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The Committee Secretary

The House Select Committee on Nuclear Energy

Re: Inquiry into nuclear power generation in Australia

14th November 2024

Thank you for the opportunity to provide this submission.

The Medical Association for Prevention of War (Australia) is an association of medical and other health professionals who work for the elimination of all weapons of mass destruction and the prevention of armed conflict. Nuclear weapons abolition is our primary focus. We promote peace through research, advocacy and education. MAPW is affiliated with IPPNW, the International Physicians for the Prevention of Nuclear War (Nobel Peace Prize 1985). MAPW founded ICAN, the International Campaign to Abolish Nuclear Weapons, in Melbourne in 2007 (Nobel Peace Prize 2017).

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RECOMMENDATIONS

- Nuclear Energy should be rejected as an energy option for Australia. It is expensive, slow, presents significant known health and accident risks and has intractable highly toxic waste – an unsolved problem globally.
- Australia must vigorously pursue energy policies that recognise the urgency of climate action. Many experts advise nuclear power will take at minimum two decades to provide electricity. It will prolong the use of fossil fuels, worsening climate change and increasing the risk of conflicts within and between nations. New coal and gas facilities are also highly problematic.
- Existing legal prohibitions against nuclear power for Australia should remain. Nuclear power has a long list of mostly insurmountable problems, as noted, but perhaps the most significant of them being its inextricable links to nuclear weapons.
- False and exaggerated claims made linking nuclear power and medical imaging and treatments must cease.

INTRODUCTION AND SUMMARY

Climate change is already having devastating ecological and health consequences, with worse to come. It demands urgent responses to transform global energy production to zero-

carbon emissions. Nuclear power proponents, including those associated with uranium and fossil fuel interests, have again called for the consideration of nuclear power for Australia as part of this response. Their calls paint an idealised and simplistic picture of an industry which, contrary to claims made:

- is inextricably associated with producing the world's worst weapons,
- generates significant emissions in many stages of its operation,
- has major health implications for populations living near its facilities, including increased rates of childhood leukemia,
- produces dangerous waste for which there is still no solution,
- is far too slow to implement as part of a response to climate change, and will prolong use of fossil fuels, worsening overall emissions,
- is vulnerable to catastrophic accidents and sabotage,
- requires huge amounts of our most precious resource - water,
- is prohibitively expensive,
- is unnecessary, given the rapid expansion of firmed renewable energy sources.

Putting policy, planning and financial resources into nuclear power would undermine the roll out of firmed renewable energy. It is a time-wasting distraction from the real work of tackling climate change, when we clearly do not have such time to waste.

NUCLEAR POWER AND NUCLEAR WEAPONS PROLIFERATION

There are clear historical links between the nuclear industry and nuclear weapons proliferation. Civil nuclear power generation goes a long way to providing a nuclear weapons capability. Proposals for Australia to acquire nuclear power – when we have other cheaper and less risky energy options – has the serious potential to raise questions elsewhere as to our motives, which may in turn fuel nuclear weapons proliferation. Indeed, Prime Minister John Gorton admitted, in relation to his plans in the late 1960s for nuclear power for Australia, "We were interested in this thing because it could provide electricity to everybody and it could, if you decided later on, it could make an atomic bomb."[i]

Most nuclear armed states have used facilities and/or fuel that were ostensibly for peaceful purposes for their weapons programs. South Africa, Pakistan and North Korea have primarily used highly enriched uranium (HEU) to build nuclear weapons, while India and Israel primarily used plutonium. All used a "peaceful" route to power their weapons, either power reactors or a research reactor.

Both France and the United Kingdom have used "civilian" reactors to produce plutonium and tritium for nuclear weapons[ii]. Similarly in Russia and China, there are close links between the civilian and military nuclear sectors.

In the US, a 2019 report from the Atlantic Council titled "The value of the US nuclear power complex to US national security" stated that "*civilian nuclear power and the associated supply chain are interwoven with key US national security priorities, specifically US*

leadership in global nuclear non-proliferation norms, the support of the nuclear navy, and the nation's nuclear deterrent".[iii]

Also in 2019, a report by the German Institute for Economic Research (DIW) concluded that all nuclear energy production 'harbors the high risk of proliferation'.[iv] Its survey of the 674 nuclear power plants built between 1951 and 2017 showed that military interests rather than economic interests have been the driving force within the industry. It also notably concluded that "*nuclear energy is not a relevant option for supplying economical, climate-friendly, and sustainable energy in the future*."[v]

Drawing on the DIW findings, IPPNW authors wrote in their report, "*How Nuclear Power Powers the Bomb",* that:

- Without a "robust" civil nuclear industry and the associated nuclear infrastructure, nuclear weapons programmes would not be sustainable due to the high costs, risks and need for trained personnel.
- In all nuclear weapon states, the military utilizes the civilian nuclear industry through hidden subsidies regarding human resources, research funds and investments in dual-use nuclear infrastructure.

None of this means that nuclear power for Australia would necessarily lead to us having nuclear weapons. But it does mean that we would far more readily have the capacity to develop them if we chose to. This capacity would raise concerns within our region and almost certainly in some instances increase pressure on our neighbours to develop the same capacity.

Nuclear weapons abolition, which is on a par with climate action as the world's most urgent security imperatives, is rendered much harder in a nuclear-powered world.

SMALL MODULAR REACTORS

While much has been made by nuclear power advocates of the newer Small Modular Reactors (SMRs), these reactors have not yet been commercialised; they are yet another promise from a failing industry of better things to come. The IPPNW report cited above concluded that it is the modernisation of nuclear arsenals in nuclear armed states that is driving the development of SMRs, stating that "*Although allegedly intended for civilian use, SMR are used primarily for military purposes, in particular for the propulsion of nuclear submarines, which have become the most important component of the nuclear weapons doctrines of the major nuclear powers*".

In common with other reactors, SMRs share the problems of being far too costly, too slow, and creating high level waste that lasts thousands of years. They also produce more expensive energy than larger scale reactors (which are already not cost competitive with renewables with storage). The failure of the NuScale project in the United States last year is the latest in a series of abandoned SMR development projects.

CARBON EMISSIONS FROM THE NUCLEAR FUEL CHAIN

Contrary to claims often made, the nuclear fuel chain generates very significant carbon emissions. A 2019 report from the Climate Council stated: "*Unlike coal and gas, no greenhouse gas pollution is created in the operation of the nuclear reactor. However, all other steps involved in producing nuclear power (from mining, to construction, decommissioning and waste management) result in greenhouse gas pollution. Greenhouse gas pollution associated with nuclear power could be similar to a gas power station*…'[vi]

NUCLEAR WASTE – FOR FUTURE GENERATIONS?

Despite more than 70 years of research and many optimistic promises, nuclear waste remains an unsolved problem. Globally there are no functioning long term disposal facilities for high level waste. Finland has a facility due to open hopefully next year that has taken over four decades of planning.[vii] Deep geological disposal remains unproven and extremely expensive.

It is worth noting the difficulties the Federal government has faced for over several decades (and continues to face) in finding a location for our relatively small amount of long lived Intermediate Nuclear Waste (ILW). Proposals have been deeply flawed, contested and well below international best practice. The process has divided communities and created enormous distress. The misinformation provided by the government has been highly problematic.

Opposition to any nuclear reactor is likely to be much greater.

TIMEFRAMES

Nuclear power is far too slow as even part of the response to the accelerating climate crisis.

The International Atomic Energy Agency (IAEA), whose primary purpose is the promotion of the peaceful uses of nuclear energy, publishes guidelines titled "*Establishing the Safety Infrastructure for a Nuclear Power Program*"[viii]. They include the following regarding timeframes for establishing a nuclear power programme:

> '1.*2. A considerable period of time is needed to acquire the necessary competences and to foster a strong safety culture before constructing and operating a nuclear power plant. While the prime responsibility for safety rests with the operating organization, the State has the responsibility to create a robust framework for safety upon committing itself to a nuclear power programme, which demands significant investment [1]. Establishing a sustainable safety infrastructure is a long process, and it has been internationally acknowledged that* ***a period of 10–15 years under optimum conditions*** *is generally necessary between the consideration of nuclear power as part of the national energy strategy and the commencement of operation of the first nuclear power plant.'* [emphasis added]

The key words are "*10-15 years under optimum conditions*". Those conditions would include very strong political and community support, which is lacking in Australia. At present there is no political consensus about nuclear power in Australia and opinion polls repeatedly suggest the electorate is likely to be resistant in the short to medium term at the very least.

Even in countries where there is already an established nuclear industry, there are cost and timing blow-outs and other unexpected developments. For example, in the UK, the Hinkley Point C station (which is the country's first new nuclear plant in decades) is due to begin generating electricity by 2030 – five years later than first planned and 12 years after construction began. The project's costs have also spiralled, from £18bn when its contracts were signed in 2016 to £47.9bn in today's money.[ixx] It was originally expected to be complete by 2017, and cost £18bn.[xi]

Other comparable western democracies - such as France with the Flamanville reactor build, and in the United States Vogtle and VC Summer (abandoned after spending USD 9 billion) - have had both massive delays and major cost blowouts.[xii xiii xiv]

Australia has no experience in building nuclear power reactors, has an extremely limited suitable workforce and would face many legislative hurdles at both federal and state levels. Any reactor build would be very slow.

Slower roll out means using even more coal and gas, and all the climate impacts that go with that. Nuclear power for Australia, including from SMRs, would result in major delays in emissions reduction, resulting in significantly greater climate disruption.

Investment in renewables will also be damaged, making urgently need decarbonisation even harder, worsening the very well documented health impacts of climate change.[xv]

NUCLEAR ACCIDENTS

Complex technology systems all fail at some point, and nuclear power plants are no exception.

Much has been written on the problem of nuclear accidents. Although the best known such accidents are Windscale, Chernobyl, Three Mile Island and Fukushima, there have been at least fifteen accidents involving fuel or reactor core damage, with substantial risk of uncontrolled radioactive release, in a variety of reactor types in Canada, Germany, Japan, Slovakia, the United Kingdom, Ukraine and the United States. In addition there have been many near-misses[xvi].

The most recent, the reactor melt downs at Fukushima, happened after a major earthquake and tsunami. More than a decade later, the power plants and spent fuel ponds are still leaking and dangerous, and vast amounts of contaminated water continue to accumulate. There are still over a million tonnes of cooling wastewater, most of it radioactive, which the Japanese government is dumping into the Pacific Ocean.

The former prime minister, Naoto Kan, said there had been a real possibility of requiring the evacuation of 35 million Tokyo residents, were the fallout to threaten the capital. It was dumb luck that it didn't, given that the prevailing winds in the first week of the disaster were largely offshore, dumping most of the fallout in the sea

The investigation into the Fukushima reactor disaster by the Japanese Diet (parliament) catalogues a multitude of errors and wilful negligence that left the Fukushima plant unprepared for the events of March 11. It outlined serious deficiencies in the response to the accident by TEPCO, regulators and the government. [xvii]

We should be very sceptical of the nuclear industry's claims for its Generation III reactors (which have no operational history) of one major accident per reactor every million years.

Risk estimates for small modular reactors, which have virtually no operational history, should also be viewed with considerable scepticism.

The public health impacts of radioactive contamination released in accidents are outlined in the section "Health impacts of radiation exposure" (below).

ATTACKS ON NUCLEAR FACILITIES

Nuclear reactors are vulnerable to deliberate attack. The most recent and potentially most catastrophic are the attacks on the Zaporizhzhia plant in Ukraine as part of Russia's war on that country. The complex contains six reactors and six spent fuel ponds, all of which contain vast quantities of radioactivity that, if released, could spread over a huge area (far beyond Ukraine).

Other attacks on nuclear facilities include:

- 1979: Israeli agents' bombing of research reactor components in France while they were awaiting shipment to Iraq.
- 1981: Israel's airstrikes on a research reactor in Iraq.
- 1991: Iraq's attempted strikes on Israel's nuclear facilities.
- 1991: the US destruction of a research reactor in Iraq.
- 1980-88: attempted military strikes by Iraq and Iran on each other's nuclear facilities during the war of that period.
- 2007: Israel's bombing of a suspected nuclear reactor site in Syria.

Most of those attacks were directed at 'research' reactors capable of producing plutonium for weapons. Most or all of them were driven by weapons proliferation fears, often legitimate fears[xviii]. Attacks or sabotage of reactors by non-state actors are also possible.

Assoc Professor Tilman Ruff has written extensively on the impacts of the 2011 Fukushima disaster in Japan. He states:

> *"What happened in Fukushima because of poor design, governance failure and a large earthquake and tsunami could equally happen because of commandos or terrorists, especially with insider help, disrupting the power or cooling water supply for reactors and/or spent fuel pools for long enough—only a matter of minutes—to cause meltdown and/or explosions. Such an event could also occur because of cyberattack, or as a result of electricity-supply and electronic-equipment failure…."*

He goes on to note such attacks or disruption

> "*could cause severe and extensive radioactive contamination requiring the long-term evacuation of large areas."*

Yukiya Amano, the director general of the International Atomic Energy Agency (IAEA), found nuclear facilities around the world are facing daily cyberattacks on their systems:

"*Reports of actual or attempted cyberattacks are now virtually a daily occurrence. Last year alone, there were cases of random malware-based attacks at nuclear power plants and of such facilities being specifically targeted …"*[xix]

In addition to the threat of terrorist attack, deliberate sabotage by operating staff or others is also possible. There have been a number of airline mass deaths due to deliberate pilot decisions, presumed to be due to mental illness. The most recent of these was the Germanwings crash in 2015. These types of attack are extremely difficult to prevent.

HEALTH IMPACTS OF RADIATION EXPOSURE

Ionising radiation, such as that created by the nuclear power industry, has long been known to cause damage to living cells.[xx] This applies particularly to DNA molecules, which are our genetic material.

The known cancer and other health effects of exposure to low does ionising radiation are authoritatively estimated by the Biological Effects of Ionising Radiation (BEIR) report from the US National Academy of Sciences. BEIR VII in 2005 stated that

> "*the risk of cancer proceeds in a linear fashion at lower doses without a threshold and that the smallest dose has the potential to cause a small increase in risk to human"*[xxi]

In other words, there is no exposure to ionising radiation that is risk-free.

Ionising radiation also increases the risk of occurrence and death from some non-cancer diseases, including circulatory diseases such as heart attack and stroke. This has been clearly demonstrated at moderate and high doses, and recent evidence has confirmed that circulatory disease mortality also increases at low doses, such as those that occur in nuclear industry workers.[xxii]

There has been a consistent trend over time that the more we know about radiation effects, the greater those effects appear to be. Maximum permitted radiation dose limits have never been raised; they have only ever been lowered. From 1950 to 1991, the maximum recommended whole-body radiation annual dose limits for radiation industry workers declined from approximately 250 to the current limit of 20 mSv per annum. Even this limit is not regarded as "safe", but merely a compromise between, on the one hand, safety, and on the other hand commercial and economic interests.

Childhood leukaemia near nuclear power plants

Apparent excesses of leukaemia occurring in children living near nuclear power plants have caused concern and controversy over decades. The most prominent initial example was a perceived excess of leukaemia and lymphoma cases around the Sellafield nuclear plant in England in the 1980s. An investigation recommended by a government commissioned committee unexpectedly found that the risks for leukaemia and lymphoma were higher in children born within 5 km of Sellafield[xxiii]. In 2007, a meta-analysis supported by the US Department of Energy examined all of the reliable data available worldwide, confirming a statistically significant increase in leukaemia for children living near nuclear power plants[xxiv].

The most definitive findings on this subject come from a large national German study, which examined leukaemia among children living near any of Germany's 16 operating nuclear plants over a 25-year period. It showed that the risk of leukaemia more than doubled for children living within 5 km of a nuclear plant, with elevated risk extending beyond 50 km from a plant[xxv].

Recent advances in low-dose radiation epidemiology are providing valuable new information on disease risks from radiation sources such as medical imaging technologies (CT and others), and nuclear power plant accidents[xxvi].

FALSE HEALTH CLAIMS

The Coalition has made claims linking radiology, radiotherapy and nuclear medicine to nuclear power, claims which are false and deliberately misleading.

A letter sent by Coalition MPs to their constituents earlier this year claimed that: *"*Nuclear energy already plays a major role in medicine and healthcare, diagnosing and treating thousands of Australians every day*".*[xxvii]

We do not have, and have never had, nuclear power in Australia, and nuclear power has no connection to our world class nuclear medicine sector.

Australians will continue to benefit from diagnostic and therapeutic nuclear medicine irrespective of whether Australia's future is powered by reactors or renewables. Nuclear power is not nuclear medicine, it is not X Rays, and it is not even radiotherapy.

X Rays and radiotherapy do not use a nuclear reactor at all. Nuclear medicine in Australia – used to diagnose and treat some types of heart disease, thyroid conditions, infections,

injuries, and cancers – involves radioactive elements (isotopes) that are made using a small research nuclear reactor at Lucas Heights in NSW.

Lucas Heights cannot and has not produced commercial power. But, like all nuclear reactors, it *does* produce radioactive waste that remains highly toxic for 10,000 years.

The Coalition also claims, on a website promoting the "need" for nuclear energy in Australia, that: "Research and advancements in radiation technology continue to evolve, providing new and improved methods for both diagnosing and treating diseases…" [xxviii]

Advancements to improve health outcomes and to reduce the size and risks of radiation exposures will occur whether or not Australia has nuclear power. With renewable energy, nuclear medicine will still exist and advance.

WATER

By no means least (although often overlooked) in the list of reasons why nuclear power is inappropriate, especially for Australia, is the fact that nuclear power plants require very large amounts of water. This is needed both for conversion to steam to drive the turbine, and for cooling of the reactor core and the spent fuel ponds. Water outflows from the plant are relatively warm, and this can affect fish and other aquatic life when it is discharged back to the body of water from which it came.

In France, where river water rather than the sea is often used to cool local reactors, the nuclear industry is obliged by law to reduce electricity output during hot weather when water temperatures rise, or when river levels and the flow rate are low. In the spring of 2022, warm temperatures, including in the rivers, threatened the output of some nuclear power plants[xxix]. However, in the hot summer that followed, the country's nuclear power regulator issued temporary waivers allowing five power stations to continue discharging hot water into rivers[xxx]. Environmental concerns were sacrificed.

Australia is a hot, dry continent, prone to heatwaves and droughts. Water is our most precious resource; it must not be jeopardised further by technology that has additional risks for our particular geography and climate.

[i] Pilita Clark, 'PM's Story: Very Much Alive…and Unfazed', The Sydney Morning Herald, 1 January 1999.
[ii] https://arena.org.au/nuclear-promises-by-tilman-ruff/
[iii] https://www.atlanticcouncil.org/wp-content/uploads/2019/10/Nuclear-Power-Value-IB-final-web-version.pdf

[iv] Chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.diw.de/documents/publikationen/73/diw_01.c.670581.de/dwr-19-30-1.pdf

[v] https://www.diw.de/documents/publikationen/73/diw_01.c.670581.de/dwr-19-30-1.pdf
[vi] https://www.climatecouncil.org.au/nuclear-power-stations-are-not-appropriate-for-australia-and-probably-never-will-be/

[vii] https://world-nuclear.org/information-library/country-profiles/countries-a-f/finland
[viii] https://www.iaea.org/publications/13435/establishing-the-safety-infrastructure-for-a-nuclear-power-programme
[ix] https://www.theguardian.com/uk-news/2016/jul/28/hinkley-point-c-should-the-18bn-nuclear-power-station-be-built
[x] https://www.theguardian.com/uk-news/2024/oct/10/edf-seeks-to-raise-up-to-4bn-to-finish-delayed-hinkley-point-c
[xi] https://www.theguardian.com/uk-news/2024/feb/16/edf-hinkley-point-c-delays-cost-overruns

[xii] https://www.euractiv.com/section/energy-environment/news/french-nuclear-safety-authority-authorises-commissioning-of-flamanville-power-plant/
[xiii] https://www.reuters.com/business/energy/vogtles-troubles-bring-us-nuclear-challenge-into-focus-2023-08-24/
[xiv] South Carolina Spent $9 Billion to Dig a Hole in the Ground and Then Fill It Back In **https://archive.md/SQrnB#selection-443.0-443.84**

[xv] https://www.croakey.org/going-nuclear-and-closing-their-eyes-to-expert-advice-on-the-urgency-of-climate-action/
[xvi] https://arena.org.au/nuclear-promises-by-tilman-ruff/

[xvii] https://reliefweb.int/report/japan/official-report-fukushima-nuclear-accident-independent-investigation-commission
[xviii] https://johnmenadue.com/the-war-in-ukraine-nuclear-power-weapons-and-winter/

[xix] https://www.iaea.org/newscenter/news/iaea%E2%80%99s-amano-calls-strengthened-computer-security-nuclear-world
[xx] Radiation is called "ionising" when it has sufficient energy to knock the electrons off atoms to produce ions (atoms which have a net positive or negative electrical charge)

[xxi] https://nap.nationalacademies.org/resource/11340/beir_vii_final.pdf

[xxii]Mortality from Circulatory Diseases and other Non-Cancer Outcomes among Nuclear Workers in France, the United Kingdom and the United States (INWORKS). https://www.ncbi.nlm.nih.gov/pubmed/28692406

[xxiii] Results of case-control study of leukaemia and lymphoma among young people near Sellafield nuclear plant in West Cumbria. https://www.bmj.com/content/300/6722/423

[xxiv] Meta-analysis of standardized incidence and mortality rates of childhood leukaemia in proximity to nuclear facilities. https://www.ncbi.nlm.nih.gov/pubmed/17587361

[xxv] Childhood Leukemia in the Vicinity of Nuclear Power Plants in Germany https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2696975/

[xxvi] A New Era of Low-Dose Radiation Epidemiology. https://www.ncbi.nlm.nih.gov/pubmed/26231501

[xxvii] https://mailchi.mp/56edb283143b/duttons-nuclear-plan-for-net-zero?e=f781350227
[xxviii] https://www.australianeedsnuclear.org.au/why-nuclear-makes-sense
[xxix] https://www.reuters.com/world/europe/warming-french-rivers-could-take-more-nuclear-supply-offline-2022-05-25/

[xxx] https://www.reuters.com/world/europe/frances-asn-nuclear-regulator-adapts-hot-water-discharge-rules-light-heatwave-2022-08-08/