Medical
Association for
Prevention of War
(Australia)

PO Box 1379, Carlton VIC 3053
03 9023 1958
eo@mapw.org.au
www.mapw.org.au
ABN 157 79 883 661

16 January, 2023

The Committee Secretary
Senate Standing Committees on the Environment and Communications
Re: Inquiry into the Removing Nuclear Energy Prohibitions Bill 2022

Thank you for the opportunity to provide this submission on the above bill.

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), and was the founder of ICAN, the International Campaign to Abolish Nuclear Weapons (Nobel Peace Prize 2017).

Principal author: Dr Sue Wareham OAM
President, MAPW Australia
Phone 02 6253 1117 or 0407 924 152; sue.wareham@mapw.org.au

RECOMMENDATIONS

- The existing legal prohibitions against nuclear power for Australia should remain.
- Australia should not acquire naval nuclear reactors, and legislated prohibitions on nuclear energy should not be compromised to allow for the acquisition of naval nuclear reactors. Their proposed acquisition should be separately and publicly scrutinised with regard to the Nuclear Energy Prohibitions Bill, and to longstanding public opposition to nuclear energy.
- Australia must sign and ratify the Treaty on the Prohibition of Nuclear Weapons.

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 mining 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 has a long list of mostly insurmountable problems. It:

- is inextricably linked with producing the world's worst weapons,
- is carbon-intensive in nearly all stages of its operation,
- produces intractable highly toxic waste which remains a global problem,
- is far too slow to implement, even as part of a response to climate change,
- is vulnerable to disastrous accidents and sabotage,
- requires huge amounts of our most precious resource - water,
- has major health implications for populations living near its facilities,
- Is prohibitively expensive,
- Is unnecessary, given the rapid expansion of renewable energy sources.

Nuclear power is a time-wasting distraction from the real work of tackling climate change, when we don't have such time to waste.

This submission will examine most of the above problems, but will first address the current context of this inquiry, specifically the government's deliberations on naval nuclear power for Australia. This is highly relevant for two reasons. Firstly, the nuclear reactors on board nuclear submarines share nearly all of the problems of reactors on land, as listed above. Naval nuclear power should in no way provide a foothold for the nuclear industry in Australia.

Secondly, it is unclear how the current prohibitions on nuclear power in Australia - prohibitions which would extend to naval reactors - will be managed if the naval nuclear power proposal proceeds. There is grave risk that they will be weakened in order to pave the way for technology which has been consistently rejected by a majority of Australians.

NAVAL NUCLEAR POWER AND THE CALLS FOR A DOMESTIC NUCLEAR POWER INDUSTRY

MAPW opposes naval nuclear power. One of our concerns is that the increased nuclear technology the submarines would require here would be a very significant foot in the door for the adoption of civilian nuclear power with all its attendant problems.

Long before the naval nuclear power decision was announced in September 2021, the question had arisen as to how much nuclear technology would be required in Australia to sustain it. In addition to unofficial commentary, then Defence Minister Marise Payne commented in June 2017, in rejecting former Prime Minister Abbott's suggestion of naval nuclear power, that developing the domestic capacity to service naval nuclear power would take "*far longer than a decade*" and that in the short term there were significant disadvantages.

In more recent times, official statements on this have at best created confusion, and at worst, indicated an opaque process that has marginalised the Australian people. For example, the Australian Strategic Policy Institute (ASPI) reported in September 2021, after the AUKUS announcement, that in a White House briefing two unnamed senior US officials said '*Australia does not have a nuclear domestic infrastructure. They've made a major commitment to go in this direction'*. What commitment has been made, by whom, when, and on behalf of whom? Certainly not on behalf of the Australian people.

However, in November 2021 then Foreign Minister Marise Payne assured south-east Asian neighbours that Australia will not adopt nuclear weapons or a civil nuclear industry. As at least the latter of those promises appears to be of little value, it would be surprising if the other were not also regarded with caution by neighbouring and other countries.

In June 2022, in a meeting in Australia with US Senate Foreign Relations Committee staff members, to discuss topics including "workforce development and training requirements to support Australia's acquisition of nuclear-powered submarines", Vice-Admiral Jonathan Mead, who is the head of Australia's nuclear-powered submarine taskforce, said he believes that Australia must give '*an unwavering commitment to safely and securely stewarding nuclear propulsion technology "*from cradle to grave*" '* (emphasis added). How much nuclear workforce development and training is envisaged for Australia? At what point does nuclear stewardship for submarines become an easy slide to nuclear power for civilian purposes? At the very least, given the responsibility to indeed take care of the "grave" end of the nuclear fuel chain, where is the discussion of what will happen to the waste from the nuclear submarine reactors? There appears to be none.

Concerns regarding a possible drift from nuclear power for submarines to nuclear power for civilian purposes were further justified in August 2022 when UK Secretary for International Trade Anne-Marie Trevelyan said, in relation to the submarines, "*As the development of nuclear skills across Australia grows, things like SMRs [Small Modular Reactors] could become part of Australia's mix. There is a really big agenda there around clean energy*". As referenced in the Introduction above, the Minerals Council of Australia has also claimed '*Now that Australia is acquiring nuclear submarines which use small reactors, there is no reason why Australia should not be considering SMRs for civilian use'*, citing oft-claimed but mythical attributes of nuclear power.

When in opposition Labor gave conditional support to the naval nuclear power proposal. The first pre-condition was that there be no requirement for a domestic civil nuclear industry, and Labor vowed to hold the then government to its promises not to set one up. Then shadow Foreign Minister Wong also referred to the need for Australian sovereignty in decisions relating to the submarines. Given that Australian sovereignty would demand significantly expanded domestic nuclear technology, how does the Labor government intend

to remain true to its commitment to no domestic nuclear power (if naval nuclear power eventuates)?

An obvious way is through upholding legislation, the very legislation to which the Removing Nuclear Energy Prohibitions Bill refers and which already prohibits nuclear power in Australia. The prohibitions should not be weakened in any way.

Secrecy in nuclear matters

The AUKUS and nuclear submarine issues have unfortunately strengthened the secrecy that has long characterised the nuclear industry, beginning with the appallingly secretive manner in which the decisions were made in 2021.

Before the May 2022 election, Labor asked for details as to how then PM Morrison chose the locations of Brisbane, Newcastle and Wollongong's Port Kembla as contenders to host a nuclear submarine base. Guardian Australia applied to the Department of Defence under freedom of information laws seeking the site analysis, and for any advice etc prepared for then Defence Minister Dutton regarding the preferred locations. All this was denied. In other words, residents of at least three Australian cities have been simply told that they might have a nuclear reactor in their port and they have no access to the reasons their cities were chosen. This cannot simply be attributed to pre-election politics. The nuclear industry has operated with false promises (beginning with 'too cheap to meter' in the 1950s), totally inadequate regulation (see for example here), and lack of consultation. In the UK, no information regarding naval nuclear accidents has been made publicly available since 2017, even though such accidents are a public health matter. There is no reason to believe that things would be transparent, even in the civilian sphere, if Australia were to develop civilian nuclear power.

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 – have the serious potential to raise questions elsewhere as to our motives, which may in turn fuel nuclear weapons proliferation. Then Prime Minister John Gorton had plans for nuclear power in the late 1960s, and later admitted '*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*'[1].

Nuclear power generally uses enriched uranium as the fuel. Any uranium enrichment plant can be used to produce not only reactor-grade uranium but also weapons-grade uranium (highly enriched uranium, HEU). Plutonium, also used as nuclear weapons fuel, is produced in reactors and can be chemically extracted from the spent fuel (via reprocessing). Thus the

[1] Pilita Clark, 'PM's Story: Very Much Alive…and Unfazed', The Sydney Morning Herald, 1 January 1999

production of nuclear power provides two possible routes to nuclear weapons. All nuclear armed states have used facilities and/or fuel that were ostensibly for peaceful purposes for their weapons programs.

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*'.

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*'. 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*'.

Drawing on the DIW findings, IPPNW authors wrote a report, '*How Nuclear Power Powers the Bomb*', which stated 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 pressure in some instances for 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.

Naval nuclear power for Australia and nuclear weapons proliferation

Given the evidence cited above of the strong links between nuclear power and nuclear weapons establishments, it is important to note the impacts that even the use of nuclear technology for the navy in Australia could have on nuclear weapons proliferation globally.

The nuclear submarine announcement in September 2021 elicited rapid and strong condemnation from around the world (see for example here, here and here). If Australia proceeds with the submarines we would set a precedent by becoming the first state to take advantage of a "loophole" in comprehensive safeguards agreements that permits nuclear material for a non-explosive military purpose to be removed from safeguards.

Tariq Rauf, who was head of verification and security policy coordination at the IAEA, and others, state that this could well open a Pandora's box of proliferation, with states such as Argentina, Brazil, Canada, Iran, Japan, Saudi Arabia and South Korea also pursuing nuclear-powered submarines and keeping nuclear fuel outside the scope of IAEA safeguards.

Countries in our region have expressed concern about the nuclear submarine proposal. The Malaysian Prime Minister Ismail Sabri Yaakob has expressed alarm about the possibility of a nuclear arms race in the region and nations acting more aggressively, stating that if, for example, China wanted to help North Korea to buy nuclear-propelled submarines '*we can't say no because AUKUS has set a precedent*'. At the Nuclear Non-Proliferation Treaty Review Conference that was held in August 2022 (postponed from 2020), Indonesia submitted a Working paper titled '*Nuclear naval propulsion'*, which expressed significant concerns relating to nuclear weapons proliferation, safety, environmental and humanitarian risks. The document stated that the sharing of nuclear technologies and materials for military purposes '*could run counter to the spirit and objectives of the NPT*', set a precedent and '*complicate safeguards mechanisms'.*

Any policy that ignores how nations outside our own sphere of friendships might react is irresponsible and dangerous. MAPW believes that naval nuclear power, like civilian nuclear power, carries an unacceptable nuclear weapons proliferation risk.

Treaty on the Prohibition of Nuclear Weapons

Regardless of what Australia decides in relation to nuclear power, civilian or naval, the single best way that we could promote not only nuclear weapons non-proliferation but their abolition, would be to sign and ratify the 2017 Treaty on the Prohibition of Nuclear Weapons. This would leave no doubt about our short, medium and long term commitment to a nuclear weapons free world, and would be a powerful example to set for other nations that – like us – hypocritically claim that we need a 'nuclear umbrella' to 'protect' us.

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. 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, SMRs 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).

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…*'.

NUCLEAR WASTE – A PROBLEM FOR FUTURE GENERATIONS?

Despite 70 years of research and many optimistic promises, the question of what to do with nuclear waste remains an unsolved problem. Globally there are no functioning long term disposal facilities for high level waste (HLW).

It is worth noting the difficulties the Federal government has faced for over two decades (and continues to face) in finding a location for our relatively small amount of long lived intermediate level waste (ILW). Current proposals are 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.

On the first anniversary of the AUKUS announcement, Defence Minister Marles said that the government will be providing answers to five questions in relation to the nuclear submarines: the final design, when they can be acquired, what capability gap the timeline will create and solutions to plug it, the cost, and how Australia's plans comply with nuclear non-proliferation obligations. He did not mention the nuclear waste from the submarines - another problem for future generations perhaps.

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*'. They include the following regarding timeframes:

> '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….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.'*

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 around nuclear power and opinion polls repeatedly suggest the electorate is likely to be resistant in the short to medium term at the very least. Therefore a timeframe of two decades is probably more likely if Australia were to proceed with nuclear power.

Even in countries where there is already an established nuclear industry, there are cost and timing blow-outs. For example in the UK, the Hinkley Point C station which is the country's first new nuclear plant in decades, is running 10 years behind schedule and is expected to cost at least A$45 billion, nearly 50% more than initially expected. It will require huge government subsidies.

Nuclear power for Australia, including from SMRs, would result in major delays in emissions reduction, resulting in greater climate disruption.

NUCLEAR ACCIDENTS

Much has been written on the problem of nuclear accidents, and this submission will make only a very few comments. Although the best known and worst such accidents were 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. The public health impacts of radioactive contamination released in accidents are outlined in the section 'Radiation and Health' (below).

Associate Professor Tilman Ruff has written extensively on the public health and other impacts of the 2011 Fukushima disaster in Japan. He writes:

> *'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….'*

Such attacks or disruption '*could cause severe and extensive radioactive contamination requiring the long-term evacuation of large areas.'*

At Fukushima, vast quantities of seawater were pumped onto the damaged reactors as coolant. Over a decade later, there are still over a million tonnes of cooling wastewater, most of it radioactive, which the Japanese government plans to dump into the Pacific Ocean.

Nuclear submarine accidents

Like other naval vessels and crew, nuclear submarines and submariners are not immune from human and technical error and therefore accidents. With a nuclear reactor on board however, the risks are expanded to include radioactive contamination, affecting human health and the environment. Like all nuclear accidents, such harm is extremely difficult to quantify as it is greatly dispersed in space and time. Naval nuclear reactors in Australian ports have the potential to cause the release of radioactivity in population centres. MAPW's Safety Brief on nuclear powered submarines summarises some of the issues that are relevant for communities that host these vessels in their ports.

In total, nine nuclear powered submarines have sunk (from causes including fires, weapons explosions, flooding and storm). In 2010 HMS Astute, 'the world's most advanced nuclear submarine', ran aground off the Isle of Skye. In October 2021, the US attack submarine USS Connecticut was grounded while in the South China Sea.

ATTACKS ON NUCLEAR FACILITIES

Nuclear reactors are also vulnerable to deliberate attack. The most recent and potentially most catastrophic are the attacks on the Zaporizhzhia plant in Ukraine, Europe's largest nuclear power facility, 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. At the time of writing, the ultimate fate of the plant is still unknown.

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;
- 1980-88: attempted military strikes by Iraq and Iran on each other's nuclear facilities during the Iran-Iraq war;
- 1991: Iraq's attempted strikes on Israel's nuclear facilities;
- 1991: the US destruction of a research reactor in Iraq;
- 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.

HEALTH IMPACTS OF RADIATION EXPOSURE

Ionising radiation[2], such as that created by the nuclear power industry, has long been known to cause damage to living cells. This includes damage to DNA molecules, which are our genetic material.

The known cancer and other health effects of exposure to low dose 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…the smallest dose has the potential to cause a small increase in risk to humans'.* 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 increase at low doses, such as those that occur in nuclear industry workers.

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 found that the risks for leukaemia and lymphoma were higher in children born within 5 km of Sellafield. In 2007, a meta-analysis supported by the US Department of

[2] 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)

Energy examined all of the reliable data available worldwide, confirming a statistically significant increase in leukaemia for children living near nuclear power plants.

Further confirmation of this link came 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.

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.

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. 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. Environmental concerns were sacrificed.

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