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REMOVING THE PROHIBITION ON NUCLEAR POWER

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It's time to rethink Australia's ban on nuclear power

Nuclear energy was banned less than two decades ago in Australia, a decision that has cost the nation significant global investment and scientific collaboration on new nuclear technologies.

Nuclear power was prohibited in Australia in 1998, horsetraded for the passage of legislation centralising radiation regulation. Public debate at the time, flamed by the anti-nuclear movement, centred on the replacement of the Lucas Heights reactor.[1] The political fix was to draw a line through the industry. After all, the need for nuclear was low – energy was affordable, abundant and with a country full of coal, there was no reason to believe that would change.

The good news is the nuclear ban can be reversed with a single amendment to the *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*. The removal of four words – 'a nuclear power plant' – in Section 140A(1)(b) would allow nuclear industries to be considered for development in Australia. Any nuclear projects would still have to meet Australia's stringent environmental and safety requirements.

Nuclear energy is a readily deployable, zero emissions, baseload energy and it shouldn't be excluded from Australia's energy mix. It has met energy challenges around the world, powers more than 30 economies and been deployed at substantial scale within a decade in countries such as the UAE.

Nuclear power is also behind the new generation of innovative nuclear start-ups, such as Bill Gates' TerraPower and Transatomic out of MIT. Australia, with its educated workforce, established uranium, nuclear research and university sectors and strong non-proliferation credentials, would be a partner of choice for private venture capital-funded new nuclear.

Global investment and scientific collaboration on nuclear technologies and fuel development are just four small words away from becoming a job-creating reality in Australia.

447

Nuclear reactors currently operating in 30 countries around the world.[2]

11%

Global electricity from nuclear in 2015 – more than three times solar, wind and geothermal.[3]

17%▼

Nuclear-powered France has electricity prices 17 per cent below the EU average.[4]

511

The number of new nuclear power plants under construction, planned or proposed.[5]

Minerals Council of Australia

How nuclear power came to be banned in Australia

Population growth and industrialisation post-World War II saw a boom in nuclear power generation across America, Russia, Britain and France between the 1950s and the 1970s. Towards the end of this period the nuclear debate reached Australia.

Australia's nuclear timeline

1969

Proposal to build Australia's first nuclear reactor at Jervis Bay. Tenders were called and land cleared, but low cost coal and fiscal constraints saw the plan deferred and eventually scrapped.

1980s–90s

Anti-nuclear movement gains traction against a back-drop of French nuclear testing in the Pacific; the Rainbow Warrior incident; the siting of a nuclear waste repository for medical and industrial nuclear waste; and leaked plans to commercially site international nuclear waste in Australia.

1998

The *ARPANS Act 1998* passes into law. The Australian Radiation Laboratory and the Nuclear Safety Bureau are merged and renamed the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). Horsetrading with the Greens and the Australian Democrats results in the 'prohibition on certain nuclear installations' included in the Act.

1999

A similar clause, but with greater effect, is written into the *EPBC Act 1999*. Section 140A(1)(b) reads:

> The Minister must not approve an action consisting of or involving the construction or operation of a:
>
> b) nuclear power plant.

The case for removing the nuclear ban

1. Reliability

Nuclear power is reliable. In the United States, nuclear power provides around 20 per cent of the country's electricity needs. America's almost 100 reactors have been operating on average at over 90 per cent of their rated capacity.[6] In early 2014, US nuclear power plants were instrumental in supplying power during an extreme polar vortex when gas electricity generation was disrupted due to frozen pipelines.[7]

2. Zero carbon emissions

Nuclear power has close to zero carbon emissions. The National Renewable Energy Laboratory in the US concluded emissions from nuclear (12 gCO_2-e/kWh) were less than solar PV (18–50 gCO_2-e/kWh) and equivalent to wind (12 gCO_2-e/kWh).[8] Nuclear is also a high density energy – one drum of uranium oxide could power almost 2,000 average Australian homes for a year.

3. Proven technology

Nuclear power is a proven technology. Thirty countries operate nuclear power plants today. Nuclear power generates around 11 per cent of global electricity consumption and underpins electricity supply in many of them. More than 220 new plants are under construction or planned. France produces over three-quarters of its electricity via nuclear power and as a consequence has amongst the lowest emissions per kWh in the industrialised world.[9]

Australia is the only high electricity consuming country without nuclear – or plans to include nuclear – in its energy mix.

Top 20 highest electricity consumption countries

Nuclear power consumer	Nuclear power planned	Nuclear power prohibited
1 China	8 Brazil	15 Iran
2 US	9 France	16 Spain
3 India	10 South Korea	17 Turkey
4 Russian Federation	11 United Kingdom	18 Taiwan
5 Japan	12 Saudi Arabia	19 Australia
6 Canada	13 Mexico	20 South Africa
7 Germany	14 Italy*	

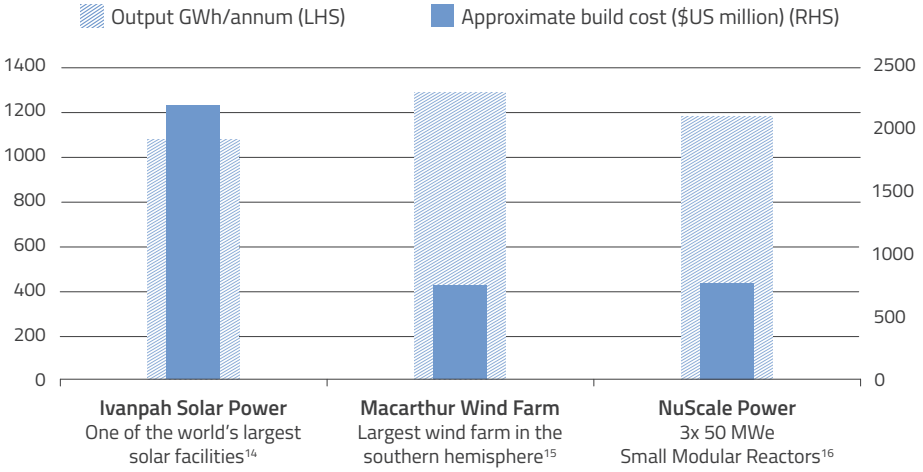
* More than 80 per cent of electricity imported by Italy comes from nuclear powered countries.

Source: BP Statistical Review of World Energy June 2017

4. Affordable

Nuclear power is affordable. All baseload power projects are capital intensive, but countries that invest in nuclear plants – and there are 58 reactors under construction today – will have assets that generate large amounts of power for 60 years at a stable cost. Small modular reactors (SMRs) are close to commercialisation in the US. A Nu-scale 50MWe SMR, for example, is projected to cost around US$250 million.[10] Three of these would cost and produce around the same amount of power as the largest wind farm in the southern hemisphere – and it would be reliable, synchronous, on-demand power.

Comparable in size and cost – but only nuclear provides 24/7 reliability



5. Safe

Nuclear power is safe. Studies repeatedly show that nuclear power is safe. A study commissioned by Friends of the Earth in the UK concluded that: 'Overall the safety risks associated with nuclear power appear to be more in line with lifecycle impacts from renewable energy technologies'.[11] Of the three well-publicised accidents in almost four decades, two resulted in no radiation related fatalities.

Nuclear power has a much smaller footprint than wind and solar

Wind
Macarthur Wind Farm[17]
13,590 ACRES

Solar PV
Ivanpah Solar Power[18]
3,500 ACRES

Nuclear
NuScale Power[19]
35 ACRES

6. Low waste

Nuclear power produces low waste. Nuclear waste is low in volume, completely contained and can be managed safely. The South Australian Nuclear Fuel Cycle Royal Commission 'found that there are now advanced programs in a number of countries that have developed systems and technologies to isolate and contain used nuclear fuel in a geological disposal facility.'[12]

7. Global innovation

Nuclear innovation is surging. New generation nuclear is being driven by private sector-funded development of innovative nuclear technologies, such as Bill Gates' Terrapower, MIT's Transatomic and Oklo Inc, and the Gateway for Accelerated Innovation in Nuclear (GAIN). Removing Australia's ban on nuclear power would see international nuclear innovators engage Australian scientists, engineers and universities in technology and fuel development leading to jobs, high-tech R&D and potentially the development of a global SMR manufacturing hub.[13]

Economic contribution of nuclear industries: Australia vs Canada

Australia digs and exports uranium, but its self-imposed nuclear power ban means it can't develop a high value, high tech nuclear industry like which exists in Canada.[20]

Australia
Jobs **3,000**
Value **A$600m**

Canada
Jobs **60,000**
Value **c$5b**

How to remove the nuclear ban in Australia

While the prohibition on nuclear power exists in two Acts of Parliament, only one needs immediate reform to allow the development of a nuclear industry to be considered – the *Environment Protection and Biodiversity Conservation Act 1999*. A similar prohibition appears in the *Australian Radiation Protection and Nuclear Safety Act 1998*, but this applies only to Commonwealth entities and is therefore not an immediate barrier for the consideration of nuclear power by either a state government entity or a private sector developer.

Environment Protection and Biodiversity Conservation Act 1999

Section 140A No approval for certain nuclear installations

The Minister must not approve an action consisting of or involving the construction or operation of any of the following nuclear installations:

a) a nuclear fuel fabrication plant;

b) a nuclear power plant;

c) an enrichment plant;

d) a reprocessing facility.

• The EPBC Act Section 140A(1)(b) that requires deletion.

Next steps towards a future nuclear industry

Repealing s140A(1)(b) of the EPBC Act is the critical first step. This will allow global entrepreneurs and innovators to develop and commercialise their designs and technology in Australia, with the prospect of possible deployment in the vast array of Australia's energy applications.

The repeal of s140A(1)(b) does not mean a nuclear power plant will be built in Australia. A nuclear power plant would firstly need to be economic and secondly, would trigger an environmental approval requirement by the federal government. Nevertheless, the removal of the prohibition in the EPBC Act would incentivise private activity with the prospect that a development which is economic, safe and environmentally sustainable could be implemented in the future.

Other reforms that should be pursued concurrently include:

- The establishment of a Commonwealth government working group, perhaps under the auspices of the COAG Energy Council, to investigate and advise state and federal ministers on a regulatory pathway for environmental approval of specific nuclear power generation proposals. This could be done with assistance from the International Atomic Energy Agency
- Removing uranium mining, milling, de-commissioning and rehabilitation from the definition of a 'nuclear action' in the EPBC Act. These activities are not nuclear actions. They are mining activities. Uranium projects should not automatically trigger a duplicative federal. environmental approval process, and the costs and delays that come with that, for no environmental benefit.

Endnotes

1 South Australian Chamber of Mines and Energy, *Tentative findings submission to Nuclear Fuel Cycle Royal Commission*, 6 March 2016
2 World Nuclear Association, *World nuclear power reactors & uranium requirements*, August 2017
3 Eurostat, *Electricity prices for domestic consumers – bi-annual data (from 2007 onwards)*, Last updated 8 June 2016
4 International Energy Agency, *Key world energy statistics*, 2016
5 World Nuclear Association, *World nuclear power reactors & uranium requirements*, August 2017
6 Nuclear Energy Institute, 'US nuclear capacity factors', viewed 15 August 2017
7 J Conca, 'Polar vortex – Nuclear saves the day', *Forbes*, 12 January 2014
8 Nuclear Fuel Cycle Royal Commission, Government of South Australia, *Nuclear Fuel Cycle Royal Commission report*, 2016
9 World Nuclear Association, *World nuclear power reactors & uranium requirements*, August 2017
10 NuScale Power, 'How NuScale technology works', viewed 15 August 2017
11 Tyndall Centre, *A review of research relevant to new build nuclear power plants in the UK*, January 2013
12 Nuclear Fuel Cycle Royal Commission, Government of South Australia, *Nuclear Fuel Cycle Royal Commission report*, 2016
13 J Lovering, 'Australia can play a big role in safer, cheap nuclear development', *The Australian*, 29 May 2017
14 B Heard, 'Ivanpah's land footprint', The Breakthrough Institute, 13 March 2014
15 G Parkinson, 'Australia's biggest wind farm – the vital statistics', Reneweconomy, 12 April 2013
16 NuScale Power, 'How NuScale Technology Works', viewed 15 August 2017
17 G Parkinson, 'Australia's biggest wind farm – the vital statistics', Reneweconomy, 12 April 2013
18 B Heard, 'Ivanpah's land footprint', The Breakthrough Institute, 13 March 2014
19 World Nuclear News, *Preferred site chosen for NuScale SMR*, 11 Aug 2016
20 Prof S Davidson and Dr A de Silva, *Realising Australia's uranium potential*, Minerals Council of Australia, October 2015