



AUSTRALIAN NUCLEAR ASSOCIATION INC

**PO BOX 445, SUTHERLAND, NSW 1499, AUSTRALIA
ABN 70 788 504911**

*Member of the Pacific Nuclear Council
Member of the International Nuclear Societies Council
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SUBMISSION TO

SENATE SELECT COMMITTEE ON FUEL AND ENERGY

Australian Nuclear Association (ANA)

The Australian Nuclear Association (ANA) is an independent incorporated scientific institution made up of individuals drawn from the professions, business, government and universities, with an interest in nuclear scientific and technical topics. The ANA provides a forum for presentation, exchange and dissemination of information on the peaceful uses of nuclear science and technology through the holding of regular technical meetings and national and international conferences.

Nuclear Power – economic low-carbon baseload electricity

Nuclear power is widely used for baseload electricity generation around the world, although not yet in Australia. Nuclear reactors for generating electricity are a mature technology. The industry has over 13,000 reactor-years of experience in operating civilian nuclear reactors since the world's first commercial nuclear power station was opened in England in 1956.

The ANA agrees with statements in the report presented to the United Kingdom parliament in July 2009 that “Nuclear power is a proven technology which generates low carbon electricity. It is affordable, dependable, safe, and capable of increasing diversity of energy supply. Nuclear Power is therefore an essential part of any global solution to the related and serious challenges of climate change and energy security.” [Ref 1]

There are 436 nuclear power plants operating in 30 countries, producing 15% of global electricity and 22% in OECD countries. Countries with a significant reliance on nuclear electricity include France with 76% of electricity produced from nuclear power in 2008, Ukraine with 47%, Japan with 25%, South Korea with 20% and USA with 20%. In addition, 44 nuclear power reactors are under construction and 110 nuclear power reactors are on order or planned with approvals, funding or major commitment in place [Ref 2].

International experience demonstrates that nuclear power reactors are reliable generators of base-load electricity with high availability. Nuclear power has the ability to provide electricity generation on a large scale, at high capacity factors over many years [Ref 3].

In many countries, nuclear electricity is cheaper than other forms of electricity generation for base load generation. Although the costs of nuclear electricity in Australia will really be known only when there is a full commercial proposal, Australia's large reserves of low-cost coal have meant that electricity from nuclear power would almost certainly have been more expensive than from coal in the eastern States, without carbon constraints. In its 2006 report to the Prime Minister, the UMPNER Taskforce estimated that nuclear electricity would be

20-50 percent more expensive in Australia than coal electricity at that time [Ref 3]. After coal, nuclear was the next cheapest source of base load electricity.

However, the cost of electricity from coal will increase when fossil fuel plants have to pay for carbon capture and storage or for carbon credits/taxes. When the costs of managing greenhouse emissions from coal fired plants are included, the cost of nuclear electricity is expected to be economically competitive with coal electricity in Australia.

Energy Security

Installing nuclear power plants in Australia would improve energy security. Nuclear fuel is easy to stockpile, low fuel costs lead to relative insensitivity to fuel price variations and there is a need to refuel only periodically (eg one-third of the reactor core might be replaced every 12–18 months). The ease of fuel management is important to countries concerned with energy security [Ref 3]. With 23% of the world low cost uranium, Australia would be self sufficient in sources of uranium.

Compared to other countries, Australia has a very high reliance on coal for electricity generation. In 2006, coal was used to generate 79% of Australia's electricity, compared to 41% world wide [Ref 4]. Our high dependence on coal is one reason why Australia is a high per capita emitter of greenhouse gases. Including a nuclear component in Australia's electricity supply would provide additional energy security by diversifying the technologies used to supply electricity.

Greenhouse Gas Emission

Nuclear power is a low emitter of greenhouse gases and air pollution. The greenhouse gas emission from the whole nuclear fuel cycle is 10 to 100 times less than the emission from natural gas and coal [University of Sydney, UMPNER 2006, Ref 3]. Nuclear power plants emit virtually no greenhouse gases, but some greenhouse gases are emitted in mining, ore processing, construction of power stations and transport of materials and equipment.

For Australia to meet its future greenhouse gas targets, low carbon technologies like nuclear must be included in the energy mix. While renewable sources of energy such as hydro, wind, solar, biomass and geothermal will make increasingly important contributions, many of these sources are limited by their dilute and/or intermittent nature. The only proven economic option to generate base load electricity with minimal greenhouse gas emissions in the foreseeable future is nuclear power supported by renewable sources in favourable locations with the renewables backed up by natural gas generators.

Radioactive Waste, Safety and Safeguards

Nuclear power generates radioactive waste. The volume of radioactive waste is small but some is very hazardous. World wide experience demonstrates that radioactive waste from nuclear power plants can be readily and safely managed. Countries with nuclear power are safely storing the spent fuel and/or high level waste generated by their nuclear power reactors. There is broad scientific and technical agreement that high level waste can be safely disposed of at depths of hundreds of metres in stable geological formations, as is being implemented in Scandinavia.

The nuclear power industry is very safe. Apart from the Chernobyl accident, there has never been a death recorded due to radiation exposure from any commercial nuclear power reactor. A Chernobyl-type accident is not possible with the types of reactors being built today.

Any power reactor program in Australia will be subject to stringent international safeguard inspections and would not in any way contribute to proliferation of nuclear weapons. The low enrichment of uranium used for power reactor fuel and the isotopic composition of the plutonium in spent reactor fuel from commercial power reactors are unsuitable for nuclear weapons, but they are subject to international reporting to ensure compliance.

Regulation in Australia

There is a lack of regulation in Australia for nuclear power reactors. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) which regulates the safe use of nuclear material by Commonwealth entities, including research reactors, is prohibited from licensing a nuclear power plant. There is an urgent need to establish a regulatory framework for commercial nuclear reactors. It would be reasonable for legislation to make clear that regulation of nuclear power plants or other commercial fuel cycle facilities is the responsibility of the Commonwealth Government.

Conclusion and Recommendations

Nuclear power is a proven, economic and mature technology for the generation of base-load electricity with minimal emission of greenhouse gases.

Having nuclear power in Australia would increase energy security and help Australia meet its greenhouse gas emission targets.

The ANA **strongly recommends** that nuclear power be included as a viable option in plans for Australia's energy future.

The ANA **recommends** that legislative and policy issues be resolved so that a commercial nuclear power plants can be proposed, built and operated provided they meet environmental, safety and planning criteria.

The ANA **recommends** that Australia establish a regulatory system to enable any proposal for nuclear power plants or other commercial fuel cycle facilities to be properly assessed and regulated. Either the restrictions on the types of nuclear plant that can be regulated by ARPANSA should be removed or a new regulatory body capable of regulating large nuclear plant should be established.

References

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2. World Nuclear Association, June 2009
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3. Commonwealth of Australia 2006. *Uranium Mining, Processing and Nuclear Energy — Opportunities for Australia?* Report to the Prime Minister by the Uranium Mining, Processing and Nuclear Energy Review Taskforce, December 2006.
4. International Energy Association (IEA) Energy Statistics, Jun 2009,
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