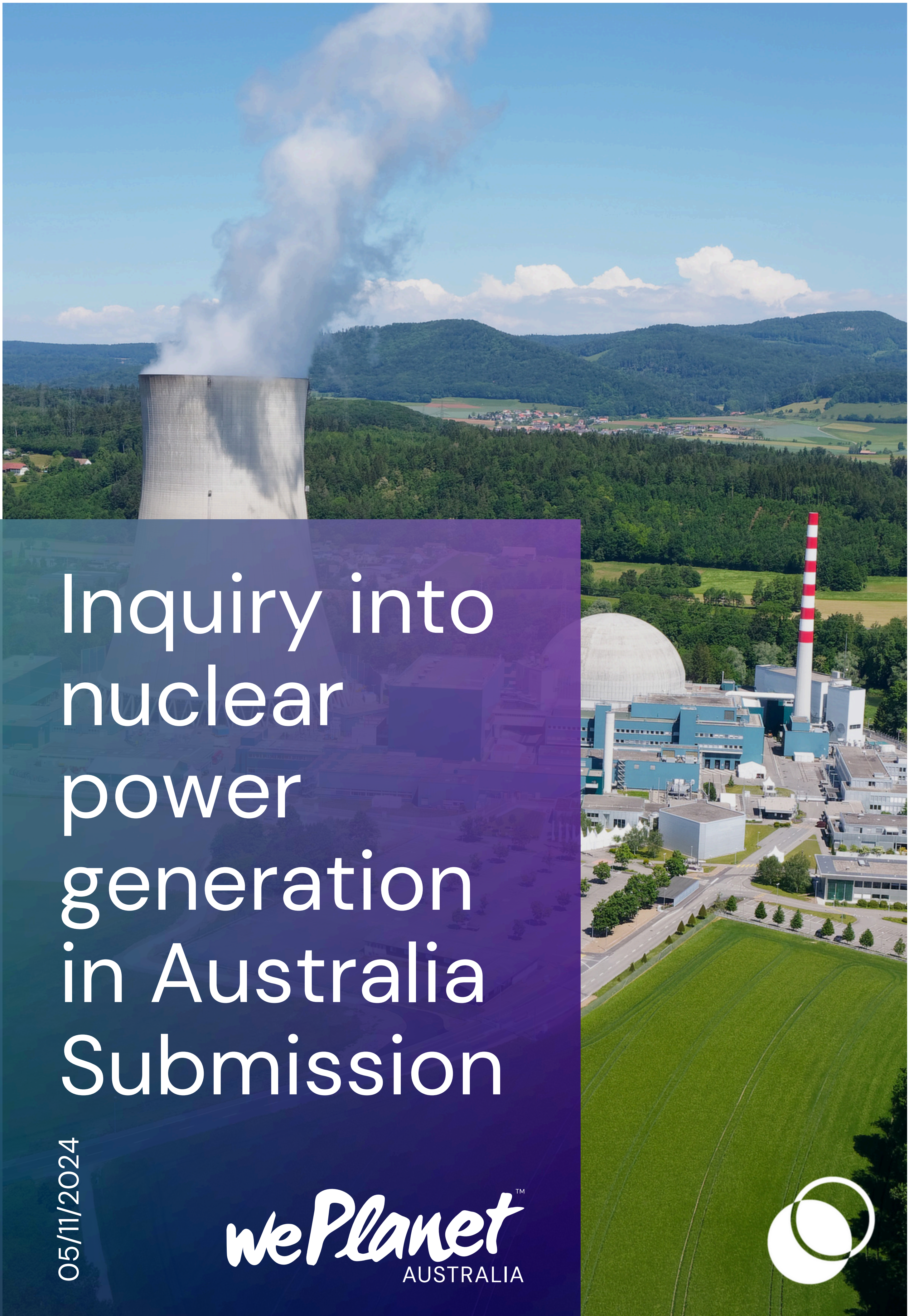


# Inquiry into nuclear power generation in Australia Submission

05/11/2024

wePlanet™ AUSTRALIA

To
The House Select Committee on
Nuclear Energy

***WePlanet Australia* submission on Inquiry into nuclear power generation in Australia (2024)**

## About WePlanet Australia

WePlanet Australia, originally founded as RePlanet Australia in 2022, is an eco-humanist organisation dedicated to advancing solutions to climate change, biodiversity loss, and poverty. As part of the global WePlanet movement, we believe that humanity, guided by science and empowered by technology, can create meaningful environmental and social progress. Our mission focuses on the urgent need for clean, reliable energy to drive sustainable development and elevate human welfare, ensuring a prosperous, resilient future for all.

# Our Position

WePlanet Australia believes that the current prohibition on nuclear energy and related nuclear fuel cycle infrastructure disadvantages Australia by preventing deployment of a proven source of clean, safe and reliable energy domestically, and limiting our participation in this industry globally. In the context of the worsening global climate emergency such a barrier is morally and politically unjustifiable.

Recent polling reveals that the existing prohibition does not have a social licence with a clear majority of 61% of Australians supporting the use of nuclear energy and the number of people strongly opposed having dramatically declined. The net support in this polling is the same as the marriage equality plebiscite.

Lifting the prohibition would bring Australia in line with key trade partners such as the US, UK, and EU, as well as a growing number of countries globally that recognise the important role nuclear energy can play in achieving climate goals and ensuring energy security.

Recent global developments in nuclear energy highlight the urgent need for Australia to reconsider its stance. At COP28, 22 nations signed a landmark pledge to triple nuclear power generation by 2050, underscoring the vital role nuclear energy will play in the global transition to clean energy.

This commitment was further bolstered during this year's New York Climate Week, when 14 of the world's largest financial institutions, including Bank of America, Morgan Stanley, and Goldman Sachs, publicly expressed their support for this goal. This broad financial backing signals growing global recognition of nuclear energy as a key tool in addressing climate change. Meanwhile, the United States has enacted both the Inflation Reduction Act and the ADVANCE Act, allocating billions to support existing and new nuclear energy projects.

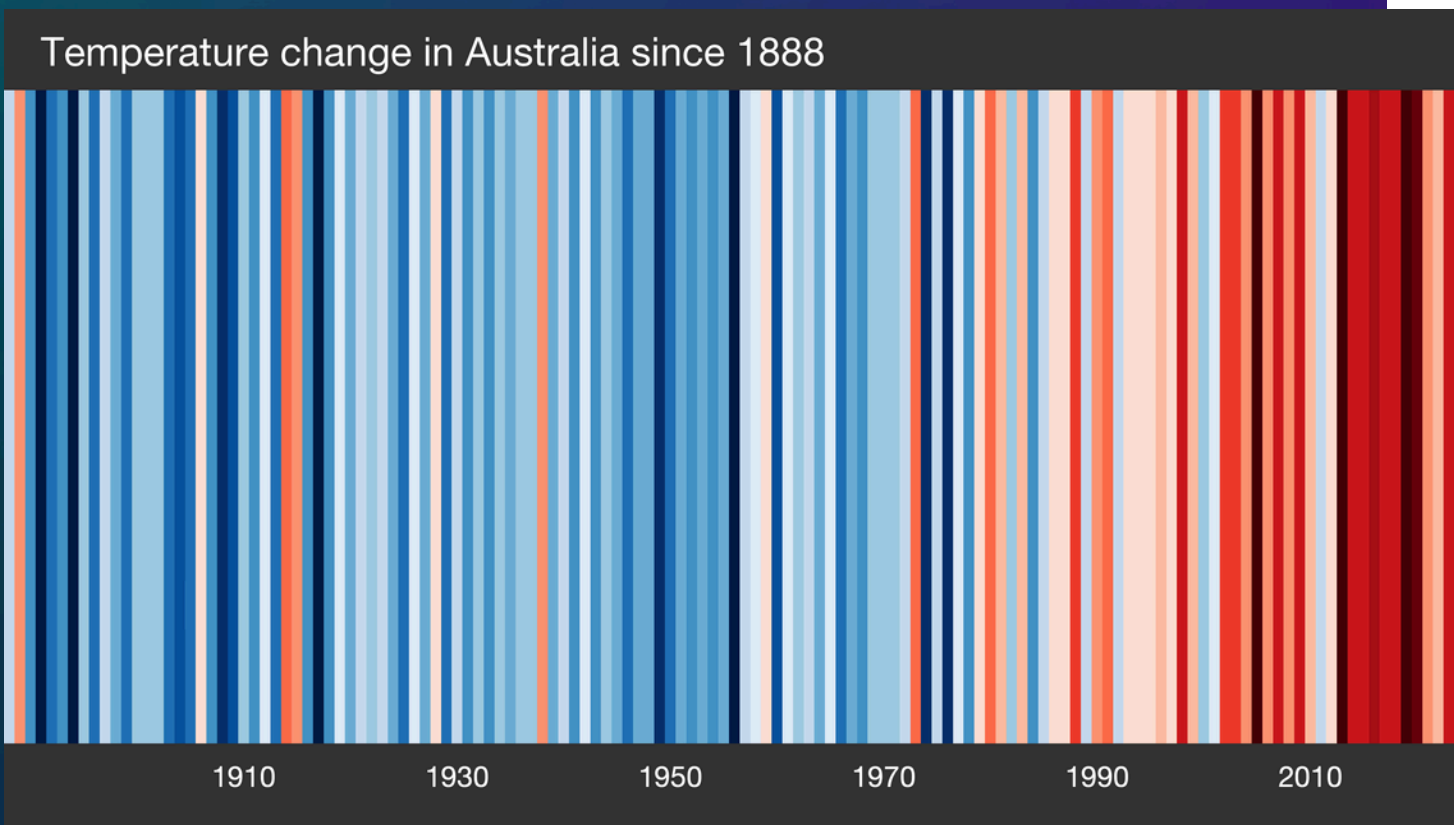
In addition, the world's five largest technology companies—Google, Microsoft, Apple, Amazon, and Meta—have begun investing significantly in nuclear energy to power their operations, particularly as the rise of artificial intelligence dramatically increases their energy needs. These companies see nuclear power as a scalable, low-carbon solution that provides the reliable energy necessary to meet their growing demands .

# History

The existing prohibition on the use of nuclear energy in Australia was introduced in 1998, with the support of the Coalition, Labor, Greens and Democrats, three years after the first Conference of Parties (COP) under the UN Framework Convention on Climate Change (UNFCCC) in 1995 and eight years after the first Intergovernmental Panel on Climate Change (IPCC) report in 1990. It was clear as this prohibition was being implemented that climate change was a growing issue and driven by human activity, primarily the release of greenhouse gases from burning fossil fuels, and yet the Australian parliament decided to block the use of low-emissions nuclear energy, locking in continued dependence on fossil fuels.

In the twenty-six years since the prohibition was introduced the seriousness of climate change has become clearer and the urgent need to transition away from fossil fuels has only increased. The fact that the prohibition has remained in place during this time is a serious failing of our political system and must be immediately rectified.

Although it should not need to be said, lifting the ban on nuclear energy does not commit us to any particular policy or technology.



# *The case for nuclear*

## Climate, environment and public health benefits

On October 17, 1956, the first full scale nuclear power station opened in the UK. Today nuclear energy is used in thirty-two countries with over four hundred operational reactors producing approximately ten percent of global electricity. Nuclear is the second largest source of clean electricity after hydroelectricity.

For almost seventy years nuclear energy has demonstrated it can provide affordable, reliable energy without producing the dangerous air pollution or greenhouse gases associated with the burning of fossil fuels. Despite a small number of notable accidents, nuclear energy remains one of the safest forms of energy available to humanity.

Research published in 2013 found "that global nuclear power has prevented an average of 1.84 million air pollution-related deaths and 64 gigatonnes of $CO_2$-equivalent ($GtCO_2$-eq) greenhouse gas (GHG) emissions that would have resulted from fossil fuel burning."

The Intergovernmental Panel on Climate Change (IPCC) acknowledges that land use plays a vital role in protecting the environment and addressing climate change, "Sustainable land management can contribute to reducing the negative impacts of multiple stressors, including climate change, on ecosystems and societies (high confidence)". Nuclear energy has the lowest lifecycle land use and mining requirement of all energy sources.

A report produced for the United Nations Economic Commission for Europe (UNECE) found that nuclear energy has the lowest lifecycle environmental impact. Note that this is for the full lifecycle and fuel cycle, not merely plant construction and operation.

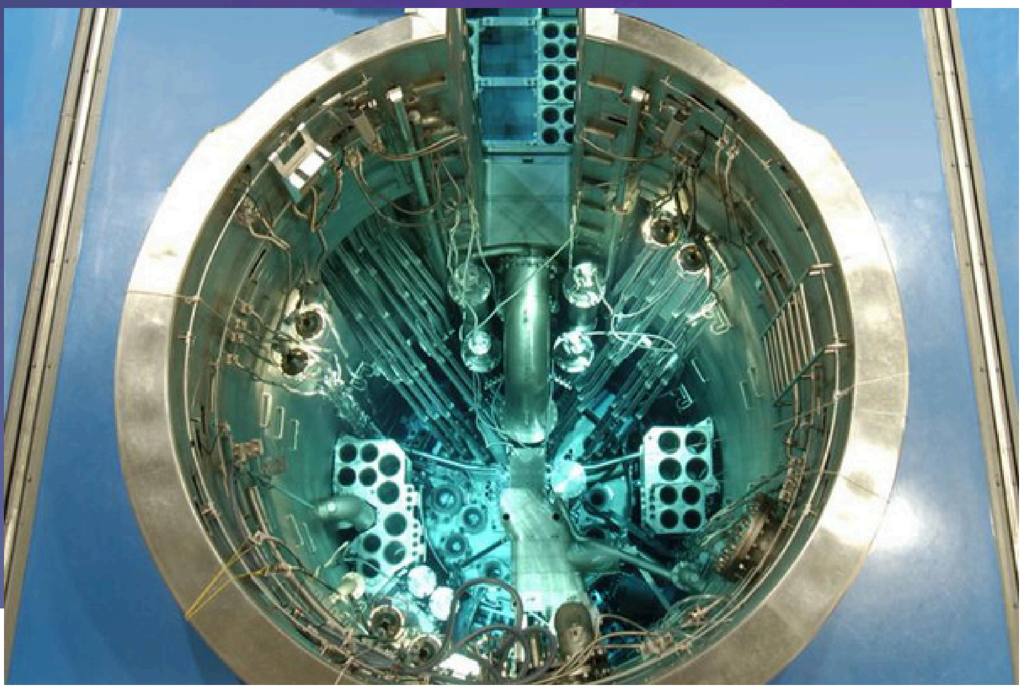
Olkiluoto Nuclear Power plant in Finland is surrounded by protected ecosystems.

# *The case for nuclear*

## Deployment timeline

The deployment timeframe for nuclear energy in Australia is infinite while the ban remains in place. However, the International Atomic Energy Agency (IAEA) states that, "experience suggests that the time from the initial consideration of the nuclear power option by a country to the operation of its first nuclear power plant is about 10–15 years." Australia's established nuclear expertise and strong regulatory framework mean much of the groundwork has already been laid. This positions Australia to potentially accelerate the deployment process once the ban is lifted. The timeline would then be shaped by factors such as workforce and supply chain readiness, political commitment, and community consent. Building trust and fostering informed community support are crucial, and such efforts are more successful when backed by clear communication, factual engagement, and bipartisan support.

OPAL research and medical reactor at Lucas Heights, Sydney
Image credit: ANSTO



# *The case for nuclear*

## Water Security

Desalination is already an essential part of Australia's water supply, with six major desalination plants operating in cities such as Sydney, Melbourne, Adelaide, and the Gold Coast. These plants play a crucial role in securing water against disruptions caused by climate change and are likely to become even more important in the future. However, as they rely on Reverse Osmosis technology, they are constrained by the high cost of the technology, the electricity required, and the significant carbon footprint associated with fossil fuel-generated electricity, which remains a major component of Australia's energy mix.
In contrast, nuclear power presents an opportunity to use thermal  expected to be essential by 2025.

Multi-Effect Distillation (MED) units, powered by reactor waste heat or process heat. While nuclear-powered desalination is already in use in countries like Pakistan, India, and Japan, it is currently prohibited under Australian legislation. This technology offers a sustainable, secure, and low-carbon water supply. As noted in an IAEA report, "only nuclear reactors are capable of delivering the copious quantities of energy required for large-scale desalination projects," which are expected to be essential by 2025.

Perth reverse osmosis desalination plant

# The case for nuclear

## Waste Management (Low Level Waste)

Low-level waste (LLW) is material that has been contaminated with radioactivity during nuclear reactor operations, such as protective clothing, cleaning materials, and equipment. It contains short-lived isotopes and has the lowest radioactivity of all types of nuclear waste. Despite representing 90% of the waste volume produced by a nuclear power plant, LLW accounts for only 1% of the total radioactivity, making it relatively easy to manage. Australia already produces low-level waste (LLW) from various government and industry activities, all of which are subject to strict management requirements. LLW in Australia is typically conditioned and sealed in containers, which are stored in dedicated facilities across the country.

Currently, LLW is managed at multiple locations, ensuring safe containment and disposal.

In terms of nuclear power, a typical 1GW reactor generates around 160 cubic metres of LLW annually, roughly the size of four shipping containers.

Australia has a commercial facility at Sandy Ridge in Western Australia, operated by Tellus Holdings, which is licensed to safely manage and dispose of low-level waste. The government is also exploring additional options, including the possibility of a government-operated facility for further LLW disposal.

Low level waste safely managed at Lucas Heights, Sydney
Image credit: ANSTO

# The case for nuclear

## Waste Management (Intermediate Level Waste)

Intermediate-level waste (ILW) is produced from nuclear reactor components, such as activated cladding, control rods, and graphite from reactor cores, as well as materials generated during reactor decommissioning. ILW contains higher levels of radioactivity than low-level waste, but it does not generate significant heat. ILW makes up 7% of the total waste volume and accounts for 4% of the radioactivity. A typical 1 GW nuclear power plant generates about 10 cubic metres of ILW annually, equivalent to around 41 wheelie bins. While the volume of ILW is much lower than that of low-level waste, it requires significantly more shielding and security due to its moderate radioactivity. Some waste from nuclear medicine production also falls under this category and is currently stored in interim facilities. In the future, Australian Synroc technology will be used to compact this waste in a newly built facility, which could also manage more challenging types of waste, including high-level radioactive waste.

At present, there is no final disposal site for ILW in Australia, but plans are underway to establish a national civilian radioactive waste disposal facility, as well as waste disposal facilities for the AUKUS nuclear submarine program. Until then, ILW would be safely stored on-site at the reactor or in dedicated interim storage facilities.

Intermediate level waste safely managed at Lucas Heights.
Image credit: ANSTO

# The case for nuclear

## *Waste Management (High Level Waste)*

High-level waste (HLW) is produced from all nuclear reactors, including those used in the nuclear submarines Australia is acquiring under the AUKUS agreement. Nuclear fuel typically stays in civilian reactors for 3-6 years and, after use, remains solid within its assemblies, though it becomes highly radioactive. Australia has been safely managing used nuclear fuel from research reactors in Sydney since the 1950s.

There is a common misconception that because certain elements within nuclear waste remain radioactive for thousands to millions of years, they pose a high-level threat for this entire duration. The opposite is true: the defining feature of radioactive material is that its radiotoxicity decreases steadily and predictably over time.

Within a few hundred years, used nuclear fuel is safe to be near, provided it is not ingested, inhaled, or otherwise brought into the body. Advanced containment methods ensure that long-lived waste remains secure. Since the start of the civil nuclear industry, no harm has been caused to people by the radioactivity from managed civilian nuclear waste.

HLW accounts for just 3% of the total volume of waste produced but contains 95% of the total radioactivity. Initially, it generates significant heat, though it cools relatively quickly.

After being removed from a reactor, used nuclear fuel is initially placed in water, which helps cool the fuel and provides shielding. After 1-5 years in cooling ponds, the fuel can either be transferred to dry casks for long-term storage or prepared for recycling or disposal.

High level waste stored safely in dry cask storage. So safe that even a pregnant woman can stand next to them.
Image credit: Madi Hilli

# The case for nuclear

## Waste Management (High Level Waste) Cont.

Dry storage involves placing the used fuel in reinforced canisters designed to withstand extreme conditions, such as fire or high impact. This method is widely used in countries like the United States. For long-term disposal, deep geological repositories are employed, where used fuel is sealed in canisters and buried underground at geologically stable sites. Finland is about to begin accepting used fuel in its deep geological repository, the first of its kind. Recycling is another viable option, as more than 90% of the potential energy remains in the used fuel. Some countries including France reprocess their nuclear fuel, with 17% of their electricity coming from recycled material.

A typical 1 GW nuclear power plant, capable of powering over 750,000 homes, discharges an average of 68 fuel assemblies every 18 months, demonstrating that while HLW is highly radioactive, its volume is relatively low and manageable.

Since 1954, only around 400,000 tonnes of used nuclear fuel has been produced worldwide. In comparison, Australia alone generates about 8 million tonnes of hazardous waste every year. The volume of used nuclear fuel is incredibly small by comparison.

High Level Waste stored at Sizewell B power station in the UK
Each of these dry casks represents used fuel that powered 1.3 million homes for a year.

# The case for nuclear

## Radioactive material and nuclear waste transport

Radioactive material makes up a very small proportion of all dangerous goods shipped each year—just 1% in the USA, the world's largest producer of nuclear power. Globally, around 15 million packages of radioactive material are transported annually via public roads, railways, and ships. It's important to note that radioactive material is not exclusive to the nuclear fuel cycle, with approximately 95% of radioactive consignments unrelated to nuclear power. (World Nuclear Association)

Australia has a well-established framework for safely managing the transport of radioactive material, including nuclear waste. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) oversees the regulation of these activities, ensuring that stringent safety standards are met, and the transport of such materials is carried out securely and responsibly.

Intermediate level waste being repatriated to Australia for storage at Lucas Heights.
Image Credit: ANSTO

# *The case for nuclear*

## *Natural Disaster Resilience (Extreme weather)*

The science demonstrates a clear link between anthropogenic climate change and the increase in severe and extreme weather events. Nuclear energy is recognised by respected international scientific organisations as a crucial clean energy source that enhances the climate resilience of energy systems.

***"Increasingly frequent extreme weather conditions and rapidly growing shares of renewable energy generation place a growing premium on climate-resilient energy sources. A diverse and resilient energy foundation from decarbonized energy sources like nuclear, hydropower, geothermal and others will play an important role in accommodating renewables and successfully decarbonizing global energy systems."***

**- *World Meteorological Organization***

The International Atomic Energy Agency (IAEA) 'Nuclear Energy in Climate Resilient Power Systems' report acknowledges that extreme weather such as heat waves, storms and droughts can impact on nuclear energy generation but stresses that historical data demonstrates that this impact is minor.

***"Reductions in nuclear output due to cooling water availability and other climate events are small — in 2022 these energy losses accounted for 0.3% of global nuclear generation. Historical data show that extreme events such as heat waves, storms and droughts have a minimal impact on the operations of nuclear plants, making nuclear energy a key partner with renewables in decarbonized energy systems."***

- *International Atomic Energy Agency*

# The case for nuclear

## Natural Disaster Resilience (Extreme weather)

Renewable energy sources like wind and solar are particularly vulnerable to the impacts of a changing climate, as their generation depends directly on weather conditions. It is well understood that high operating temperatures can reduce the efficiency and lifespan of solar pv cells and battery cells, higher average temperatures may impact on these technologies. Similarly, shifting wind patterns, driven by climate change, increase the risk of reduced wind energy output. The Intergovernmental Panel on Climate Change (IPCC) reports that climate change will affect aggregate global wind speeds, with projections showing an average annual decline of up to 10% by 2100, though regional variations will be significant. One study suggests that under a low-emissions scenario (SSP1-2.6, linked to warming below 2°C), 11% of global wind farms could see a 5% decrease in average wind speeds, rising to 18% under a high-emissions scenario (SSP5-8.5, associated with warming above 4°C).

In addition, the risk to wind power infrastructure from lightning strikes is growing. Currently, an estimated 5.4% of turbine blades are hit by lightning each year, with considerable regional variation. Despite the presence of protection systems, lightning strikes account for 60% of operational blade losses and 20% of total operational wind losses. Climate change is projected to exacerbate this risk, with lightning frequency expected to increase by 12% for every 1°C rise in temperature. Addressing these vulnerabilities calls for a diversified and resilient approach to clean energy, integrating reliable technologies like nuclear power to bolster energy stability and ensure a sustainable future.

Hail Damaged solar farm
Image Credit: ABC13 Houston

# The case for nuclear

## *Natural Disaster Resilience (Earthquakes and Tsunamis)*

Nuclear power stations are engineered to withstand severe external threats, including earthquakes and tsunamis. Approximately 20% of the world's nuclear fleet operates in seismically active regions, yet in 70 years of global civilian nuclear power generation, there has never been an accident directly caused by an earthquake. When most people think of earthquakes and nuclear power, they recall the 2011 accident at the Fukushima Daiichi plant, triggered by the Great East Japan Earthquake. However, it was not the earthquake itself but the ensuing 15-metre tsunami that caused catastrophic damage to the site. This pivotal event has driven comprehensive global regulatory updates and site enhancements, reinforcing nuclear facilities to better withstand similar threats in the future. During testimony to the House Select Committee on Nuclear Energy on October 28, 2024, Geoscience Australia affirmed that Australia is the most geologically stable continent on Earth, with seismic activity far less intense than in regions like Japan or the United States, which already safely operate nuclear plants. This geostability underscores Australia's potential for hosting secure nuclear power infrastructure, contributing to a diversified, resilient, and climate-friendly energy mix.

***"Let me start. Australia is its own tectonic plate. We have no tectonic boundaries that intersect with the continent. On a global scale, the seismicity of Australia is considered low. We are a relatively low seismic hazard environment. Certainly in comparison to other areas, such as Japan and California, we are extremely low."***

***— Dr. John Dawson, Geosciences Australia, testimony to the House Select Committee on Nuclear Energy, October 28, 2024.***

News Headline announcing the restart of the nuclear power plant that safely shutdown during the 2011 Great Eastern Japan Earthquake which was 9.0 magnitde

JAPAN

**Japan restarts nuclear power plant closest to 2011 earthquake**

The Onagawa Nuclear Power Plant's No. 2 reactor was set to restart Tuesday after more than 13 years of suspension. | JIJI

BY SHOKO ODA
BLOOMBERG

SHARE/SAVE Oct 29, 2024

# The case for nuclear

## Federal, state, territory and local government legal and policy frameworks

Australia's legal and policy frameworks related to nuclear energy provide a solid foundation, allowing for an expansion of existing systems rather than requiring an entirely new approach. Current domestic laws, particularly in relation to uranium mining, export activities, and the operation of the OPAL research reactor at Lucas Heights, demonstrate that much of the necessary regulatory architecture is already in place. The swift legislative changes required by the AUKUS agreement for nuclear-powered submarines further highlight rapid adaptation is possible when there is political will and a clear national objective.

If Australia chooses to pursue nuclear energy, it would be essential to conduct a comprehensive review of existing legal and regulatory frameworks. This review should first outline clear policy goals for nuclear energy development, ensuring that these align with Australia's commitments to nuclear non-proliferation, safety, and security. Embedding these principles into any civilian nuclear energy program would ensure compliance with international standards and build public confidence.

Significant legal barriers, such as the prohibitions in the Australian Radiation Protection and Nuclear Safety Act 1998 and the Environment Protection and Biodiversity Conservation Act 1999, would need to be addressed. Similar prohibitions and laws at the state level would also need to be reviewed to ensure a cohesive national framework. States which fail to provide a policy framework that fits with the national framework would likely miss out on any potential investment in a nuclear power industry. At the federal level, Australia could also consider strengthening its international commitments by becoming a party to an international convention on third-party liability for nuclear damage. This would bring Australia in line with global norms on nuclear compensation, ensuring proper frameworks are in place for managing nuclear incidents.

# The case for nuclear

## *Federal, state, territory and local government legal and policy frameworks*

Australia's domestic legal infrastructure would need to be revisited to ensure that nuclear safeguards, security, safety, and emergency preparedness provisions are sufficiently robust for a civilian nuclear energy program. Existing laws would need to be adapted to include a comprehensive nuclear liability regime, providing appropriate mechanisms for addressing potential nuclear incidents.

Additionally, the regulatory responsibilities of key agencies like ARPANSA and ASNO could be expanded. While these agencies currently oversee most of Australia's nuclear regulations, their authority and resources would need to be increased to effectively manage a civilian nuclear energy sector. This would also involve benchmarking Australia's regulatory practices against international standards, such as those of the International Atomic Energy Agency, to ensure the highest levels of safety and best practices are followed.

Image: Australia Helen Cook is an internationally recognised expert on nuclear law

# The case for nuclear

## Response to the following terms of reference questions

I) potential share of total energy system mix;
J) necessary land acquisition;
K) costs of deploying, operating and maintaining nuclear power stations;
L) the impact of the deployment, operation and maintenance of nuclear power stations on electricity affordability;

Due to the current prohibition on nuclear energy in Australia, these questions cannot be fully addressed at this time. While preliminary responses may offer insight into the potential outcomes of nuclear energy integration, definitive answers will only emerge when the Australian government and parliament establish clear objectives and policies regarding nuclear deployment within the national energy framework.

For instance, the cost of deploying nuclear energy infrastructure would be influenced by factors such as regulatory requirements, reactor technologies chosen, and the structure of commercial agreements. Until a formal policy pathway is set, estimations regarding nuclear energy's share in the energy mix, associated land requirements, and its impact on affordability remain speculative. However, a commitment to fact-based exploration of nuclear energy's potential role could help Australia craft a resilient and sustainable energy strategy for the future.

# The case for nuclear

## A Just Transition

The shift away from fossil fuels has been politically challenging, as workers and communities reliant on these industries are understandably concerned about their future. Governments must find equitable solutions to ensure these workers and communities are not left behind during the transition—a concept known as a 'Just Transition'.

WePlanet Australia believes that nuclear energy provides a viable 'Just Transition' pathway for workers and communities currently involved in thermal electricity generation and mining. The nuclear fuel cycle, including energy generation, offers a wide range of employment opportunities, with many skills transferable from the existing fossil fuel industry. For instance, workers at coal and gas power stations already possess experience with machinery like that used in nuclear power stations.

Unlike wind and solar, nuclear energy generation is directly comparable to existing thermal generation, making the sites of coal and gas power stations ideal for nuclear development in Australia. A US Department of Energy report highlights the advantages of transitioning from coal to nuclear, with nuclear energy offering 25% more jobs per unit of energy produced and wages that are 25-30% higher than other clean energy sectors. This makes nuclear power a politically attractive option and helps ease Australia's energy transition, which is already facing growing resistance from communities across the country.

Ensuring a 'Just Transition' for workers and communities currently reliant on the economic benefits of local fossil fuel generation is essential to maintaining public support and economic stability.

Canadian Nuclear Power Workers

# *The case for nuclear*

## Decarbonising industrial sectors

Overseas, major corporations such as Dow chemical are partnering with next generation nuclear to replace fossil gas for their process heat requirements with zero carbon nuclear. Australia's industrial sector currently derives only about 20% of its energy from electricity, relying heavily on lower-cost (per gigajoule) and dependable fossil gas for the remainder. This dependency is a significant source of greenhouse gas emissions. To meet our emissions targets and drive meaningful climate action, it's essential that we keep all options on the table. Embracing a mix of innovative solutions—including electrification powered by renewables and nuclear energy—will be crucial to decarbonising the sector and ensuring a sustainable, low-carbon future.

Nuclear power isn't limited to grid-based applications—an essential aspect of Canada's SMR Action Plan is the development of small modular reactors (SMRs) for the mining sector, aiming to decarbonise this energy-intensive industry. SMRs offer versatile solutions: generating electricity in remote areas, supplying process heat for local industries, supporting desalination efforts, and even providing district heating. Additionally, they can power hydrogen production, facilitating the use of hydrogen-fuelled mining equipment. By leveraging these innovative nuclear technologies, industries can accelerate their path to carbon neutrality, showcasing the multifaceted potential of nuclear energy in building a sustainable, resilient future.

Pictured: Chemical plant

# The case for nuclear

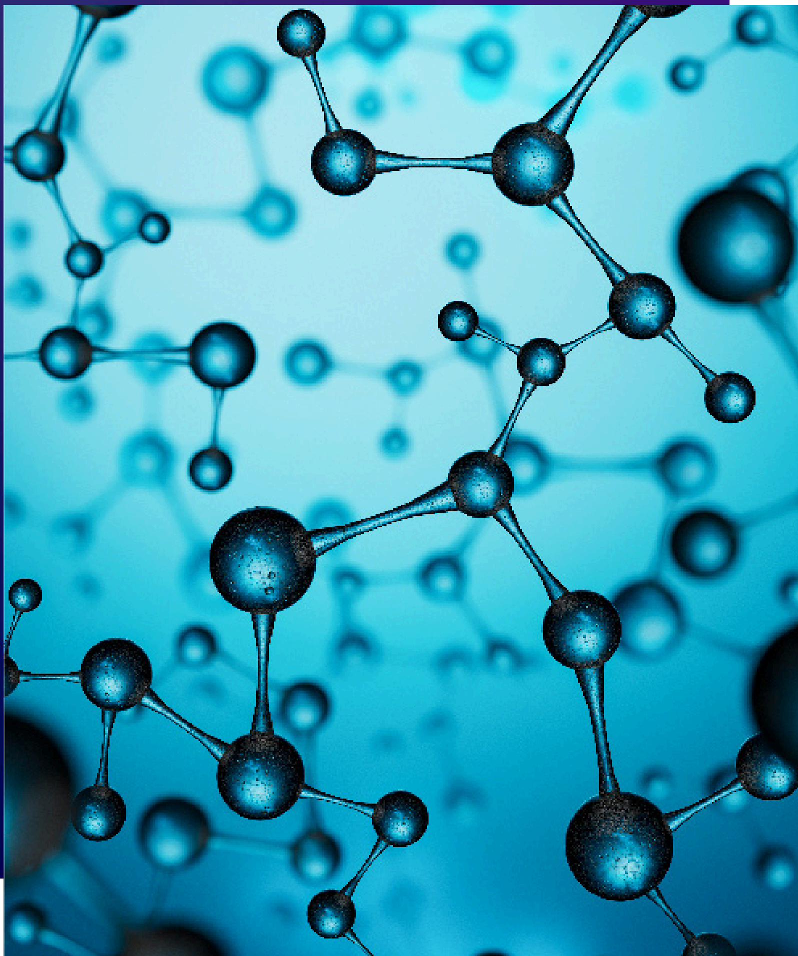
## Hydrogen production

The Australian government recognises hydrogen as a crucial tool for decarbonisation, and high-temperature electrolysis (HTE) offers an efficient method to produce it. HTE uses thermal energy and electricity to split water into hydrogen and oxygen, achieving greater efficiency than electricity alone. Nuclear energy, as a reliable source of high-temperature heat, could provide the thermal energy required for this process, complementing electricity from renewable sources like wind and solar.

By integrating nuclear heat with renewable power, Australia could create a stable, low-carbon hydrogen production system that supports industrial decarbonisation and advances national sustainability goals.

# Conclusion

WePlanet Australia calls on the Australian parliament to lift the prohibition on nuclear energy, uranium mining, and related nuclear fuel cycle facilities. This will expand the range of tools available to us for decarbonisation, improving energy security and climate resilience, and social justice during the energy transition.



## Acknowledgements

Authored by Tyrone D'Lisle


# We thank you for the opportunity to provide a submission on this important issue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