Climate Council of Australia

Submission to:	Inquiry into nuclear power generation in Australia
Addressed to:	House Select Committee on Nuclear Energy Department of the House of Representatives Parliament House, Canberra ACT 2600 By Email: nuclear.reps@aph.gov.au
Submission from:	Climate Council of Australia Ltd L18 1 Nicholson St East Melbourne VIC 3002 Tel: 02 9356 8528 Email: info@climatecouncil.org.au

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About the Climate Council

Climate Council is Australia's own independent, evidence-based organisation on climate science, impacts and solutions.

We connect decision-makers, the public and the media to catalyse action at scale, elevate climate stories in the news and shape the conversation on climate consequences and action, at home and abroad.

We advocate for climate policies and solutions that can rapidly drive down emissions, based on the most up-to-date climate science and information.

We do this in partnership with our incredible community: thousands of generous, passionate supporters and donors, who have backed us every step of the way since they crowd-funded our beginning as a non-profit organisation in 2013.

To find out more about the Climate Council's work, visit www.climatecouncil.org.au.

Executive summary and recommendations

The Climate Council welcomes the opportunity to make a submission to the House Select Committee on Nuclear Energy's Inquiry into nuclear power generation in Australia.

The Australian Government should reject the notion that nuclear power is a genuine solution for Australia's contemporary energy needs and maintain its focus on energy options that will cut climate pollution as quickly as possible, to avoid the worst impacts of climate change and unnatural disasters.

We received the announcement of the federal Liberal-National Coalition's proposal for nuclear reactors, and the ensuing political debate that has provided the context for this Inquiry, with equal measures of disappointment and dismay. We welcome the contribution that this Inquiry can make to ensuring Australia maintains an evidenced-based, science-led approach to energy policy development, and note that a substantial, conclusive body of evidence already exists to advise the Committee on nuclear energy.

Trusted, independent experts including the Australian Energy Market Operator (AEMO), energy regulators and the Climate Change Authority have been clear: nuclear is an unviable, uneconomic and inappropriate energy solution for Australia. As such, the Climate Council is concerned that nuclear energy is a distraction from the urgent tasks of slashing climate pollution and replacing rapidly retiring coal power.

We are concerned that proponents of nuclear energy are selling it to the Australian community as a 'silver bullet' for our energy needs, when it is more like a 'dragging anchor' that would delay progress on necessary action and investment.

As this Committee's work will ultimately inform Australia's future energy mix, it is crucial for the Committee to consider the speed and scale of climate action required in Australia, and to be led by what the science tells us is necessary right now to avoid the worst impacts of dangerous climate change.

The effects of climate change are already hitting Australians hard, and playing out across every corner of the country. Climate pollution, caused by the burning of coal, oil and gas, is fuelling unnatural disasters, including increasingly severe bushfires, floods, heatwaves and destructive storms. As a result, the overwhelming majority of Australians (84%) report having been directly affected by at least one climate-fuelled disaster since 2019. Globally, limiting global average temperature rise well below 2°C is considered essential to avoid far more severe and irreversible

changes to our climate. As one of the top 20 polluters globally and a very significant exporter of fossil fuels, Australia has a critical role to play.

What we do now matters, and the required action is clear: Australia must cut climate pollution and decarbonise our economy as quickly as possible to secure a safer future and avoid the worst impacts of climate change. To delay action is to fail in our project to arrest the climate crisis and protect more Australians. We must continue to cut climate pollution in areas where we already have the technology and know-how, and there is no better example of this than the electricity sector.

Nuclear energy will take too long to contribute to the urgent project of slashing climate pollution in Australia in the coming decade.

Australia's ageing coal power stations are all on track to shut down well before nuclear energy could come online. It is clear that building nuclear reactors will take too long to meaningfully contribute to either our energy supply needs or necessary reductions to climate pollution. Nuclear is also the most expensive form of energy and, under the federal Coalition's current proposal, would provide less than one-sixth of the electricity Australia needs by 2050. It is important to invest in our energy supply, but nuclear represents paying too much for too little, to come online too late.

Given that nuclear could not be ready in time to meet Australia's energy needs this decade or the next, the Climate Council is concerned that the pursuit of nuclear energy would only increase reliance on polluting coal and gas, undermine policy and investment certainty in clean energy technologies, and ultimately increase climate pollution, unnecessarily exposing more Australians to climate harms. Nuclear reactors would also unnecessarily expose Australians to risks of nuclear accidents, nuclear waste and water security issues, which are likely to be even harder to manage in world of more frequent and ferocious extreme weather events.

The good news is that renewable technologies can both affordably and reliably power our economy, and reduce climate pollution. In fact, renewable sources like wind and solar, backed by storage, are already powering about 40% of the electricity in our National Electricity Market (NEM) – up from 20% only six years ago (Open Electricity, 2024), and around one in three Aussie households have taken power into their own hands with 4 million homes putting solar panels on their roof.

Renewable electricity investors are also lining up to build more than 20 GW of wind, solar and storage projects in the NEM, with a further 284 GW proposed (AEMO, 2024c). Collectively this represents more than four times the capacity of utility-scale generation and storage in our main national grid today. Under current projections, by 2035, more than 96% of our main national grid will be powered by renewables - before even one nuclear reactor could be built.

For these reasons, the Climate Council strongly recommends that Australia maintain its focus on building clean, safe, reliable and affordable renewable electricity, backed by storage and, in the immediate term, gas peaking.

We have previously outlined our recommendations to make the most of Australia's renewable energy opportunity in our submission to the Energy and Electricity Sector Plan consultations (Climate Council, 2024c), and in our Seize the Decade report, which maps a clear evidence-based pathway to slash Australia's climate pollution by 75% this decade and get us on the right track for net zero by 2035 (Climate Council, 2024a). This submission focuses on the key reasons nuclear is not a viable solution to cut climate pollution or meet Australia's energy supply needs.

Recommendations

Recommendation 1

Australia must invest in energy options that will cut climate pollution as quickly as possible to avoid the worst impacts of climate change and unnatural disasters. Clean, safe, reliable and affordable renewable technologies are the most viable solution to achieve this, and are readily available now.

At the same time all our coal fire generators are slated to close by 2038. Nuclear reactors will take too long to build to meaningfully contribute to urgently slashing climate pollution or ensure our urgent energy security needs, and the Australian Government should reject nuclear energy on this basis.

Recommendation 2

Any consideration of nuclear energy for Australia must take into account the significant climate pollution, cost and reliability impacts of delaying the closure of coal-fired power plants and increasing gas generation.

Recommendation 3

Any consideration of nuclear energy for Australia should take into account the impact of escalating climate risks, including more severe and frequent storms, bushfires and droughts, on proposed nuclear reactor and waste sites.

Recommendation 4

Australia should invest public resources in efforts to slash climate pollution now, rather than in high risk, high cost energy options like nuclear. By maintaining its focus on unlocking Australia's huge renewables advantage, the Australian Government can maintain energy policy certainty for investors and trading partners.

1. Climate change is here, and it's already harming Australians – we must cut climate pollution urgently this decade

Australia needs to urgently cut climate pollution this decade and focus on energy solutions that will decarbonise our economy as quickly as possible, to avoid the worst impacts of climate change and unnatural disasters.

It is well documented that the climate crisis is here and harming Australians now. Consistent scientific analysis in Australia and around the world shows that we must slash climate pollution this decade to reach net zero as quickly as possible.

We are all living in this age of climate consequences. 2023 was the Earth's hottest year on record by a large margin, and 2024 is on track to be even warmer (NOAA, 2024). Australia has now warmed beyond 1.5°C (CSIRO and Bureau of Meteorology, 2024). Meanwhile, Australians have lost homes or livelihoods to fires or floods, been forced to pay higher prices for food or insurance, stayed indoors to avoid bushfire smoke blanketing our cities, been unable to get home due to heat-related transport disruptions, or witnessed our landscapes and wildlife being devastated by bushfires (Climate Council, 2023).

There is no safe level of global warming, and every fraction of a degree matters. Globally, limiting global average temperature rise well below 2°C is considered essential to avoid far more severe and irreversible changes to our climate. Therefore, it is essential that Australia puts in place real plans to rapidly drive down emissions this decade, and beyond.

Renewable energy is the most reliable, safe and affordable way to cut climate pollution while maintaining a strong electricity grid.

The urgency of the climate crisis requires a focus on proven solutions and technologies that are available now. Renewable electricity has accelerated dramatically in recent years and now contributes about 40% of the electricity in our main national grid. In South Australia it is already more than 70%.

Renewable energy from wind and solar, backed by storage, is by far the cheapest form of new electricity generation in Australia (Graham, Hayward and Foster, 2024). Australia must build on this momentum to accelerate the build out of renewable energy and storage, both in the grid, and on Aussie homes and businesses. This will require continued effort from both the private and public sector, including private investment, workforce capacity, efficient regulation and approvals, and clear direction and stability in energy policy.

Independent, expert analysis shows that Australia's main grid can be powered by over 96% renewable electricity backed by storage and gas peaking by 2035.

AEMO's Integrated System Plan (ISP) meticulously analyses the necessary future developments in the NEM, across three scenarios, with countless sensitivity and stress tests (AEMO, 2024b). The ISP's modelling and assumptions are transparently and publicly released, and include over 500 pages of detailed documentation, explanation, analysis and stakeholder consultation reporting.

Under the most likely scenario, AEMO expects our main national grid to be powered by 84% renewables as soon as 2030. Importantly, this scenario provides a strong and reliable grid that meets our energy needs 24/7. The ISP meets a very high 99.998% reliability standard every year - including during times when electricity demand is high, and wind and sun resources are low. A balanced mix of wind, solar, batteries, pumped hydro and very small amounts of gas peaking can work together to provide reliable, renewable electricity around the clock. As a result, we simply don't need nuclear energy. Our current plan will enable us to affordably cut climate pollution and ensure Australia's energy security into the future.

Given this, the Climate Council is particularly concerned that disinformation is being disseminated by vested interests, which wrongly claims that achieving high shares of reliable renewable energy is not possible. In practice, AEMO's analysis shows that it is not only possible, but also the least-cost pathway to secure our electricity supply as demand grows into the future. As such, it is clear that Australia must continue to grow our renewable energy and storage capacity to slash climate pollution and ensure our energy security into the future.

This submission details why nuclear energy, in contrast, is not only unnecessary, but also a high risk, high cost option that cannot achieve the required cuts to climate pollution this decade or meet Australia's energy supply needs.

2. Nuclear will take too long to build in Australia to cut climate pollution or keep the lights on

Our ageing coal-fired power stations are closing down. Australia must keep building renewables and storage to keep the lights on and reduce climate pollution. Nuclear reactors would take too long to build in Australia and therefore cannot meaningfully contribute to our energy needs in the timeframe required.

The Australian electricity market is undergoing a significant change, with our ageing and unreliable coal fired power plants on the east coast set to retire by 2038. We urgently need to replace this capacity, but nuclear reactors would take too long to build and deliver too little.

Leading, trusted independent experts (including from the CSIRO and Australian Energy Regulator) estimate that to meet safety and development best practices, it would take at least 15 years to build a single nuclear reactor, and up to 25 years (Graham, Hayward and Foster, 2024; Macdonald-Smith, 2024). That means that not a single nuclear reactor would come online before all Australia's coal fire generators come to the end of their life.

There are several factors that will delay the implementation of nuclear energy in the Australian context, including:

1. **Overturning legislated bans:** Experts suggest that even with political support, it would take two years to overturn Commonwealth[1] and state level bans[2] on nuclear energy and associated activities including nuclear waste transport and management (White, Andrews and Latten, no date).[3] Currently, no state government has said they will overturn these bans, and Premiers in Queensland, New South Wales and Victoria have explicitly ruled out changes to state legislation (Evans, 2024).

2. **Introduction of a new regulatory framework:** Expanding and creating regulations to ensure the appropriate management of health, safety, security,

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[1] Including the Environment Protection and Biodiversity Conservation Act 1999 (Cth) and the Australian Radiation Protection and Nuclear Safety Act 1998 (Cth).

[2] Including the Nuclear Activities (Prohibition) Act 1983 (Vic), the Nuclear Facilities Prohibition Act 2000 (Qld) and the Uranium Mining and Nuclear Facilities (Prohibitions) Act 1986 (NSW).

[3] Including Nuclear Waste Transport, Storage and Disposal (Prohibition) Act 2004 (NT), the Nuclear Waste Storage and Transportation (Prohibition) Act 1999 (WA) and the Nuclear Waste Storage Facility (Prohibition) Act 2000 (SA)

environmental impacts, and transport of nuclear fuels and waste could take up to eight years (Macdonald-Smith, 2024).

3. **Workforce and technical capability:** International estimates suggest that building the kind of large-scale reactors proposed in Australia would require over 5,600 full-time equivalent on-site workers (OECD Nuclear Energy Agency, 2018), or nearly 40,000 workers across the seven locations proposed in Australia. These workers would have to be redirected from similar sectors, worsening existing labour shortages in energy, residential and commercial construction and engineering.

4. **Construction delays and cost overruns:** Australia has no experience building large scale nuclear reactors, and it would be implausible to believe we could build nuclear plants faster or cheaper than France, the UK and the USA. Recent nuclear projects in these highly-developed, democratic nations have been plagued with delays and cost overruns, and suggest that construction of nuclear plants in Australia would follow a similar pattern. For example:

    - In 2007, France began construction on their first and only nuclear plant built this century. Despite France's 60 years of nuclear energy experience, the project's cost has blown out, more than doubling from €5.6 billion to €13.2 billion (in 2015 euros) (Bowyer and Edis, 2024). The project was originally expected to be completed in 2012 (Le Monde avec, 2012), but finally began test operations in September 2024, more than 12 years behind schedule.

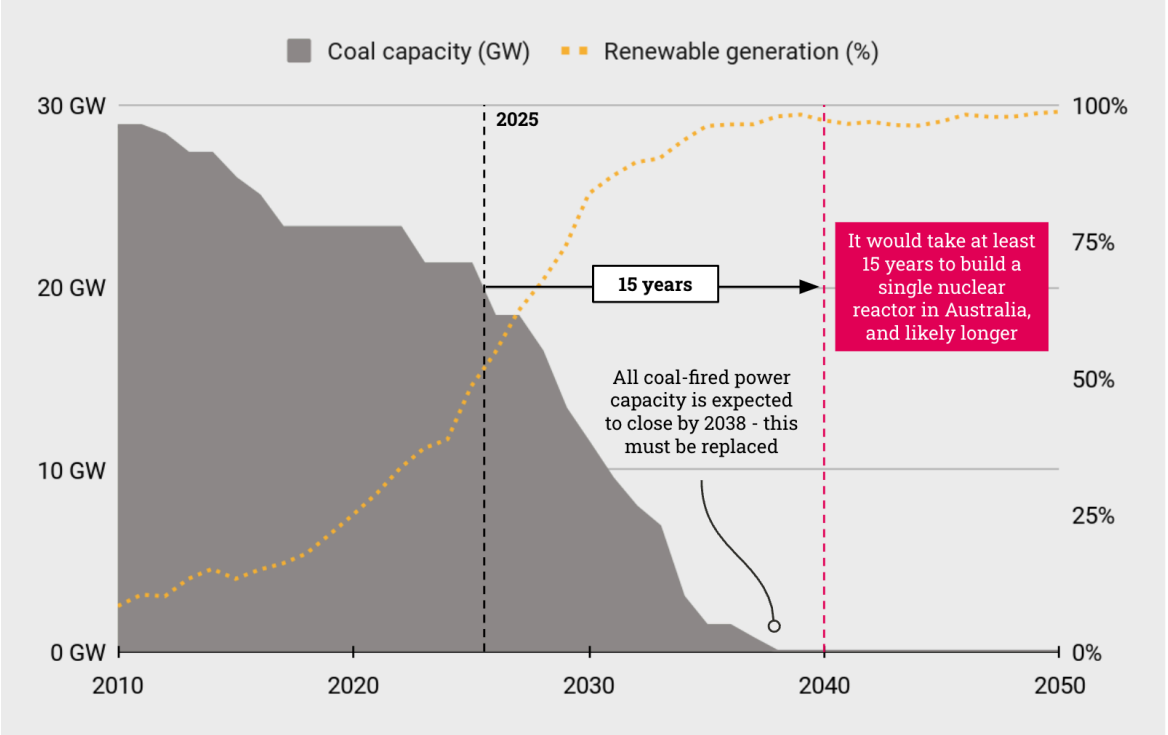
    - The UK has nearly 70 years of nuclear energy experience, with its first reactor opening in 1964. Despite this, the first nuclear project built in the UK this century, Hinkley Point C, has seen its cost almost double from 18 billion to 35 billion (in 2015 pounds). Construction began in 2018 and is currently expected to be completed in 2030 – five years later than the original 2025 completion date (BBC News, 2016, 2018; Bowyer and Edis, 2024).

    - Two Westinghouse AP1000 reactors, which the federal Liberal-National Coalition have cited as a potential option for Australia, were recently built at the Vogtle power plant in the USA (Dutton, Littleproud and O'Brien, 2024). The USA has nearly 70 years of nuclear energy experience, and the world's largest nuclear energy fleet. Despite this, the two reactors were delivered more than seven-years late, and at double the original estimated cost – a total of about $A50 billion (Campbell, 2024).

These substantial barriers mean that at least two decades of legislative change, planning, regulatory development, training and construction would be required in Australia before even a single watt of electricity from nuclear reactors could be generated.

As shown in Figure 1 below, this will be too late to meet Australia's energy needs as coal-fired power exits the grid. Over 90 percent of coal-fired generation is set to retire by 2035 under current projections, with the remainder closed by 2038, years before nuclear energy could replace it (AEMO, 2024b).

Figure 1: All coal-fired power plants will retire before a single nuclear reactor is operational.



Note: Based on (AEMO, 2024b), Step Change scenario.

As low-cost renewables dominate the electricity market and the costs of maintaining these ageing assets grow, they are increasingly uncommercial. On top of this, Australia's ageing coal plants are incredibly unreliable. AEMO expects that about 10% of coal generation capacity will be offline due to unplanned outages at any given time over the coming decade (AEMO, 2024a), and has repeatedly called for urgent investment in renewable energy and storage as the lowest-cost approach to maintaining a reliable electricity supply (AEMO, 2024b).

Extending and expanding coal and gas generation while waiting for nuclear to be built would significantly increase climate pollution and climate harms.

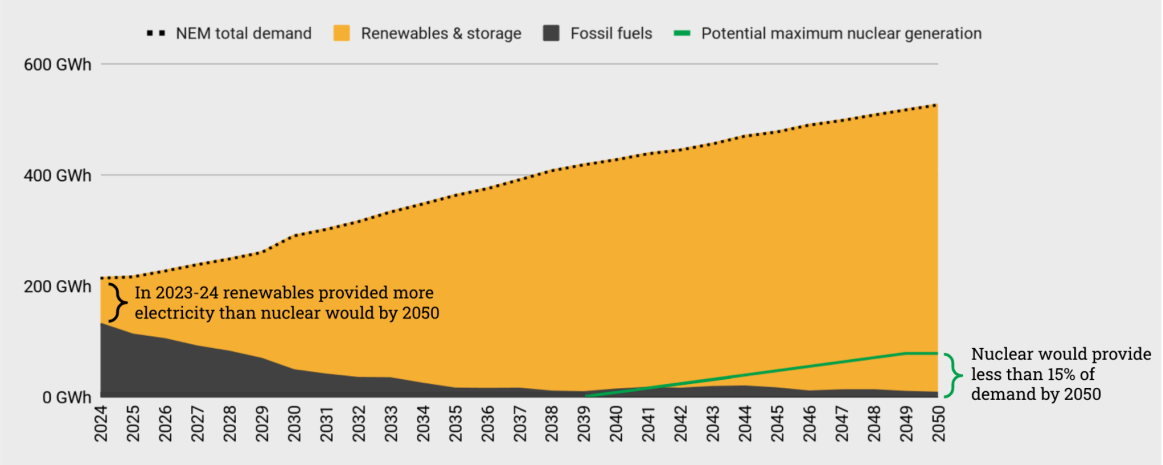
The Climate Council is extremely concerned that current nuclear energy proposals for Australia include plans to delay the closure of these ageing and unreliable coal fired power plants and increase currently declining gas generation. The stated objectives of the federal Liberal-National Coalition's current energy policy include "ensuring that there is no premature closure of baseload power stations, [and] that more gas is poured into the grid" (House Select Committee on Nuclear Energy, 24 October 2024, p. 6). There are significant practical barriers to extending the life of Australia's ageing coal-fired assets i.e. prohibitively high maintenance needs and operational costs, and delaying closure won't necessarily be an option. Our primary concern, however, is that Australia's climate pollution levels would remain significantly higher for longer under such a plan.

Recent analysis by the Institute for Sustainable Futures indicates that delaying the closure of coal-fired power plants and building more gas generation capacity could cause a further 1.5 billion tonnes of climate pollution by 2050, the equivalent of delaying the build-out of renewables entirely for 10 years (Teske, 2024). This level of emissions is completely incompatible with keeping warming as close as possible to 1.5ºC, or with the Australian Government's current emissions reduction targets. This increase in climate pollution can be expected to worsen heatwaves, extreme weather, and unnatural disasters, putting more Australians at risk, more often.

Nuclear energy, under the federal Coalition's proposal, would provide less than one-sixth of the electricity Australia needs by 2050, and it is unclear how our remaining needs would be met.

Even if nuclear reactors were successfully built in Australia, they still would only provide less than 15% of the electricity needed in the NEM by 2050 under current proposals. Assuming the 5 locations within the NEM identified by the federal Coalition all hosted 2 GWs of nuclear generation capacity, and that this could be built by 2050 (which experience in the US, UK and France suggests is optimistic), only about 78 GWh of electricity could be generated annually (see Figure 2).

Figure 2: Nuclear reactors would only provide about 15% of the electricity we need by 2050, even under optimistic assumptions.



Note: Assumes 10 GW of nuclear capacity is built in the NEM by 2050, with a capacity factor of 89% (the high estimate from Graham, Hayward and Foster (2024). Forecast demand and generation based on the 2024 ISP's Step Change scenario (AEMO, 2024b). 'Fossil fuels' includes flexible gas, which is expected to increasingly include hydrogen, biomass, and other renewable energy options into the 2040s and 50s.

Considering the capital investment required is in excess of $100 billion, this is very expensive for low return. It's less than the amount of electricity renewables already provide in the NEM today, and it's 30% less electricity than rooftop solar is expected to generate by 2050 (AEMO, 2024b).

Any consideration of nuclear energy for Australia must clearly articulate what Australia's broader energy mix will comprise of, and fully account for the climate pollution, cost and reliability impacts of any delayed closure of coal-fired power plants or increased gas generation within this proposed mix. Transparency regarding the proposed energy mix is essential, given nuclear energy does not mix well with flexible renewable technologies like solar, which already provides about 15% of Australia's electricity (DCCEEW, 2024).

Any additional support for hypothetically extending the life of coal and significant investment in gas power needs (rather than peaking power) would increase Australia's climate pollution, be very expensive and be out of step with the global push to tackle the climate crisis.

Nuclear plants, like our current coal plants, are inflexible and can't be turned on and off as needed. This presents a big problem for rooftop solar, which is already cutting bills for more than 4 million households and businesses (Clean Energy Regulator, 2024).

Rooftop solar produces energy in a predictable pattern: increasing generation from sunrise until a peak at about midday, and then gradually reducing generation until sunset. At times of peak generation, rooftop solar alone often powers over 40% of

total electricity demand in the NEM, and in South Australia it has met over 100% of demand (Parkinson, 2023; *Open Electricity*, 2024).

However, this abundance of low cost, clean energy creates a dilemma for generators who can't easily turn off, like coal and nuclear: the electricity they generate has to go somewhere to keep the electricity system stable. To maintain stability, grid operators are forced to turn rooftop solar systems off or limit them, forcing households and businesses to consume and pay for more expensive electricity from the grid.

Queensland Conservation Council analysis suggests that building just 1 GW of nuclear capacity in Queensland would see 45,000 rooftop solar systems turned off every day (Silcock, 2024). Across the NEM, this could mean hundreds of thousands rooftop solar systems would be turned off to accommodate nuclear every day, forcing Australian families to buy electricity they would otherwise be generating for free on their own rooftop. This outcome is economically inefficient, and would be a bad deal for Australian consumers.

In a changing climate which is expected to increase the risk of droughts in Australia (CSIRO and Bureau of Meteorology, 2024), the significant amounts of water used by nuclear plants is also a significant concern.

Nuclear energy presents significant environmental challenges for Australia due to its high water use in our increasingly water-stressed climate. Analysis suggests that 61% of the USA's nuclear plants are expected to face water stress by 2030, potentially forcing them to reduce their generation or even shut down (Whieldon and Kuykendall, 2020). In addition, the handling, storage and disposal of nuclear waste also presents significant environmental risks to Australian communities, which are also likely to be even harder to manage in a warming world. Any consideration of nuclear energy in Australia must also consider such risks.

3. Nuclear is the most expensive form of energy and does not make economic sense for Australian businesses or families

Put simply, watt for watt, pursuing nuclear energy would cost at least five times more than the current plan for our main national grid.

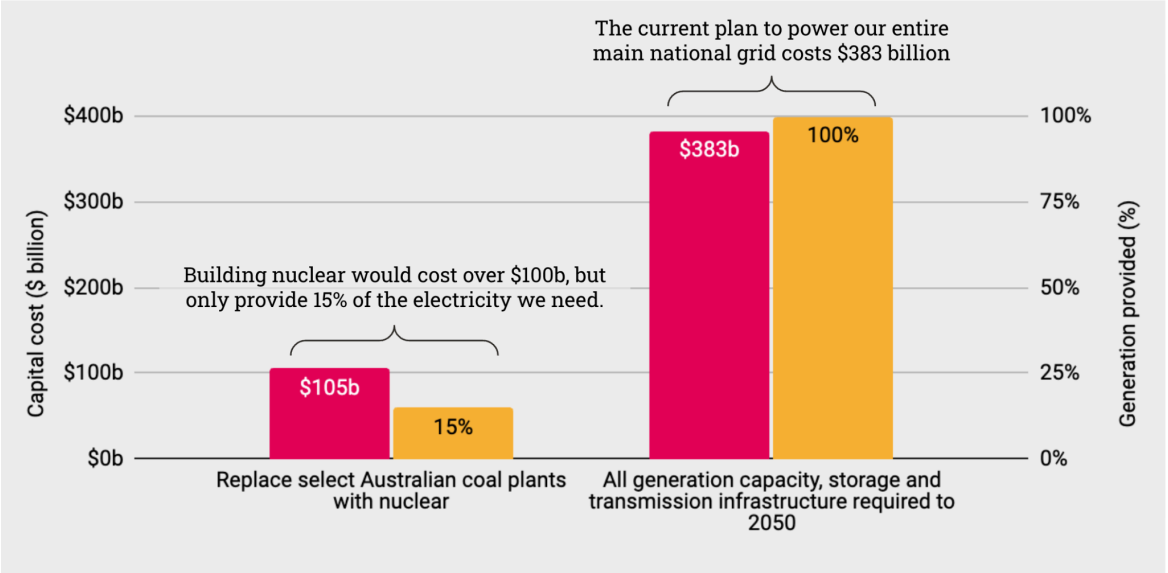
Building nuclear reactors in Australia would be incredibly expensive, especially compared to the least-cost pathway of renewable wind and solar, backed by storage and limited gas firming, supported by transmission. Worse still, international experience suggests that existing estimates of the cost of nuclear energy in Australia may be wildly optimistic.

AEMO's 2024 ISP estimates that the capital cost of all required transmission, utility-scale generation, storage and firming required in the NEM until 2050 is about $383 billion in undiscounted terms (AEMO, 2024b). This would see the grid triple in size, with the total addition of 122 GW of new utility-scale capacity and storage. The vast majority of this upfront cost would be borne by commercial investors, not governments. Most importantly, this plan ensures that climate pollution from the electricity sector is reduced this decade, helping create a safer future for all Australians, while meeting our electricity needs as old coal-fired capacity retires.

The cost of building nuclear reactors is a stark contrast. Across Australia, building 11 GW of nuclear capacity would cost at least $116 billion, and up to $600 billion dollars (Smart Energy Council, 2024). But despite this price tag, nuclear wouldn't provide anywhere near the amount of electricity we need. For example, nuclear reactors would only provide about 15% of the power needed in the NEM by 2050, at a minimum cost of approximately $105, and up to $540 billion.[4] Australia's current plan can meet 100% of our electricity needs for $338 billion, while nuclear would meet less than one-sixth, for a minimum of $105 billion (See Figure 3).

[4] On the basis that the NEM hosts 10 GW of the anticipated total 11 GW costed by (Smart Energy Council, 2024).

Figure 3: Building nuclear reactors would provide less than one-sixth of the generation we need, at a cost of over $100 billion.



This *does not include* the cost of updating regulations, compulsory acquisition of land, the cost of operating and maintaining reactors, let alone the cost of handling, and storing nuclear waste which would cost billions – in Canada it is expected to exceed $33 billion in 2024 Australian dollars (Nuclear Waste Management Organization (Canada), 2021). Unlike the current transition, which is primarily funded by private capital, Australian taxpayers would bear all of these costs. This means that if costs increase or construction timelines are delayed, taxpayers would have to pick up the bill, and international experience (detailed in section 2 of this submission) indicates that cost overruns and delays would be very likely.

Australian families will pay the price of nuclear energy, on their electricity bills and via their taxes.

The federal Coalition's current proposal to build nuclear energy in Australia would see taxpayers fund nuclear reactors in seven locations, and capital costs are significant, relative to other current government priorities. While no details of cost or funding arrangements have been specified, Australians would either have to pay for nuclear on their energy bills, via their taxes, or both. If funded through tax, nuclear reactors would cost Australia's 13.6 million taxpayers at least $8,562 each, and up to $44,118, if Australia saw the cost blowouts common in other countries.[5]

This would be a significant investment of public funds in an energy source that won't meet our energy needs, or do anything to cut climate pollution in the next 10

[5] Based on cost estimates of $116 billion and $600 billion respectively, prepared by (Smart Energy Council, 2024)

years. Even the most optimistic cost of building nuclear reactors – $116 billion – would be enough to put rooftop solar on every Australian home, build 77 major hospitals, or pay off the HECS-HELP debts of every Australian 1.4 times over (Table 1).

Table 1: What could government invest in for the cost of seven nuclear plants?

Alternative investment	Nuclear Cost	
	Lower estimate ($116 billion)	Upper estimate ($600 billion)
Put rooftop solar on every Australian home[1]	2.4 times	12.2 times
Build hospitals with a 500 bed capacity	77 hospitals	400 hospitals
Build preschools with room for 120 children	15,263 preschools	78,947 preschools
Provide universal childcare for every family in Australia	8 years	42 years
Pay every Australian school teacher's salary for	4 years	19 years
Build affordable housing	305,261 homes	1,578,935 homes
Pay off every Australian's current HECS-HELP debt	1.4 times	7.4 times

Notes: Nuclear cost based on (Smart Energy Council, 2024). See Appendix A for other cost assumptions. [1]: Excludes homes which already have solar.

If not funded entirely by taxpayers, the costs of nuclear energy could theoretically be recovered in the wholesale electricity market. However, it is not clear how nuclear would compete in this market, given existing coal generators, which have a similar commercial model to nuclear reactors, have become increasingly uncompetitive. Further, several of Australia's largest energy companies including AGL, Alinta, EnergyAustralia and Origin have all consistently indicated they would not invest in nuclear energy (Hannam, 2024).

As the amount of low cost wind and solar in the grid has increased, wholesale prices have dropped, leaving inflexible generators, like coal, struggling to compete. For inflexible nuclear power to generate enough revenue in the market to recover its operational and capital costs, the government may need to force renewables to be turned off to accommodate nuclear generation, and/or guarantee a particular price for nuclear generation.

As the federal Coalition has indicated that nuclear reactors would run on a continuous basis close to their maximum capacity, it is expected that to recover the cost of investment and operations, the cost of electricity would have to rise to nuclear power's levelised cost of electricity. If this occurred, power prices would increase by over $665 per year on average, or $972 per year for a four-person household (Bowyer and Edis, 2024).

Recent international experiences support this projection, with power prices increasing after nuclear plants are built. In Georgia, where two AP1000 reactors were recently opened, regulators have passed on billions of dollars in construction costs to electricity consumers, increasing electricity bills by almost 10%, or $258 AUD per year (Amy, 2023). Remarkably, this 10% increase in bills only paid for the development of about 2 GW of generation capacity, which would provide the equivalent of 8% of the electricity used in the NEM in 2023 (US Department of Energy, 2019; *Open Electricity*, 2024). In contrast, rooftop solar provided about 11 percent of the electricity needed in the NEM, and saved Australians billions of dollars on their electricity bills (Climate Council, 2024b).

Clearly, nuclear energy is not a cost-effective option, even in countries with significant experience building and operating nuclear plants. The suggestion that nuclear energy could be an affordable option in Australia, a country with no experience building or operating nuclear reactors, is a pipe dream.

4. Australia needs energy policy and investment certainty, not nuclear pipe dreams

Attempting to build nuclear energy in Australia risks undermining policy and investment certainty, and delaying the necessary build of renewables and storage.

After more than two-decades of inaction, delay and dispute over Australia's energy policy, momentum has finally started to build behind the renewables and storage we need. Investors, superannuation funds and businesses are already investing in Australia's clean energy pathway on the basis of strong and clear policy direction, including the Capacity Investment Scheme, Rewiring the Nation and the Safeguard Mechanism. They are ready to put billions of dollars to work building Australian renewable energy projects, but are not interested in nuclear energy. A survey of 104 of the biggest institutional investors in Australia, collectively representing $37 trillion in assets under management, found that renewable energy is considered the top investment opportunity for more than half of firms (Investor Group on Climate Change, 2024). Nuclear on the other hand is being explored by fewer than one in 10 investors.

Introducing nuclear into this policy landscape would significantly disrupt the current energy strategy. According to AEMO, "delays and uncertainties in energy regulation" could undermine investor confidence and delay the much-needed expansion of renewable energy and storage to replace coal-fired generation (AEMO, 2024b). Already, political uncertainty surrounding nuclear energy has caused delays in solar and renewable energy projects, as investors are left uncertain about the direction of Australia's energy future (Investor Group on Climate Change, 2024); (Readfearn, 2024). This lack of certainty has also prompted leading investor bodies to warn that Australian projects could be abandoned in favour of more stable international markets

Pursuing nuclear energy risks diverting critical resources away from proven, affordable and reliable renewable options and slowing down Australia's progress.

The transition to a cleaner energy grid requires a rapid build-up of both renewable generation and storage capacity. This effort will require doubling the size of the renewable energy workforce within the next decade (AEMO, 2024b). This is an opportunity to create thousands of skilled, well-paying jobs. However, attempting to develop a nuclear energy program—one that could require upwards of 40,000 workers—would place additional strain on the already limited labour pool, hindering progress on both renewable energy projects and any proposed nuclear infrastructure. The risk of delays to these renewable energy projects could significantly hinder Australia's ability to meet its energy needs and climate goals.

The Climate Council is also concerned that any delays in the rollout of renewable energy will create an energy reliability gap, and by extension, force governments to consider underwriting uneconomical fossil fuel generators - including our ageing and unreliable coal-fired power stations - for extended periods. If this occurred, it would likely reduce incentives for private sector investment in renewables, particularly in critical areas like energy storage, and therefore delay the necessary shift to a cleaner, more sustainable energy system and keep climate pollution high for many years to come.

Globally, renewable energy is experiencing unprecedented growth, while nuclear energy is on the decline.

Despite nuclear energy being a component of electricity generation for 16 per cent of the world's countries, its contribution to global electricity supply is contracting. Cost-effective and quick to deploy renewable energy is the fastest growing form of electricity generation, while nuclear's contribution has decreased.

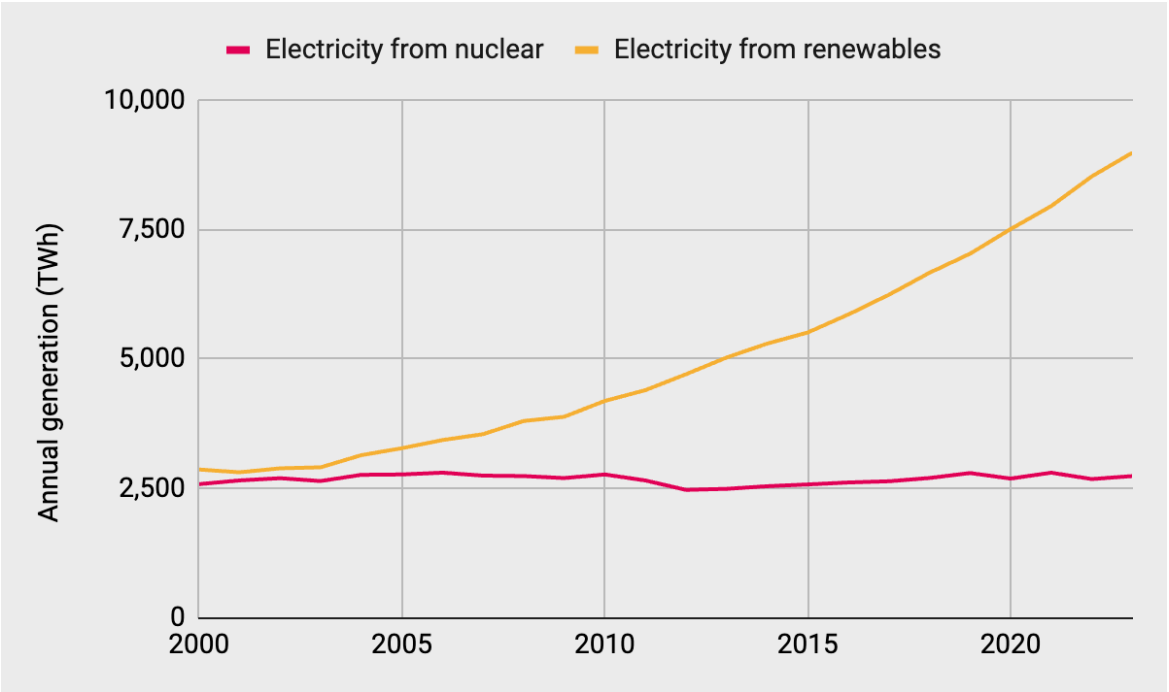
Australia's abundant wind and solar resources are the envy of the world. With such strong renewable resources, we simply don't need to take on the risk and cost of nuclear energy. As the world is increasingly powered by renewables, Australia can capitalise on our renewable energy advantages, and ensure we are not left behind.

There are fewer nuclear power plants in the world now than there were in 2000. Nuclear energy now provides less than 10 percent of the world's electricity, while renewables provide over 30 percent. In 2023 enough renewable electricity was generated globally to meet Australia's electricity needs 33 times over.

Many countries have stopped building nuclear energy, or are actively moving away from it. Nuclear energy generation has reduced over the last 5 years in 45% of countries with nuclear, including Canada, the US, Germany, France and the UK (Energy Institute, 2024). Notably, Germany closed their final nuclear plant and saw no material increase in cost or reliability issues, and emissions continue to decline (Wehrmann, 2024).

With the world moving toward renewables and nuclear stalling, the small economies of scale for nuclear energy are not expected to grow. In fact, the cost of large scale nuclear reactors is not expected to significantly reduce in the coming decades. In stark contrast to renewables and storage: the cost of solar is expected to roughly halve in the next 25 years, while batteries are expected to halve in the next five (Graham, Hayward and Foster, 2024).

Figure 4: Renewables are booming globally, while nuclear lags.

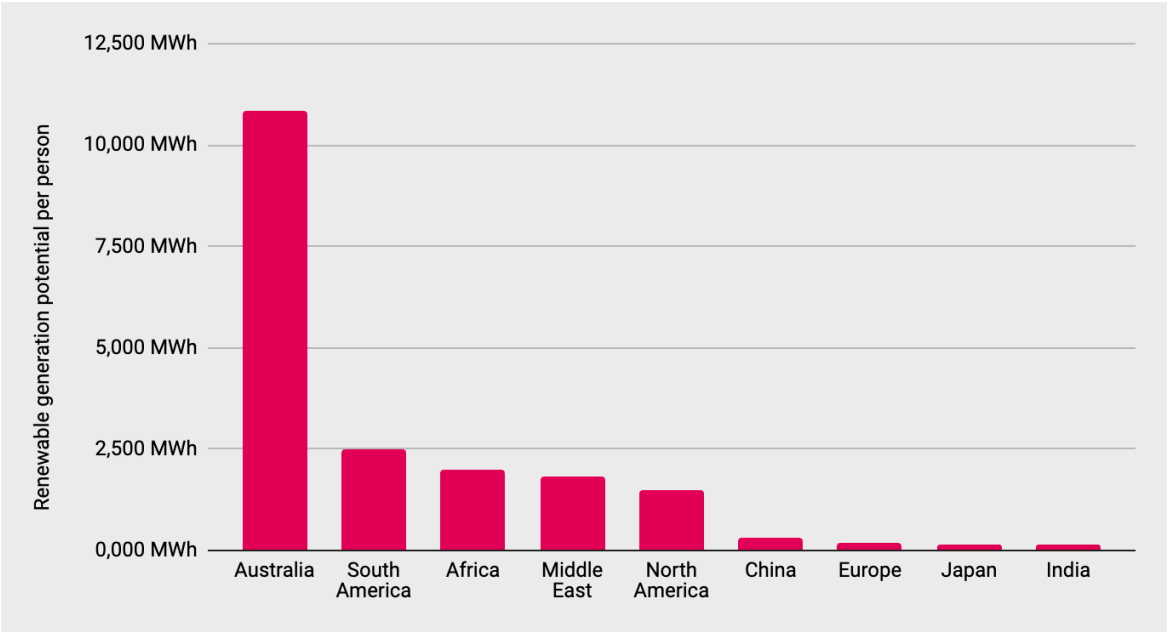


Source: (Energy Institute, 2024)

Australia has a huge renewables advantage compared to most other countries, which can unlock future economic growth, jobs and prosperity. We are fortunate that the solutions to the climate crisis can also be an economic boom for Australia.

To take advantage of these dramatic and ongoing improvements in technology, Australia should keep planning for a least-cost grid centred around renewable generation and storage. Australia in particular, with our abundant sunshine and wind, has huge renewable energy opportunities. Australia could generate all the energy we need using solar on only 0.1% of our total land mass (Carbon Tracker Institute, 2021). Overall, Australia has the potential to generate about five times more renewable electricity per person than any other country in the world (Figure 5).

Figure 5: Australia could generate more than five times more wind and solar energy per person than anywhere else.



Source: Reproduced from (Carbon Tracker Institute, 2021)

The simple reality is that nuclear energy doesn't make economic sense for Australia, because our renewable advantage is so strong, and because we don't have any experience or advantage building nuclear energy. Notably, even high-profile advocates of nuclear energy, such as Dr. Faith Birol of the International Energy Agency and Bill Gates, acknowledge that nuclear energy is not the best fit for Australia due to our abundance of renewable resources (Ferguson, 2023; van Leeuwen, 2024).

In summary, while nuclear energy may be suitable for countries with large energy demands and limited renewable resources, it would clearly be an unnecessary risk for Australia. With our abundant natural resources and the global energy transition already underway, Australia is in a unique position to lead the world in renewable energy development. The future of our energy system lies not in the costly and uncertain path of nuclear energy, but in harnessing the full potential of clean, safe, affordable and reliable renewable energy and storage technologies to build a sustainable, prosperous future for all Australians.

Appendix A: Cost comparison

Alternative investment	Estimated cost ($2024)	Source
Put rooftop solar on every Australian home	$49b for all remaining homes.	Solar Citizens, 2024
Build hospitals with a 500 bed capacity	$1.5b per hospital	Victorian Health Building Authority
Build preschools with room for 120 children	$7.6m per preschool	NSW Parliamentary Budget Office
Provide universal childcare for every family in Australia	$13.6b per year	Grattan Institute, p60. Cost escalated based on ABS consumer price index
Pay every Australian school teacher's salary for	$30.9b per year	Australian Tax Office, escalated based on ABS wage price index
Build affordable housing	$380k per dwelling	AHURI, escalated based on ABS construction price index and CoreLogic land value index for Greater Sydney
Pay off every Australian's current HECS-HELP debt	$81 billion for all loans ($81,051,782,865)	Australian Tax Office, HELP statistics 2023-24

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