Background.
I am an Honorary Associate Professor attached to the School of Humanities and Languages, at the Australian Defence Force Academy, University of New South Wales. Current projects include two monographs: *The path to AUKUS: Australian Strategic Alignment and the role of nuclear submarines 1941-2023* and *Australia and Global Power 1756-2024.* Book chapter: 'Australia's Nuclear Ambitions' in *The Cambridge History of the Nuclear Age* (to be published in 2024). Selected works on nuclear issues include: 'An Astute: Anglo-Australian Co-operation on Nuclear Submarines in Historical Perspective), *Security Challenges*, January 2013. Edited volume with David Lee: *Australia and the Nuclear Non-Proliferation Treaty 1945-1974: Documents on the History of Australian Foreign Policy* (Canberra: DFAT, 2013) Book chapter with John Simpson, Mountbatten Centre, *Forecasting Nuclear Proliferation in the 21st Century: A Comparative Perspective* Vol. 2, eds. William Potter with Gaukhar Mukhatzhanova (Stanford: Stanford University Press, 2010); Book: *Australia's Bid for the Atomic Bomb,* (Melbourne University Press, Melbourne, 2000).

Key Recommendations:
1. The rights of the Minister to issue a declaration for an action of a nuclear propulsion plant should be applied to the entire nuclear fuel cycle from manufacture, core upgrades, reprocessing and disposal of waste.
2. Australia's right to develop and use highly enriched uranium in its Nuclear Attack Submarine (SSN) fleet should be confirmed in the bill. Such a right should be established with respect to both the Virginia class SSN, if that is chosen, and the AUKUS SSN. Australia should also exercise the right to reprocess spent fuel in its management of waste.
3. A statement be made that the use of the term 'military' applications with respect to Australian safeguards agreements - employed in the 2010 Australia-United States Atomic Agreement - does not apply to the AUKUS defence agreement.
4. The bill should provide an explanation of the Australian-United States safeguards agreement in 1979, which prohibits the supply of enrichment and reprocessing technology to Australia. Specific reference should be made to the intention in the Australian Radiation Protection Act and Nuclear Safety Act (1998) to not prejudice Australia's defence.
5. The bill should provide the respective reasons for selecting and maintaining two SSNs.
6. An explanation regarding the criteria to be employed in selecting a SSN base on the east coast of Australia should be considered.

Recommendation 1: The most urgent objective in this legislation is to counter the unfortunate sense of urgency in the so-called capability gap and to communicate the sense of control and planning implied by the stress of sovereign capability. The 2024 national strategy will presumably explain the Australian role of littoral warfare in the maritime strategy of the United States and its relevance to the protection of Australia's maritime area. Developments in nuclear power, like cybersecurity, have considerable consequences for the civil economy and trade relations. Moving to affordable nuclear power may be a future means of offsetting cost and capitalising on the commercial links provided by Australian defence industry work on a sovereign shipping capability. In the meantime, the regulatory framework precludes the establishment of a civil industry, but does not rule out military applications such as nuclear propulsion and other 'non-explosive' applications of nuclear power.

It seems that there is considerable room for progressing nuclear research and development in stressing that the Minister of Defence is 'not prevented from issuing a declaration for *an action*, consisting of, or involving the construction or operation of a naval nuclear propulsion plant related to use in a conventionally-armed, nuclear-powered submarine.' The scope for

action is considerable if, as the technical guidance notes, the word 'plant' encompasses the entire nuclear propulsion system of which the reactor is a part.

Recommendation 2: Is it the intention of the proposed legislation to deny Australian access to enriched uranium fuel technology? The AUKUS statement released by the White House on 14 March 2023 noted:

1. As a non-nuclear weapon state Australia will not seek nuclear weapons.
2. Australia will not enrich uranium or reprocess fuel as part of this program.
3. Australia will not produce its own fuel for its SSNs.
4. The United States and United Kingdom will supply complete welded power units, needing no need to refuel.
5. Fuel suppled will require chemical reprocessing which Australia does not utilise. Australia will be responsible for spent reactor fuel.
6. Comprehensive Safeguards and the Additional Protocol will be applied.[1]

Australia's approach to safeguards, in line with the Nuclear Non-proliferation Treaty (NPT), provided for work on the 'military non-explosive uses of nuclear power.' In other words, nuclear propulsion. Yet items 2 and 3 of the AUKUS deal above deny the ability to fuel the submarine or to improve the reactor core. Australia has to manage waste but in Item 5 is denied the possibility of reprocessing, a development that can be traced to the Carter Administration's pressure on Australia to slow the movement toward a plutonium economy.[2]

Recommendation 3: As Defence Minister Richard Marles has made clear, this is a *defence* bill. Yet items 3-5 of the White House statement are consistent with the Australia-United States Section Four Nuclear Agreement in 2011. That was a *civil* agreement which specifically prohibited the transfer of restricted data as well as sensitive nuclear technology, sensitive nuclear facilities and major critical components. That was indeed the position in 1965 when the United States considered a 123 Nuclear Agreement with Australia to clear the way for a nuclear power reactor. Any agreement on Australian enriched fuel would require a separate defence agreement. Only in 1999 did the United States finally agree to a technology exchange agreement on enrichment, and that to *acquire* Silex laser enrichment technology from Australia. Congress was advised in 2010 that in considering any proposal for a reactor to Australia fuelled by Highly Enriched Uranium (HEU) could be done on a lock and key basis.[3]

AUKUS has delivered a conflation of a civil agreement with a separate defence agreement. The Minister, in announcing the amendments on the operation of the Australian Radiation Protection and Safety Act (ARPANSA)1998, noted that the act ruled out the authority to construct nuclear facilities for a domestic industry. ARPANSA underscored the point that nothing in the act sought to prejudice Australia's defence. The minister accordingly advised that it was not necessary to modify the moratorium on civil nuclear power, other than to clarify that it does not prevent the performance of regulatory functions that might be necessary in respect of conventionally armed nuclear-powered submarines and their *supporting infrastructure and facilities* – a crucial addition addressed in my concluding remarks.

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[1] AUKUS: White House Fact Sheet, 14 March 2023.
[2] Warren Christopher to the President, 16 June 1977. NLC-5-1-2-8-5, Carter Presidential Library, Atlanta.
[3] Mary Beth Nikitin and Bruce Vaughn, 'U.S. – Australia Civilian Nuclear Co-Operation: Issues for Congress, Congressional Research Service, 7 July 2010.

Recommendation 4: There is also a conflation of Australia's rights to produce enriched uranium fuel by the reference in ARPANSA to the inclusion of the Nuclear Non-proliferation (Safeguards) Act of 1987. This act was the result of the Fraser Government's 1979 agreement with President Jimmy Carter to supply the United States with uranium oxide for enrichment and retransfer from the United States of source material or special nuclear material to third countries.[4] This cut out the prospects of a nuclear fuel cycle in Australia and also considerable export earnings to be gained by the supply of nuclear services and nuclear fuel. The AUKUS position has not moved from the prohibition on the supply of HEU for naval nuclear propulsion since Malcolm Fraser's discussions with President Jimmy Carter in June 1977.[5] It does not help public understanding that there has been no reference to the links to the American Atomic Energy Act 1954 (sections 123 and 144); the Australia – United 1979 Atomic Energy Agreement and its upgrade in 2010; and the currently closed archival records on Australia-United States negotiations on nuclear safeguards.[6]

Recommendation 5: Concern over the impact of supplying three Virginia class submarines to Australia on America's industrial base – 'to the breaking point' – have been raised publicly by Republican senator James Inhofe, and the former Democrat chair of the Senate Armed Services Committee Jack Reed.[7] President Biden has promised an additional $2.4 billion and another $2.2 for maintenance. Australia would commit to a 'proportionate financial interest' in the United States submarine industrial base to 'accelerate' the delivery of the Virginia with Tomahawk missiles, with 200-missile costing a further $2 billion.

With the acceleration of the Virginia to fill the apparent capability gap it is hard to see the extent of Australian nuclear expertise required in this process. Indeed, there is a prospect for the reverse. The Australian company supplying littoral combat and amphibious vessels to the United States has operated from a facility in Alabama. The company was also awarded a contract to construct in the United States modules for the Virginia submarines and to receive staff training to build modules for the Columbia class SSBN. [8]

Quite apart from the question of sharing the technology for nuclear propulsion, there are substantial economic risks. An urgent focus on China presents for some an issue for the prospects for the balance of trade. Supporters of the United States in this contest often strong focused on two-way trade and investment which ignores a long history of a negatively skewed Australian balance of payments. With limited participation in the export of elaborately transformed goods or the provision significant offsets, much is expected of the later phases of AUKUS. Indeed, the United States is seeking foreign skilled labour and technology. Biden's Inflation Reduction Act with vast sums to secure local manufacturing has raised an 'existential question' for Europe which requires a response to 'balance between Europe's industrial needs and maintaining close ties with its allies'.[9] Any strategic assessment in 2024 cannot afford to ignore the balance of trade and the role of the United

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[4] Uses of Nuclear Energy (Washington, 2 August 1985)
Entry into force: 2 August 1985 NOTE NO. 33W85 13/3/1/1
https://inis.iaea.org/collection/NCLCollectionStore/_Public/18/083/18083521.pdf
[5] Warren Christopher to the President, 16 June 1977. NLC-5-1-2-8-5, Carter Presidential Library, Atlanta.
[6] United States: Safeguards Agreement with Australia – Negotiating History. Australian National Archives (NAA), B1838, 720/5/2/10.
[7] ABC (Australia) news, Friday 5 January 2023.
[8] *Australian*, 15 March 2023.
[9] 'Talk of green trade war overshadows Davos optimism,' *Australian Financial Review*, 23 January 2023.

States in prospects for technology transfer, investment in domestic research, development and manufacturing.

What of Britain? In September 2021 Scott Morrison compared the proposed sale of eight SSNs to Australia with the deal between Britain and the United States in 1963.[10] The files on the safeguards agreement with the United Kingdom are largely open, and it is clear discussion provided for technology transfer which allowed for reprocessing and enrichment. Item four of the White House list above, however, marks a retreat on what the British had seemingly signed up to in 1979.[11] Yet Britain has been assigned the most significant role in propulsion and submarine constriction – in the later phases.

How Australia should proceed with the propulsion used in the AUKUS SSN can be gained by revisiting the actual nature of the original agreement on nuclear propulsion with Britain. The leader of the American nuclear submarine program, Admiral Hiram Rickover, supported the sharing of Westinghouse S5W 'skipjack' reactor for Britain's first nuclear submarine HMS *Dreadnought*. Rickover, however, insisted on a commercial agreement between Westinghouse and Rolls Royce and confined the agreement to a ten-year period. Maintenance would be conducted but future upgrades would require new agreements. Significantly there was no agreement on cooperation on civil nuclear power, where indeed the British were to emerge as significant competitors in the supply of HEU. This was fundamental to Britain's commitment to have an independent nuclear deterrent. By the time the British launched their fourth SSN, *HMS Churchill,* they were using their own Rolls Royce PWR 1. The nuclear core would require constant upgrading thereafter. The Astute SSN in 2023 had a PWR 2 (Core H). Its future replacement, the so-called AUKUS SSN, would mount a PWR 3.

The AUKUS SSN may contribute to Australia's stated aim of a sovereign capability and a role in a long-term manufacturing endeavour, but it faces a more immediate problem. Australia is signing on to the purchase of two separate classes of SSN. There has been a suggestion that the Virginia submarine could provide 'an interim capability' given the Chinese threat the submarines were needed 'quickly'. There were already 19 Virginia submarines deployed with 14 more on order.[12] But as Zac Cooper, a former official under George W. Bush, has written, the plans for an AUKUS SSN constitute a 'Frankenstein approach.' He proposes a fleet of 10 Virginia craft only from an expanded production line. ASPI's Marcus Hellyer too has pointed to the established infrastructure and supply chains established for the Virginia class.[13] The Productivity Commission weighed in, questioning the building submarines domestically as not the most cost effective - curiously pointing to the long-term decline in Australian productivity.[14]

There was little thought of Virginia technology transfer. The head of the SSN Taskforce, Vice Admiral Jonathon Mead himself reasoned that the government sought the development of a 'sovereign shipbuilding industry and a shipyard' with a 'nuclear powered submarine capacity'. The United States , however, would be discontinuing Virginia production by 2043

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[10] *Australian*, 20 September 2021.
[11] United Kingdom: Safeguards Agreement with Australia – Negotiating History, NAA: A1838, 720/1/1/1; A12909, 24476 and 3047..
[12] Ross Babbage, 'Australia must inject speed into its submarine plan,' *Australian Financial Review,* 21 September 2021.
[13] 'AUKUS under attack for "Frankenstein" sub plan', *Australian*, 16 March 2023.
[14] *Sydney Morning Herald,* 20 March 2023.

and 'do not want you to be building the boat by yourself.' Mead suggested that after that point there would cease to be diminution of support from an American supply chain.[15]

Recommendation 6: The choice of submarine and the extent of nuclear propulsion technology transfer will have a major impact of the sort of base chosen. There has been reference to a possible base at Port Kembla. The presentation of the AUKUS agreement at San Diego, presented such a prospect, ignoring the fact it was the base for the American surface fleet. The west coast base with deep-water access to the Pacific is at Kitsap Peninsula in Washington State. The east Coast base located in Kings Bay Georgia. Nuclear submarine bases, such as Faslane and Holy Loch in Scotland, have not been located in busy ports and major cities.

Environmental protection is central to the location of a base for the SSNs. Historically the preferred site for an east coast submarine base was Jervis Bay. In the words of the 1986 Parliamentary report into Jervis Bay it was considered the 'most suitable location for a Fleet Base with expansion potential and with nuclear powered warship berthing capability,' but it would be unlikely that any significant move from Sydney to Jervis Bay would occur within 15-20 years.[16]

Jervis Bay, however, is located near a national park. Yet bases are hard to come by and there are considerable sums to be spent on an AUKUS SSN. Jervis Bay was chosen because it was accessible to power sources in the Snowy Mountains and infrastructure in the Illawarra. It also retained the advantage of a secure location with deep water access to the Pacific and off-shore exercise areas. Safety is crucial, especially if Australia intends to host another Faslane. Jervis Bay was to be the site for the first reactor, which remained on the books until the mid-1980s. In similar fashion Dounreay in northern Scotland had hosted a naval reactor in the development of cores for the PWR. If – at this stage a big if – Australia was to be involved in the development of the PWR now in its third iteration (PWR 3), the AUKUS SSN may yet deliver a capability not apparent to date.

Concluding Remarks: The proposed Nuclear-Powered Submarine Safety Regulator will have the functions and powers necessary to regulate circumstances associated with nuclear safety and radiological protection across the life cycle of Australia's nuclear-powered submarine enterprise. This apparent focus on containing Australian nuclear prospects with an emphasis on safety can be a major block to realising the stated aims of AUKUS – especially the delivery of defence industry and sovereign capability. There is a history to consider here. Australia was confined to overseeing the safety aspects of the British nuclear atomic tests. The role of the Australian Atomic Energy Commission, however, was crucial in maintaining a strategic focus and momentum over three decades until its abolition by the Hawke Government. The United States issues quadrennials nuclear posture reviews and embeds nuclear research and development in the Energy Research and Development Administration. Apart from the vague reference to the Safety Regulator's work linked 'associated infrastructure and facilities,' there seems to be no institutional framework. We are left with the statement that 'Building the legal architecture to support this endeavour will involve multiple tranches of legislation.' Now is not the time for undue haste in such a costly and significant endeavour, especially in the absence of a comprehensive review of Australian defence strategy and its relationship with the nation's diplomatic and economic settings.

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[15] *Australian,* 17 March 2023.
[16] Hansard. 1986. *Possible Impact of Constriction and operation of a Fleet Base at Jervis Bay.*