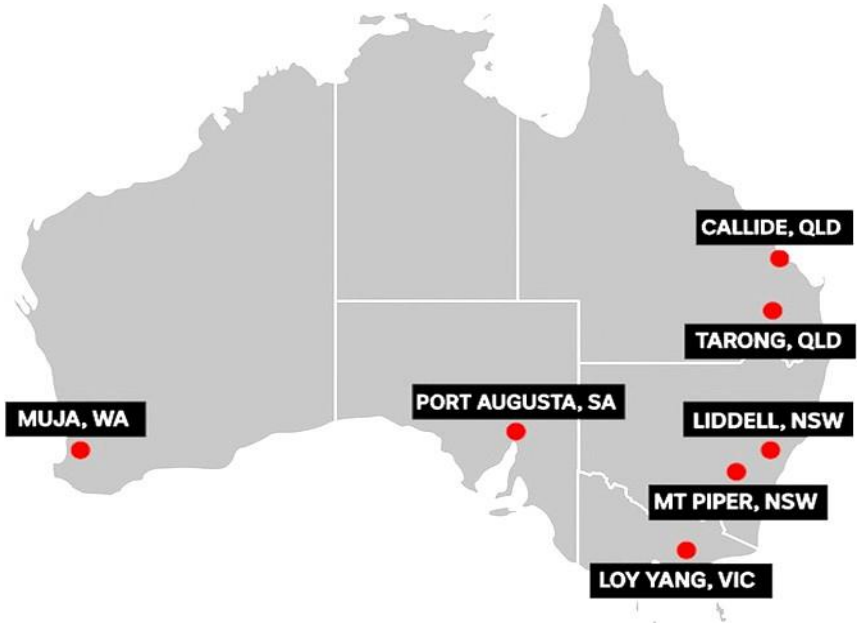
The pre-election nuclear debate gave raise to many valuable reports by scientists, economists, NGOs and others. Likewise, a number of journalists contributed valuable research to inform the nuclear debate. The purpose of this report is to summarise the most useful research produced in recent years (including some produced since the May 2025 election). In short: what have we learned about nuclear power as an energy option for Australia?

This report seeks to provide a snapshot rather that a definitive assessment of the pros and cons of introducing nuclear power to Australia. For a comprehensive assessment, please

see the November 2024 submission to the House Select Committee on Nuclear Energy by major state, Territory and national environment groups. Many other submissions to the House Select Committee also provided important information and insights.

On the basis of the recent wide ranging nationwide debate the clear conclusion is that Australia's energy future is renewable, not radioactive. As Australia's premier science organisation CSIRO states, nuclear power "does not currently provide the most cost competitive solution for low emission electricity in Australia" and "long development lead times mean nuclear won't be able to make a significant contribution to achieving net zero emissions by 2050."

International developments strengthen the conclusion that Australia's future is renewable, not radioactive. Global nuclear power generation has been stagnant for more than 20 years. The number of countries building reactors has fallen sharply from 16 in mid-2023 to just 11 in mid-2025. The number of operating power reactors has fallen from a historic peak of 438 in 2002 to 408 as of mid- 2025. Nuclear power accounts for just 9% of global electricity generation – barely half its historic peak. The renewables share of global electricity generation has grown to over 30% and the International Energy Agency expects 'turbocharged' growth with renewables reaching 46% by 2030.



The seven nuclear power sites identified by the Coalition.

TOO SLOW

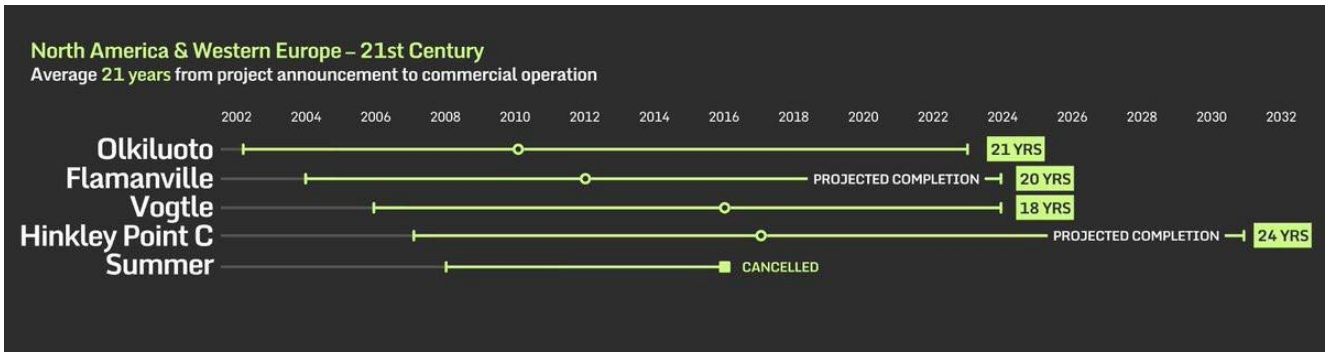
The most comprehensive assessment of the timeframe required to introduce nuclear power to Australia is the December 2024 submission to the House Select Committee on Nuclear Energy by energy expert Simon Holmes à Court. Based on assumptions which he describes as "optimistic" and even "fantastical", Mr. Holmes à Court concluded that it would take at least 19 years to complete planning and construction of a nuclear power reactor in Australia.

On the basis of overseas experience and expert analysis, it should be assumed the introduction of nuclear power to Australia would require 10 years for planning and another

10 years for reactor construction. Assuming that planning to introduce nuclear power began in 2030, nuclear power generation would not commence until 2050. Clearly this timeframe undermines claims that nuclear power is an essential component of reaching the target of net zero greenhouse emissions by 2050. It is near impossible for nuclear power to make any meaningful contribution.

Emeritus Professor Robin Batterham, Chair of the Net Zero Australia Steering Committee and former Australian Chief Scientist, said: "Nuclear power should not be in our plans, because it's too expensive and slow." Likewise, a report prepared for the NSW Cabinet by NSW Chief Scientist Hugh Durrant-Whyte, a former Chief Scientific Adviser at the UK Ministry of Defence, noted that it would be naive to think a nuclear plant could be built in Australia in less than two decades.

A submission to the House Select Committee on Nuclear Energy by national, state and Territory environment groups provides detail on recent reactor construction projects in Western countries. Every one of those projects has been subject to extraordinary delays and cost blowouts. In France and Finland, for example, reactor construction alone took 17 years in addition to years of planning.



Source: Simon Holmes à Court

The long timeframe to deploy nuclear power complicates the Coalition's proposal to replace coal plants with nuclear power. The Australian Energy Market Operator's 2024 Integrated System Plan forecasts the retirement of Australia's entire fleet of coal plants by 2038. Replacement power sources will need to be operating well before nuclear power reactors could possibly replace coal.

Claims by the Coalition that planning and construction of nuclear reactors could be completed in 10–12 years do not withstand scrutiny. South Korea's reactor construction project in the United Arab Emirates is frequently cited – the timeframe was 12–16 years from the announcement of the project to completion of the reactors. However, Australia could not match the timeline achieved in the UAE for a myriad of reasons including the authoritarian nature of the UAE political system, and the employment of a large, mostly-foreign workforce with few rights.

Promoters of small modular reactors (SMR) claim a 3–5 year construction timeline with 'cookie-cutter' factory construction techniques. Even bending the definition, only two SMRs exist worldwide, one each in China and Russia. In China, planning to commercial operation spanned 22 years, and construction took nine years. In Russia, planning to commercial operation spanned at least 19 years, and construction took 12 years. Construction of Argentina's CAREM SMR began in 2014, but the project remained incomplete when it was abandoned a decade later.

Former Australian Chief Scientist Dr. Alan Finkel provided this reality check regarding SMRs:
"In Australia, we would be looking to use SMRs because of the enormous cost and construction delays of large-scale nuclear plants. But we will want the reassurance of first seeing SMRs work safely and well in the UK, Europe, Canada, the US or another OECD country. The trouble is, there are no SMRs operating in the UK, Europe, Canada, the US or any other OECD country."

TOO EXPENSIVE

Before the May 2025 federal election, the Coalition proposed building nuclear power plants at seven sites, entirely funded by the government. This was an implicit admission that there was no chance of the private sector funding the construction of nuclear reactors in Australia.

By far the most useful studies on the economics of nuclear power and other energy sources in Australia are the annual GenCost studies produced by the CSIRO in collaboration with the Australian Energy Market Operator (AEMO).

The most recent GenCost report was released in July 2025. It concludes that 'firmed' renewables – in particular solar PV and wind power coupled with storage and including transmission costs – are far cheaper than nuclear power. Firmed renewables will soon be cheaper than coal and are already cheaper than coal or gas with carbon capture and storage.

The GenCost report compares the 'levelised cost of electricity' (LCOE) for different sources: the cost per unit of electricity generated over the life of the project including capital costs as well as ongoing fuel, operation, and maintenance costs. The LCOE estimates per megawatt-hour (MWh) are as follows:

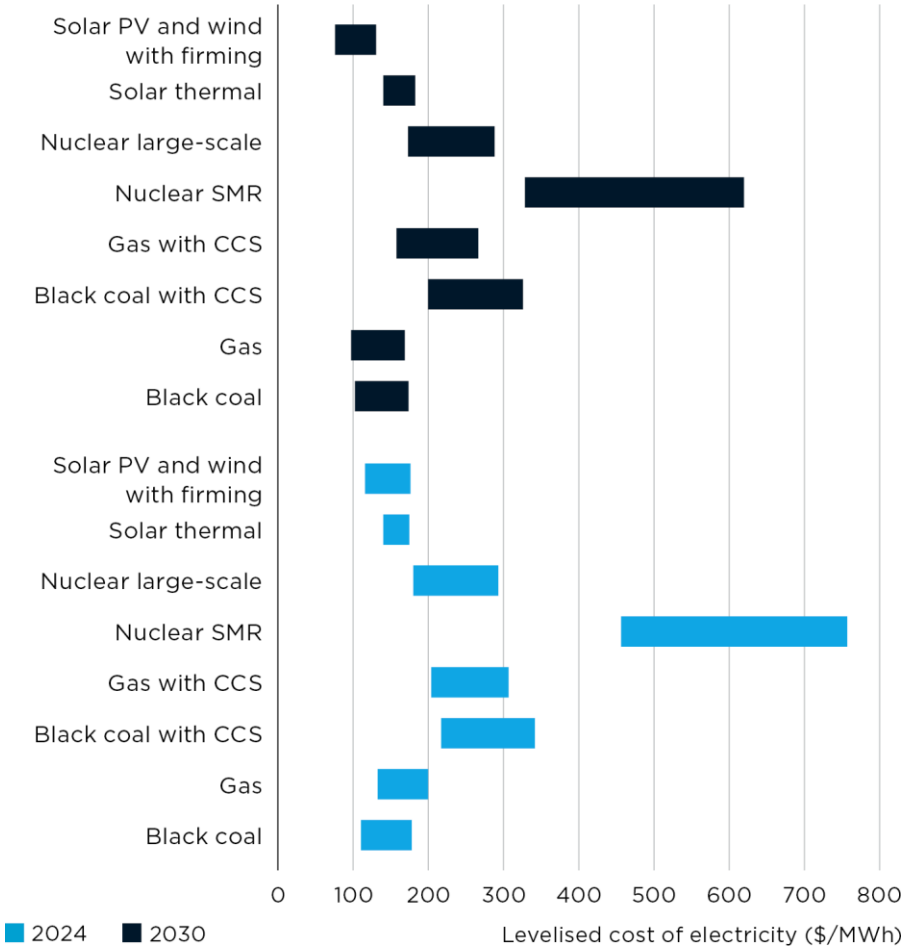
	2024 (A$/MWh)	2030 (A$/MWh)
90% wind and solar PV with integration costs	125–176	90-131
Nuclear (small modular reactors)	456-757	328-619
Nuclear (large-scale)	180-293	173-288

Source: CSIRO GenCost, July 2025, Apx Table B.10

The CSIRO/AEMO GenCost studies have been the subject of relentless criticism from pro-nuclear advocates but in fact the small modular reactor (SMR) cost estimate is based on the most advanced SMR project in any Western country – the project in Darlington, Canada, where pre-construction activities are underway. The Darlington SMR capital cost estimate is an exorbitant A$29,667 / kilowatt (kW). Further, the GenCost estimates for large-scale nuclear are extraordinarily low. The capital cost estimate of A$8,984 per kW (see Table B.1) is approximately one-third of the cost of recent reactor construction projects in the US, the UK and France.

In short, the GenCost report uses very low cost estimates for large-scale nuclear but still

finds that firmed renewables are considerably cheaper. SMRs are by far the most expensive option.



Levelised cost of electricity estimates, 2024 (blue) and 2030 (black). Source: CSIRO Gencost, July 2025

Readers with an interest in criticisms of CSIRO GenCost studies may wish to read the following rebuttals:

– "It makes my blood boil:" Bowen fumes as Dutton leads new attack on CSIRO integrity, RenewEconomy, 10 Dec 2024

– The Coalition told the CSIRO to redo its nuclear report. It's bad news for Dutton, The Age, 9 Dec 2024

– Peter Dutton's bid to politicise top science agency is 'absurd', former CSIRO energy director says, The Guardian, 11 Dec 2024

– Balancing the scale: An open discussion on the cost of new nuclear, Simon Holmes à Court, 26 March 2024

– Nation's science agency CSIRO hits back at Dutton claim that nuclear power costings were 'discredited', ABC, 15 March 2024

– CSIRO chief warns against 'disparaging science' after Peter Dutton criticises nuclear energy costings, The Guardian, 15 March 2024

– Factcheck: Dutton's blast of radioactive rhetoric on nuclear power leaves facts in the dust, The Guardian, 14 March 2024
– The cheapest reliable energy system to meet Australia's climate targets? Solar and wind, no question, The Guardian, 1 Sept 2023

The annual reports by Lazard investment firm provide an important source of information on energy costs. Based on US data, the most recent Lazard report, released in June 2025, notes that utility-scale solar and onshore wind remain the most cost-effective forms of new-build energy generation on an unsubsidised basis (i.e., without tax subsidies). The Lazard report shows sharp cost declines for battery energy storage systems driven by market dynamics and technological advancements (e.g., increased cell capacity and energy density).

The 2025 Lazard report presents these levelised cost estimates:

	US$/MWh (A$/MWh)
Solar PV – Utility	38-78 (58-118)
Solar PV + storage – Utility	50-131 (76-198)
Wind – onshore	37-86 (56-130)
Wind + storage – onshore	44-123 (67-186)
Wind – offshore	70-157 (106-238)
Nuclear	141-220 (213-333)

To give some sense of the capital costs of building nuclear power reactors in Australia, the following table assumes the replacement of Australia's current 21.3 gigawatts (GW) of coal generating capacity with nuclear power, The nuclear costs are based on recent projects in Western countries as well as SMR cost estimates for Darlington, Canada, and the NuScale project that was the most advanced SMR project in the US until it was abandoned in 2023.

	$ / reactor and $ / GW	Cost for 21.3 GW
USA — Vogtle (Georgia) US$34 billion / 2.4 GW	US$17 billion (A$25.8 billion) per reactor or A$23.5 billion / GW	A$501 billion
UK — Hinkley Point £46 billion / 3.2 GW	£23 billion (A$47 billion) per reactor or $A29.4 billion / GW	A$627 billion

UK — Sizewell C £47.7 billion / 3.2 GW	£23.9 billion (A$48.9 billion) per reactor or A$30.6 billion / GW	A$652 billion
France — Flamanville €19.1 billion / 1.6 GW	€19.1 billion (A$34 billion) per reactor or $A21.3 billion / GW	A$454 billion
SMR — NuScale (USA) US$9.3 billion / 462 MW	A$14.1 billion per six-unit plant or A$30.1 billion / GW	A$641 billion
SMR — Darlington (Canada) $C20.9 billion / 1.2 GW	A$22.9 billion per four-unit plant or A$ per A$19.1 / GW	A$407 billion

Additional to capital costs, countless billions would be required to train and employ a nuclear workforce, establish a regulatory agency, etc. Waste management costs would be vast: the US government estimates that to build a high-level nuclear waste repository and operate it for 150 years would cost US$96.2 billion (A$146 billion).

Prior to the May 2025 election, the Coalition relied on research by Frontier Economics to support its claim that nuclear power would be cheaper than renewables in Australia. This research was seriously flawed, including assuming that capital costs for nuclear reactors in Australia (A$10 billion / GW) would be 2-3 times lower than the cost of recent projects in the US, the UK and France.

For a detailed critique of the Frontier Economics research, see this article by Tristan Edis from Green Energy Markets (which includes links to valuable research by the Institute of Energy Economics and Financial Analysis, the Grattan Institute and others):
The four accounting tricks behind Peter Dutton's nuclear cost claims
See also the four-part critique by Tristan Edis:
Nuclear accounting trick #1: Assume you can halve the cost of nuclear power
Nuclear accounting trick #2: Pretend petrol and gas are free
Nuclear accounting trick #3: Hide the costs of keeping coal
Nuclear accounting trick #4: Assume climate change has no cost

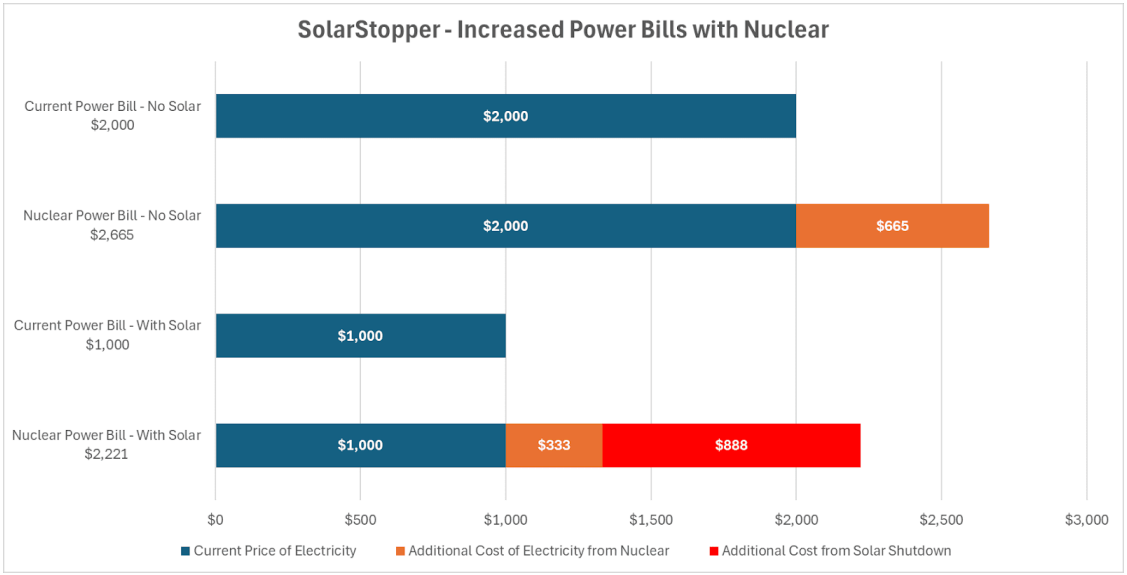
Economists are overwhelmingly opposed to nuclear power as a competitive energy option for Australia. A mid-2025 survey of 40 members of the Economic Society of Australia – including experts in public finance, macroeconomics and economic modelling – found that nuclear power was the least favoured method of reducing Australia's carbon emissions.

A fortnight prior to the May 2025 federal election, 60 Australian economists, energy analysts and policy specialists signed an open letter comparing the economic consequences of introducing nuclear power compared to distributed clean energy technologies, including batteries. They wrote:
"As economists, energy analysts and policy specialists we strongly support government investment in household clean energy and industrial electrification and not in nuclear energy. Why? Because simple household clean energy upgrades can deliver immediate cost-of-living benefits and reductions in carbon emissions, and electrification can safeguard the future of industrial jobs and the communities that rely on them."

The extent to which power bills would increase with the introduction of nuclear power

would depend on a number of variables. For the Coalition's plan to use taxpayer funds to build 13-14 GW of nuclear capacity at seven sites, a number of studies estimated the impact on power bills:

* A study by the Institute for Energy Economics and Financial Analysis found household electricity bills would rise by $665 per year on average. For a four- person household, the rise would be $972 per year.
* An analysis by global consultancy firm Jacobs for the Clean Energy Council found the Coalition's nuclear plan would increase the average household bill by $449 per year plus an $877 increase for small businesses, further aggravating the cost-of-living crisis.
* A study by the Smart Energy Council study found the Coalition's nuclear plan would add $665 per year to the average non-solar household's power bill and the rooftop solar systems of up to 12.5 million Australians would need to be shut off every day to allow nuclear to be shoe-horned into the system. Nuclear would knock out solar for an average 67% of the year, resulting in lost energy savings and solar residents being forced on to higher nuclear power prices.



Source: Smart Energy Council.

Throughout the debate leading up to the May 2025 election, the Coalition was silent on the economic impacts of nuclear disasters. The financial costs of the Fukushima disaster amount to many hundreds of billions of dollars – more than one trillion dollars if indirect economic impacts of the disaster are included. Likewise, Chernobyl was a trillion-dollar disaster.

Nuclear reactor vendors refuse to accept economic liability for the damage caused by their technology. As a result the astronomical costs associated with nuclear disasters are primarily foisted onto taxpayers.

Compounding the problem is the fact that insurance policies from many of Australia's major insurers – including AAMI, CGU, Allianz, QBE and NRMA – contain specific text excluding coverage for nuclear disasters and none of these will insure homes, cars or possessions against a nuclear accident or release.

INDUSTRY OPPOSITION

A remarkable feature of the nuclear debate in Australia in recent years has been the clear opposition of the business sector to the introduction of nuclear power to Australia. In part, the opposition was specific to the Coalition's proposal to build seven nuclear plants at taxpayers' expense; in part, it is due to the economic impacts of favouring more expensive nuclear power over the cheaper option of renewables coupled with storage technologies.

The Coalition said it received legal advice that it could use compulsory acquisition powers to seize land for its seven proposed nuclear reactors on the sites of closed or closing coal power plants. There was no support for the Coalition's coal-to-nuclear plan among the owners of the seven sites. *Guardian Australia* reported in March 2024 that Australia's big private electricity generators — AGL Energy, Alinta, EnergyAustralia and Origin Energy — dismissed nuclear energy as a viable source of power and that they remain focused on developing renewable sources as coal and gas plants exit the grid.

AGL chief executive Damien Nicks warned the nuclear debate risks derailing critical investment in the energy transition. AGL reportedly plans 12 gigawatts of new renewable and firming capacity by 2035. Nicks said:
"There is no viable schedule for the regulation or development of nuclear energy in Australia, and the cost, build time and public opinion are all prohibitive … AGL is already developing our coal and gas power station sites into low-emissions industrial energy hubs … As the owner of these sites, nuclear energy is not a part of these plans."

Alinta Energy CEO Jeff Dimery said in an April 2024 address to the National Press Club that pitching nuclear power in Australia to board rooms and investors is like "looking for unicorns in the garden." Alinta states that for nuclear power to be viable in Australia, "the regulatory environment would need to be amended and many other considerations would need to be assessed."

Origin is targeting 4-5 gigawatts of renewables and energy storage capacity by 2030, including the Eraring big battery and a large-scale battery alongside its gas-fired Mortlake Power Station in Victoria. Origin said in March 2024 that the company is focused on accelerating the expansion of renewables and storage.

EnergyAustralia, Australia's third-largest electricity and gas supplier, and owner of the Mount Piper (NSW) coal power plant, believes nuclear energy is unnecessary. The company does not include nuclear power in its long-term planning.

In WA, (recently-retired) Synergy CEO David Fyfe expressed concern and scepticism about the Coalition's nuclear power plan on cost and timing grounds.

The Australian Energy Council – whose members include AGL, Alinta, EnergyAustralia, Origin, Stanwell and Synergy – said in December 2024 that coal power plants were too costly to run and maintain for the decades required by the Coalition's coal-to-nuclear plan.

Broader industry responses

The Business Council of Australia argues for a rapid, renewables-led decarbonisation. Tennant Reed from the Australian Industry Group says Australia's energy future almost

certainly lies in large-scale solar and wind rather than nuclear because solar and wind are cheap, abundant and open doors to developing green export industries.

Rio Tinto says it is not interested in nuclear power and in March 2025 signed a massive solar and battery storage deal with Australian company Edify Energy to help secure the future of its Gladstone-based smelter and refineries that are among the country's biggest consumers of energy. "These agreements are integral to repowering our Gladstone aluminium operations with affordable, reliable and lower carbon energy for decades to come," Rio Tinto Australian chief executive Kellie Parker said. Previously, the company signed the two biggest renewable energy power purchase agreements, with the proposed 1.4 gigawatt (GW) Bungaban wind project and the 1.2 GW Upper Calliope solar project.

Asked if Rio Tinto's smelters could run on nuclear power, Vik Selvaraja from Rio Tinto's energy and climate division said nuclear power is too slow and too expensive:
"As far as we can see … all validated and independent data that exists on costs say that it is a very expensive source of energy. And I think in Australia, certainly, we've got low cost wind and solar, and we were going to run with that."

A 2024 survey by the Investor Group on Climate Change (IGCC) – a coalition of 104 global and local investors such as AustralianSuper, Cbus, HESTA, Fidelity, BlackRock and Vanguard – asked big institutional investors with $37 trillion under management which energy and climate solutions they believed had good long-term returns. Nuclear power was ranked last of the 14 options. Renewable energy was ranked first.

The IGCC said nuclear power's last placing was due to its "very high cost, and the lack of maturity and deployment in next-generation technologies" and there is no interest among investors in nuclear power because of "project time blowouts of anything from seven to 15-plus years and cost blowouts in the tens of billions, and lowest-cost technologies, renewables, batteries and so on, are available to deploy now".

The Clean Energy Investor Group – a group of 18 large investors including Australia's Macquarie, America's BlackRock and France's Neoen – said the Coalition's nuclear plan introduces "unprecedented sovereign risks" for investment in new energy. Interim chief executive Marilyne Crestias said in June 2024 that "a stable and predictable policy environment is essential for attracting and retaining the significant capital required to achieve our renewable energy targets." None of the Clean Energy Investor Group's members have expressed an interest in investing in nuclear power.

Andrew Richards, chief executive of the Energy Users Association – representing firms such as BlueScope Steel, Tomago Aluminium and Visy – said in mid-2024: "Even if the country wants to pursue a government-funded nuclear strategy, that's still a decade away from any energy being produced from it, so it doesn't do anything to solve the very real problems we have now."

Jeremy Cooper – Director, Bennelong Funds Management; Chair, Carbon Advisory Board, Future Group; and a former Deputy Chair of ASIC – said:
"If nuclear power does arrive in Australia, it will be an ugly duckling in every possible respect; too late; too costly; too toxic and unable to supply a 21st century power grid that will have moved to flexible power sources. Unlike the famous Danish children's story, the nuclear duckling will never be recognised as a 'swan'.

"This is not to say that the transition to renewable energy is without challenges, costs, and the potential for delays. There are and will be obstacles, but we cannot afford to wait for nuclear energy while continuing to burn fossil fuels in the meantime."

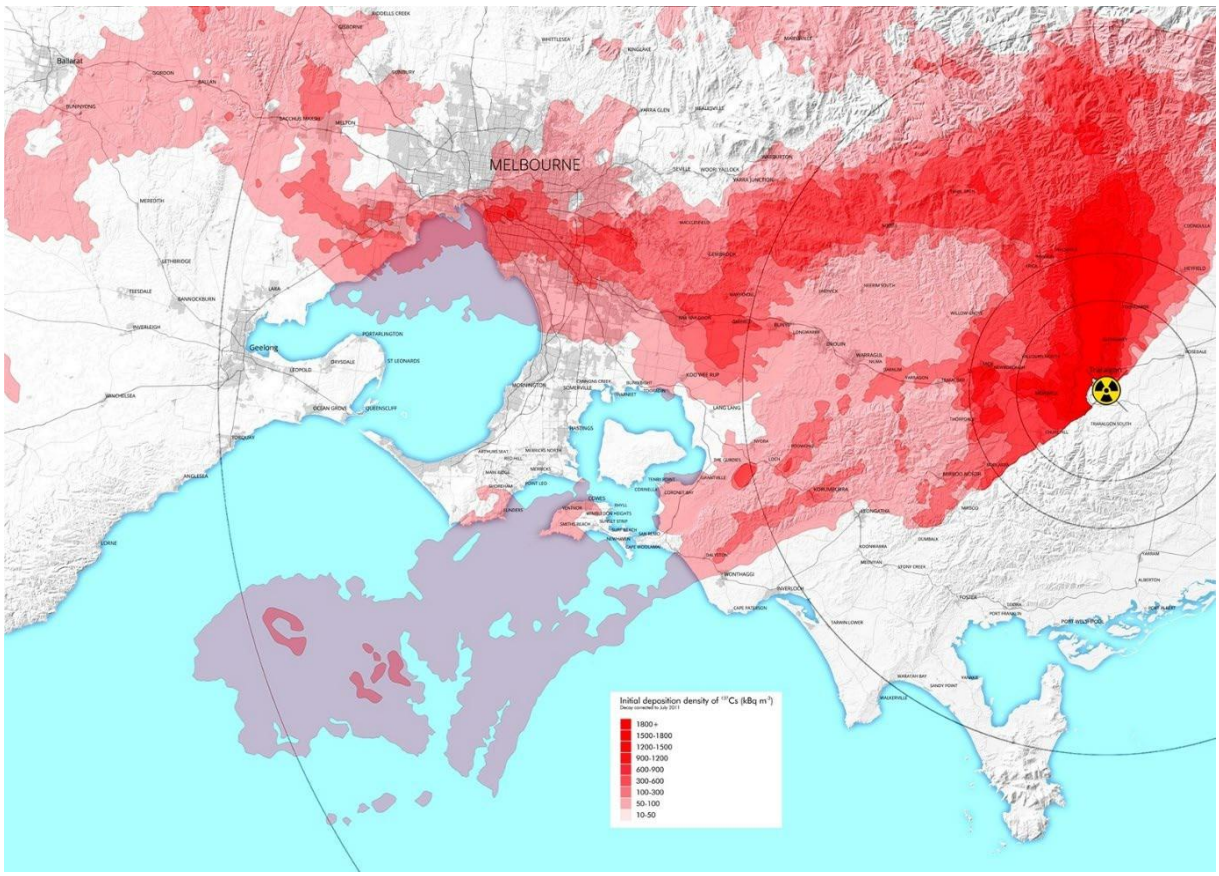
NUCLEAR ACCIDENTS

The Nuclear Plume project initiated by national environment groups provided detail on the impacts of a Fukushima-scale nuclear disaster at the seven reactor sites proposed by the Coalition. At the Nuclear Plume website, you can select the reactor site and wind direction to see how a Fukushima-scale nuclear disaster would contaminate different areas.

The findings of the Nuclear Plume project are alarming. Applying a 30 km evacuation zone at the seven reactor sites the project showed:

* Almost 200,000 Australians live within nuclear evacuation zones
* 33 hospitals and medical centres are located within evacuation zones
* 99 schools are located within evacuation zones
* 62 daycares are located within evacuation zones

The Nuclear Plume project pointed to the failure of the Coalition to provide any information on key issues such as nuclear disaster evacuation planning, or the pre-distribution of stable iodine tablets to reduce the number of thyroid cancers in the event of a nuclear accident.



Mapping the spread of a Fukushima-scale disaster at the proposed Loy Yang reactor site in Victoria. Source: Nuclear Plume project.

Agricultural risks and ingestion zones: Nearly 12,000 farms are located within 80 km of the seven sites that were targeted by the Coalition for nuclear reactors. A July 2024 Joint Ministerial Statement released by Agriculture Ministers of the Governments of Australia, Queensland, NSW, the ACT, Victoria, SA, WA and the NT notes that in similar countries, states have produced detailed plans to manage radioactive emergencies from nuclear reactors within a similar radius of farmland (known as the "ingestion zone"). The joint statement said:
"As the nation's agriculture ministers, we have a duty to protect and grow the industry we represent in our respective jurisdictions. We have serious concerns that this duty would be compromised by the Federal Opposition's proposal for nuclear power in and around prime agricultural land."

Health effects of low-level radiation exposure: Importantly, the health risks associated with nuclear power are not limited to nuclear accidents. Dr Margaret Beavis OAM summarised international scientific research linking even low levels of exposure to ionising radiation to increases in cancers including childhood leukemia.

Medical experts speak out: Prior to the May 2025 federal election, a joint letter by Doctors for the Environment Australia and Médecins Sans Frontières / Doctors Without Borders urged election candidates and parties to support policies that will have a positive impact on both the environment and the lives of their patients. The medical groups urged political candidates and parties to:

* Stop funding fossil fuels – end public coal, oil, and gas subsidies.
* Invest in renewables – wind and solar provide jobs and are cheap, safe and fast to build.
* Reject nuclear power – it is costly, poses health and environmental risks, takes too long to build, and slows down the move away from fossil fuels.
* Boost climate aid – Expand Australia's aid budget to support Pacific and global communities' responses to climate disasters and protect health.
* Properly fund Australia's National Health and Climate Strategy.

A statement by Doctors for the Environment Australia (DEA) said nuclear power in Australia:

* is unnecessary, uneconomical, and not flexible enough for changing energy needs
* carries high health and safety risks
* is a significant security risk
* creates high-level radioactive waste, which cannot be safely disposed of and for which there is no known secure long-term storage
* requires large amounts of water
* cannot decarbonise the energy sector fast enough to avert catastrophic climate change
* is neither renewable nor a low emissions energy source, if the entire nuclear life cycle from mining fuel to decommissioning of the reactor is considered
* distracts from and delays more reliable, safer and less costly existing and developing technologies
* emerges from the history of nuclear weapons testing and uranium mining on First Nations lands without consent, and may continue to disproportionately affect First Nations people.

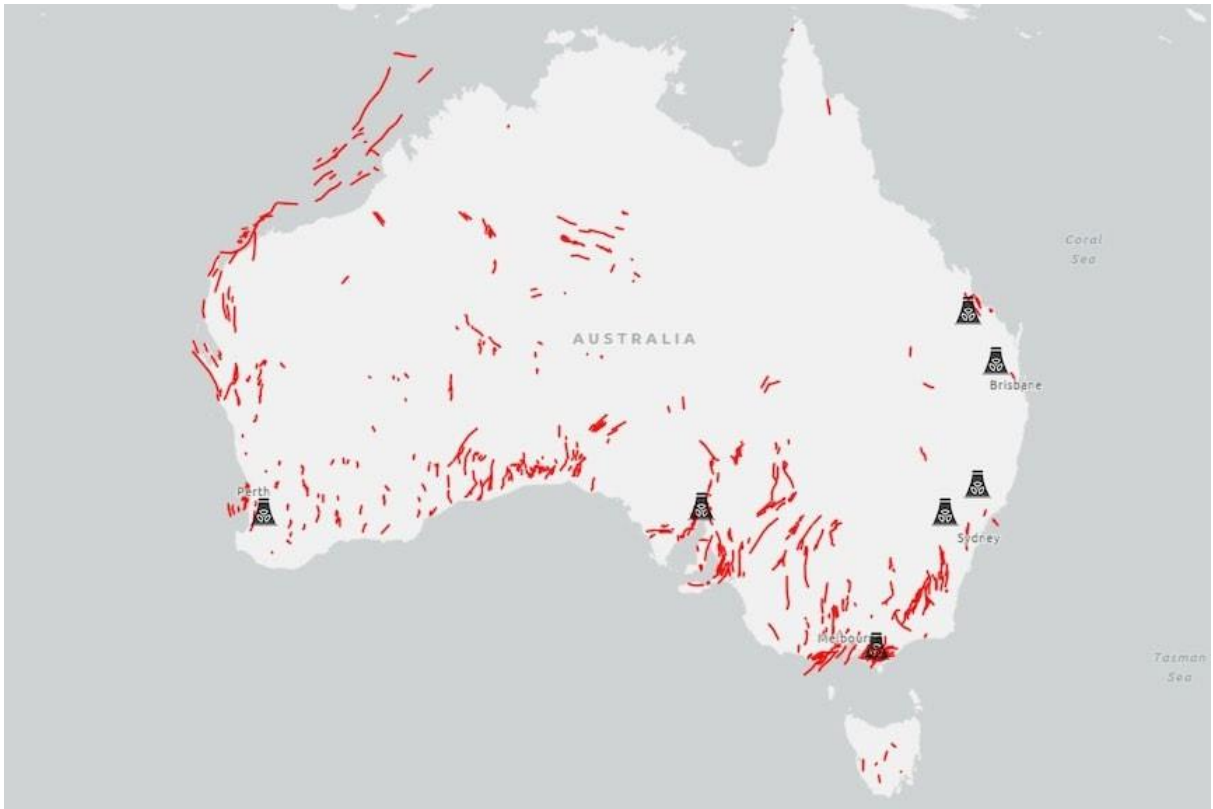
Health impacts of greater reliance on fossil fuels: In addition to the direct health and safety

risks associated with the introduction of nuclear power to Australia, the Coalition's energy plan involved much greater and longer reliance on coal and gas power. A February 2025 study by the Climate Change Authority, a government agency, found that the Coalition's energy plans would add an extra two billion tonnes of carbon dioxide to the atmosphere and make it "virtually impossible" for Australia to reach net zero by 2050.

The Climate and Health Alliance estimated the health impacts of greater reliance on coal under the Coalition's energy plan. A paper prepared for the Alliance by Dr. Thomas Longden and Prof. Martin Hensher concluded:
"Over a 25 year period, the prolonged use of coal-fired electricity generation envisaged under the nuclear plan will lead to the following additional (preventable) harms to human health across Australia through continuing air pollution, when compared with AEMO's existing scenarios for transition in the electricity sector:

* *Between 3,000 and 10,000 additional premature deaths*
* *Between 3,500 and 9,800 additional premature births / low birthweight deliveries*
* *Between 14,000 and 214,000 additional asthma attacks in children and young people (aged 5-19)*
* *By locking in current levels of coal-fired generation until around 2040, a nuclear future would cause a decade of avoidable death and health damage by failing to reduce air pollution".*

Earthquakes in the vicinity of three of the seven proposed reactor sites in the lead up to the May 2025 election focused attention on seismic risks. Hardening nuclear power plants against the risk of large earthquakes would add to the overall cost, a significant problem given the already excessive cost of building nuclear power plants.



GeoScience Australia's Neotectonics map shows known and possible fault lines (marked in red), with many near the proposed nuclear reactor locations. Source: ABC.

Security risks: The Coalition's plan to build nuclear reactors would leave Australia vulnerable to missile warfare and sabotage, the Australian Security Leaders Climate Group warned. The group includes former Australian Defence Force chief Chris Barrie, who said: *"Every nuclear power facility is a potential dirty bomb because rupture of containment facilities can cause devastating damage. Modern warfare is increasingly focused on missiles and uncrewed aerial systems, and with the proposed power stations all located within a 100 kilometres of the coast, they are a clear and accessible target".*

Warnings from first responders

Emergency responders were strongly opposed to the Coalition's nuclear power plan. In the week before the May 2025 federal election, organisations representing more than 350,000 emergency and health services workers called on the Coalition to dump the nuclear policy in the interests of good health. The open letter was signed by the United Firefighters Union of Australia, the Australian Nursing and Midwifery Federation, Emergency Leaders for Climate Action, Climate Action Nurses, Climate and Health Alliance and Doctors for the Environment Australia.

The open letter said:
"As the frontline responders to disasters and emergencies, we are uniquely positioned to assess the risks posed by nuclear energy infrastructure to public safety, worker health, and environmental security.
"Australia's emergency services do not have the support or resources to respond to nuclear disasters. Unlike other nations with established nuclear industries, Australia lacks the necessary infrastructure, resources, and expertise to manage incidents involving nuclear reactors or radioactive waste transportation and storage.
"Furthermore, international examples have shown that populations residing in close proximity to nuclear reactors are at an increased risk of developing severe health complications.
"Existing emergency response and health frameworks would need extensive – and costly – overhauls to address these challenges effectively.
"Nuclear accidents expose emergency responders to ionizing radiation levels far exceeding safe occupational limits. International precedents such as Chernobyl and Fukushima demonstrate the devastating health impacts on first responders, including acute radiation sickness and long-term cancer risks."

Former NSW Fire and Rescue Commissioner Greg Mullins said:
"Our firefighters are on the frontlines of escalating climate fuelled disasters, like bushfires and floods, fuelled by climate pollution. They're not trained or equipped to deal with nuclear emergencies that could arise from nuclear reactors or the transportation and storage of radioactive waste.
"I oversaw the deployment of Australian firefighters to assist in the wake of the earthquake and tsunami that led to the Fukushima disaster, where the chaos and devastation caused by nuclear failures was stark. First responders, many of them civilian firefighters, were thrown into situations they weren't trained for. That's not a risk we should take in Australia, no matter how remote.
"There are no safety or environmental frameworks in place to manage the risks of nuclear reactors or to safely transport and store radioactive waste in Australia."

An analysis by the United Firefighters Union of Australia found that establishing nuclear firefighting capabilities in line with the International Atomic Energy Agency's standards would cost over half a billion dollars. The costs include $446.7 million to establish

specialised fire stations both in and near the proposed nuclear sites, and $79.7 million annually in additional firefighter salaries.

United Firefighters Union National Secretary Greg McConville said the nuclear plan was both financially reckless and a threat to firefighter and public safety:
"The Coalition's nuclear plan ignores the reality that nuclear power demands a specialised, fully equipped emergency response capability. This is a half-billion- dollar black hole in their costings puts firefighters and communities at risk, and places the overall cost further out of reach.
"Firefighters already face extreme risks responding to bushfires, floods, and industrial incidents. Nuclear power introduces a new, more dangerous threat we are not prepared for, radioactive contamination that can linger for decades. "A nuclear accident would stretch our already under-resourced emergency services to breaking point. The consequences for firefighters, first responders, and surrounding communities would be catastrophic."

Emergency responders could be asked to take actions resulting in dangerous radiation doses up to 500 millisieverts – 500 times the annual limit for members of the public.

NUCLEAR WASTE

The Coalition advanced no plans whatsoever for the long-term management and disposal of low, intermediate and high-level nuclear waste from a nuclear power program. Then opposition leader Peter Dutton said nuclear waste would be stored at the seven proposed reactor sites and then moved to an unspecified "permanent home" at the end of the operating life of the reactors.

The Coalition planned up to 14 gigawatts (GW) of nuclear power capacity. That would result in the creation of 420 tonnes of high-level nuclear waste each year or 33,600 tonnes over an 80-year reactor lifespan. Large amounts of additional radioactive waste would be created at the reactor sites – over 300,000 cubic metres of low- and intermediate-level wastes at the seven sites combined over 80 years (300 m3 / GW / year).

In addition, troublesome radioactive waste streams are generated across the nuclear fuel cycle including uranium mining tailings waste, uranium hexafluoride, and depleted uranium.

There are currently no operating deep underground repositories for high-level nuclear waste anywhere in the world. Finland is close to opening a facility but has yet to do so and no other nation is close. There is one operating deep underground repository for long-lived intermediate-level nuclear waste − the Waste Isolation Pilot Plant (WIPP) in the US state of New Mexico. However, the WIPP repository was shut for three years following a chemical explosion in an underground radioactive waste barrel in 2014. 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. Costs associated with the WIPP explosion are estimated at over A$2.9 billion.

Efforts to establish a national radioactive waste repository in Australia have repeatedly failed. Decades of mismanagement of low and intermediate level waste do not inspire confidence that far more complex high-level nuclear waste from a nuclear power program (or a nuclear submarine program) would be responsibly managed in Australia.

Prof. Rosemary Hill and Prof. Ian Lowe noted in *The Conversation* in June 2024 that interim, on-site storage of high-level nuclear waste – involving wet storage and/or dry storage – poses various risks including corrosion as well as natural disasters such as cyclones, tsunamis, earthquakes, fires and floods. In addition, there are risks from human-induced hazards such as war, terrorist attack, arson and accidents.

Prof. Hill and Prof. Lowe noted issues and problems associated with deep underground burial of high-level nuclear waste:

- *"cost: the construction, decommissioning, closure and monitoring of such a facility in South Australia has been estimated at A$41 billion*
- *siting: the location must be geologically stable, to prevent waste from escaping over many thousands of years*
- *transport: the further waste has to be moved, the greater the safety risks. This is relevant to the Coalition's plan, under which seven nuclear sites would be distributed around Australia*
- *preventing corrosion and leakage: the waste container must be sufficiently robust to corrosion and the invasion of microbes. The shaft to the underground storage also needs to be sealed*
- *social acceptance: in a democratic country such as Australia, communities must agree to host a nuclear waste site and be satisfied it is safe. This includes securing "free, prior and informed consent" from Traditional Owners."*

Prof. Hill and Prof. Lowe noted that Finland is the country closest to realising an operational repository for high-level nuclear waste – it has selected a site for a repository 500 metres underground, and begun construction, but the project has taken decades and suffered numerous technical problems.

Then Opposition leader Peter Dutton claimed a 450-megawatt reactor would produce waste "equivalent to the size of a can of Coke each year." In fact, just the high-level nuclear waste (spent fuel) alone would require 11,700 empty Coke cans per year.

Greenpeace Australia released a report a month prior to the May 2025 federal election titled 'Toxic Threat: The Danger of Nuclear Waste in Australia'. The report found the Coalition's nuclear power plan would produce 14 billion Coke cans' worth of radioactive waste a year including the vast streams of waste generated across the nuclear fuel cycle beginning with uranium mining. The Greenpeace report discussed the unacceptable risk this waste poses to Australian communities and warns Australia's long history of nuclear waste management failures point to a very high likelihood of future nuclear disaster.

Joe Rafalowicz, Head of Climate and Energy at Greenpeace Australia Pacific, said:
"Australia's unenviable track record of mismanaging even low-level nuclear waste, as well as a history of radioactive incidents in the US, UK and EU, reveals how complex it is to manage nuclear waste safely. Multiplying that challenge many times over by building a fleet of nuclear reactors could have devastating consequences for communities and ecosystems."

WATER CONSUMPTION

Coalition MPs have claimed the water consumption of nuclear power plants is comparable to water consumption by coal plants. (Consumption is the net water loss from evaporation and equals the amount of water withdrawn from the source minus the amount returned to the source.)

In fact, nuclear plants consume large amounts of water and considerably more water than coal plants per unit of electricity produced. The OECD Nuclear Energy Agency notes that nuclear plants are more water intensive than fossil fuel plants "because the steam in NPPs [nuclear power plants] is designed to operate at lower temperatures and pressures, which means that they are less efficient at using the heat from the reactor and thus require more water for cooling."

The OECD Nuclear Energy Agency notes that for once-through cooling systems (with warmed water returned directly to the water source), nuclear plants consume about 33% more water than fossil fuel plants per unit of energy produced. For a closed-loop system (with a cooling tower cooling water through evaporation), nuclear plants consume about 50% more water than fossil fuel plants per unit of energy produced. The pro-nuclear Centre for Independent Studies in Australia states that nuclear plants consume about 25% more water than coal plants per unit of electricity produced.

Daily water consumption to operate a standard 1,000-megawatt reactor is typically 28 million litres of water per day with once-through cooling or 51 million litres of water per day with recirculating cooling towers. The water consumption for solar PV and wind power is negligible and greatly lower than the water consumption of coal and nuclear plants per unit of energy produced.

The OECD Nuclear Energy Agency notes that:
"Water use could become an issue of increasing concern should climate change impacts include more frequent heat waves, as currently expected. All large thermal generators, including NPPs, are susceptible to reduced production during extended periods of hot weather when return water temperatures to already warm water bodies approach or exceed regulatory requirements."

An April 2025 report by Prof. Andrew Campbell, former Land & Water Australia chief executive, analysed the water requirements of the Coalition's proposed seven nuclear power plants. The report assessed catchment hydrology at each of the sites, the current water allocation regime and applicable water markets, and the likely sources of water for nuclear reactors.

Prof. Campbell's detailed report concludes:
"Across the seven sites proposed by the Coalition, five sites comprising 90% of the proposed nuclear generation are water-constrained, either now or over the projected 80-year life of a nuclear power station.
"At these sites, it is highly likely that nuclear generation would need to be curtailed during hot, dry conditions, and/or new cooling water sources would need to be found by diverting water from other uses – industrial, agricultural, residential and environmental – or by increased use of desalination plants and pipelines at great expense."

Commenting on Prof. Campbell's report, Liberals Against Nuclear spokesperson Andrew Gregson said:
"The Nationals have spent 15 years educating rural communities on how much water buybacks hurt them and fighting tooth and nail to protect our agricultural water. Now, there is a proposal to take water from the very farmers who grow our food."
"Research commissioned by the federal Labor Government concluded that an additional 508,000 megalitres of water – about the equivalent volume of Sydney Harbour – would be required each year to cool the reactors proposed by the Coalition. Minister Tanya Plibersek said:
"Where will the water come from and who will pay for it? Will farmers foot the bill? Or are they going to leave communities without a reliable drinking water supply? What happens during drought?"

Coastal sites for nuclear reactors can use seawater for reactor cooling. However the local marine impacts can be severe including the killing of extensive numbers of marine creatures sucked in by water intake pipes.

Australian engineer Peter Farley writes:
"A particular issue with nuclear is cooling water, A single 1.1 GW nuclear plant, (the most common size) needs 20-25 GL of water per annum. that is about 7% of the water supply for Melbourne, a fully nuclear system would need 4-5 plants to supply Melbourne so increasing fresh water demand by 30-35%. The plant could be cooled by seawater, but that requires more pumps and much higher maintenance due to fouling and corrosion."

An analysis by the Queensland Conservation Council found two nuclear power plants proposed under the Coalition's policy would require far more water than the coal-fired stations they were intended to replace and would exacerbate water supply issues in Central and South East Queensland. A nuclear plant at the Callide site could use more than twice as much water as the existing coal plant, while the proposed reactor at Tarong could consume 55% more water than its coal-fired counterpart.

Some nuclear proponents claim the high water consumption of nuclear power is a non-issue because alternative cooling methods can be used. Shadow minister Ted O'Brien stated, "modern nuclear plants have different cooling systems including wet systems which use water, dry systems which don't use water, along with other emerging designs which use other innovative systems."

But in fact dry cooling – highly inefficient heat transfer from steam or water to air via metal fins, not by evaporation – is not used in nuclear power generation with the exception of three very small reactors in Russia (each with a capacity of 11 MW – about 100 times smaller than standard reactors). The World Nuclear Association notes that it "is unlikely that large nuclear plants will adopt dry cooling in the foreseeable future" because of the high cost. The OECD Nuclear Energy Agency states that dry cooling systems "appear to be too expensive to be used frequently".

On the basis of worldwide experience, lessons for Australia include the following:

* The enormous cooling requirements for nuclear reactors severely limits non- coastal siting options.
* For coastal sites, the impact on marine life can be severe even during routine operations, and nuclear accidents can have devastating impacts (e.g. the devastation of the fishing industry in the Fukushima region of Japan following the 2011 nuclear disaster).
* It is highly unlikely that dry cooling would be an option as it would seriously worsen

nuclear power's already large cost disadvantage compared to firmed renewables.

* The growth of renewable energy in Australia has been, and will continue to be, dominated by two energy sources with very low water requirements: solar PV and wind power.

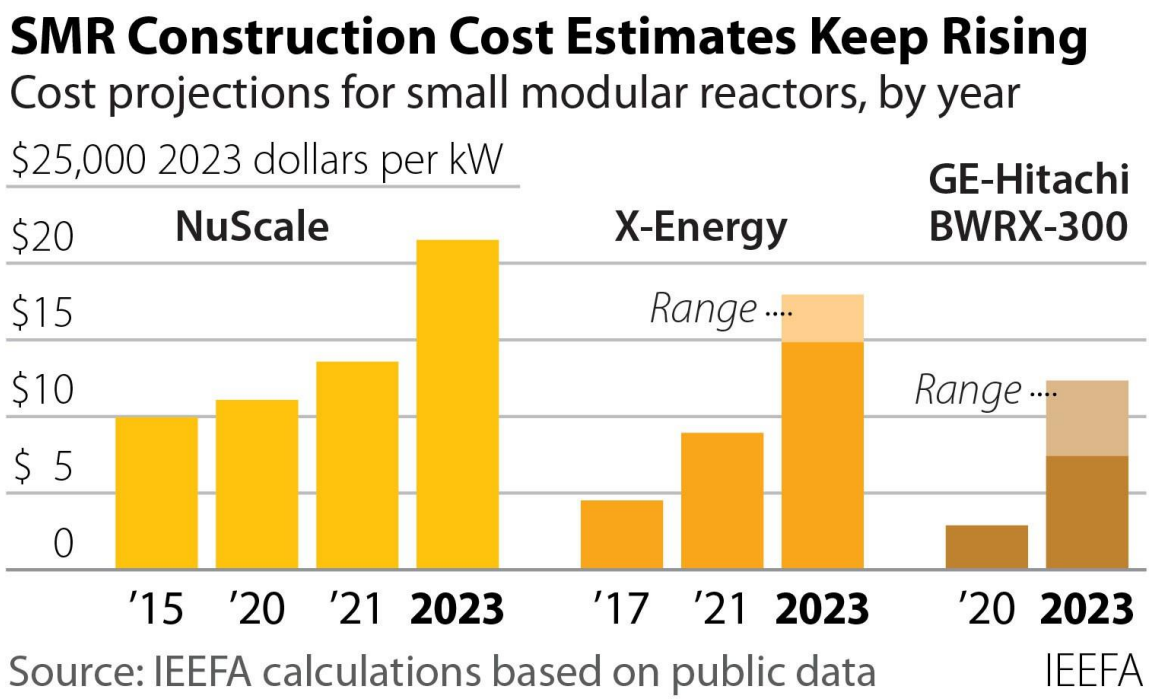
SMALL MODULAR REACTORS

Small modular reactors (SMRs) were heavily promoted by the Coalition. Indeed the Coalition's nuclear policy was entirely based on deploying SMRs in Australia until the November 2023 collapse of the most advanced SMR project in the US – NuScale's project in Idaho – due to cost blowouts. After the NuScale failure, the Coalition promoted both large conventional reactors and SMRs.

SMRs are advertised with the promise of cost reductions through serial, 'cookie-cutter' factory production of reactor components. But there has been no real-world demonstration of the theory and the advantages of serial production would need to outweigh the inevitable diseconomies of scale associated with SMRs compared to large reactors.

Worldwide, there are only two operating SMRs: one each in Russia and China. Neither of them meet a strict definition of SMRs (modular factory construction of reactor components). Both were long delayed and well over-budget, and both have badly underperformed since they began operating with load factors well under 50%.
A 2024 report by the Australian Academy of Technological Sciences and Engineering noted that no small modular reactors exist in any OECD countries and the technology has not been proven technically or financially.

A May 2024 report by the Institute for Energy Economics and Financial Analysis (IEEFA) states:
"IEEFA has taken a close look at the data available from the four SMRs currently in operation or under construction, as well as new information about projected costs from some of the leading SMR developers in the U.S. The results of the analysis show little has changed from our previous work. SMRs still are too expensive, too slow to build, and too risky to play a significant role in transitioning from fossil fuels in the coming 10 to 15 years."



Cost estimate increases for 3 SMR designs (none of which have been built). Source: IEEFA.

The 2025 World Nuclear Industry Status Report notes that there are no SMRs under construction in Western countries. The report points to the high costs and long timelines for SMRs and notes that the hype isn't matched by real-world developments:
"The Merriam-Webster dictionary defines the term "Potemkin village" as "an impressive façade or show designed to hide an undesirable fact or condition." The state of Small Modular Reactors (SMRs) today might well be described as a Potemkin Village."

A blunt assessment of SMR hype by Kerrisdale Capital investment firm in November 2024 concluded:
"The primary reason for the lack of SMR traction is poor economics. There is little evidence SMRs can avoid the cost increases which have plagued recent large nuclear projects and construct plants on a more efficient $ / kW basis."

An important 2024 analysis of SMRs by physicist Dr. Edwin Lyman notes that much of the promotion of SMRs is "rooted in misinformation". Dr. Lyman notes that:
* SMRs are not more economical than large reactors;
* they are not generally safer or more secure than large reactors;
* they will not reduce the problem of what to do with radioactive waste;
* they cannot be counted on to provide reliable and resilient off-the-grid power; and
* they do not use fuel more efficiently than large reactors.

PUBLIC OPINION

There is abundant evidence that Australian voters rejected nuclear power ahead of the May 2025 election – much of it collated in a detailed Friends of the Earth paper available online. The Coalition's nuclear policy may have cost it around 11 seats based on polling commissioned by the 'Liberals Against Nuclear' group.

To summarise just a few key moments in the lead-up to the May 2025 election:
* In October 2024, nuclear power regained its status as Australian's least popular energy source, overtaking coal. Two months later, nuclear was still Australia's least

popular energy source.

* On April 19, 2025, a fortnight before the election, the News Corp. press released polling results showing that the nuclear power policy was "driving a collapse in the Coalition's primary vote in marginal seats across Australia."

* On May 1, 2025, four days before the election, the News Corp. press reported on polling finding that only one issue was driving voters away from the Coalition to a greater extent than the nuclear power policy.

A RedBridge poll of around 2,000 Australian voters in May 2024 found those supporting nuclear power tended to be older, wealthier Australians who already intended to vote for the Coalition. Amongst all other demographics, opposition to nuclear power exceeded support. Nuclear enthusiasts repeatedly claim younger Australians support nuclear power but that claim is not supported by the evidence.

Voter rejection of the Coalition's nuclear policy was evident to the South Australian Liberal Party, which abandoned its pro-nuclear power policy and abolished the position of 'Shadow Minister for Nuclear Readiness' two days after the federal election. State leader Vincent Tarzia acknowledged nuclear power has been "comprehensively rejected" by the electorate.

Numerous polls demonstrate opposition to nuclear power in regional Australia (including regions being targeted for nuclear power plants) and opposition to nuclear reactors being built locally. Polling finds that nuclear waste and the risk of nuclear accidents are key concerns among Australians.There is a striking gender divide with women far less supportive of nuclear power than men. For example, a RedBridge poll of around 2,000 Australian voters in May 2024 found that just 18% of female respondents supported lifting the federal legal ban prohibiting nuclear power in Australia while 50% of male respondents supported lifting the ban.

The nuclear power policy caused considerable angst among First Nations people and communities, in part because of the legacy of British nuclear tests and the long history of failed attempts by successive federal governments to impose nuclear waste dumps on unwilling Aboriginal communities. The following articles provide detail:

– *The scars of Australia's nuclear past stain Coalition proposal for First Nations voters, 28 April 2025*

– *Indigenous group considers legal battle over proposed Port Augusta nuclear power plant, ABC, 21 July 2024*

– *Traditional Owners protest Dutton's nuclear plan for Collie*, National Indigenous Times, 18 Oct 2024

– *The Decades-Long First Nations Fight Against Nuclear, VICE, 20 June 2024*

– *Dutton's nuclear plans threaten Traditional Owners' land rights, National Indigenous Times, 20 June 2024*

– *Indigenous elders to fight 'death sentence' nuclear policy, New Daily, 21 June 2024*

– *Nuclear energy would harm Aboriginal and Torres Strait Islander peoples' health, wellbeing and connection to Country, Croakey, 27 June 2024*

– *As Dutton champions nuclear power, Indigenous artists recall the profound loss of land and life that came from it, The Conversation, 2 May 2025*

CONCLUSION

In addition to the unpopular nuclear power policy, the Coalition's anti-renewables policies – including rejecting renewable energy targets and planning to curtail the growth of renewables – are unpopular with voters.

This was highlighted on election night by *7 News* political editor Mark Riley who declared the "party that chose nuclear energy as its policy has exploded in a nuclear bomb set on them by the voters tonight".

Despite their comprehensive 2025 election defeat the Coalition has failed to heed the clear lesson that support for credible climate action and renewables and opposition to domestic nuclear power is part of the mainstream Australian political expectation.

The Coalitions rejection of Net Zero and ongoing nuclear promotion is evidence of the need for continuing vigilance and advocacy to secure a low emissions energy future that is renewable, not radioactive. We hope this paper is a useful contribution on this journey.