AUSTRALIAN NUCLEAR FORUM

Nuclear Power for Australia

Policy

Nuclear power plants should be used in Australia where considerations including both economic and environmental factors show advantages when compared with alternatives. (Adopted 31/1/03)

Summary and Conclusions (revised 13/6/12*)

The generation of electricity by nuclear reactors is a mature technology used in many countries. Australia generates most of its electricity by burning coal - a process that produces much of the nation's greenhouse gas emissions plus large amounts of ash and environmental contaminants. Other methods such as photo-voltaic, tidal, hydro, wind, biomass and geothermal have insufficient capability to produce the base load electricity needed by Australia.

Nuclear generation produces minor amounts of greenhouse gasses and very few emissions of any kind. Australia also holds some 23% of the world's uranium reserves and could operate a domestic nuclear fuel industry. Available commercial nuclear plants have been proved safe and to have generating costs comparable with coal fired generation overseas. Nuclear costs here probably would be competitive with coal if all environmental costs were considered.

Considerations

1. Current Status of the Nuclear Power Industry

The nuclear power industry is a mature technology with some 433 plants in 30 countries supplying 13.5% of the world's electricity. The most common types of power reactors are the pressurised water reactors (PWRs), boiling water reactors (BWRs) and the unique Canadian design called CANDU. PWRs and BWRs are light water cooled and use slightly enriched uranium feed fuel. The CANDUs use heavy water and natural uranium fuel. All are similar in costs and safety.

Few new reactors have been built in recent years but the capability exists to do so when nations move to diversify their sources of electricity supply away from fossil fuels. For the future, another type of reactor the breeder, is available to extract up to 60 times more energy from the world's uranium resources - more energy than is contained in all of the world's natural gas, oil and coal combined.

2. Electricity Supply in Australia

A reliable electric energy supply is essential to meet domestic and industrial needs. Currently this energy comes mainly from grid-connected power stations producing: coal-fired (54%), hydro (13%), natural gas-fired (26%) and (other) renewables (4.5%).. On present trends hydro will not expand and increasing demand will be met by more coal and natural gas stations. Other methods such as wind, solar (thermal and PV), tidal, biomass and geothermal are handicapped by factors such as high cost, intermittent operation, location and/or environmental impact. These disadvantages will limit the use of these methods of generation to special situations unless their technologies improve, or through continued subsidies by governments.

3. Environmental Aspects

Coal and gas burning for electricity produces much of the greenhouse gasses emitted in Australia including about 36% of the net CO2 emissions. With this comes an extensive amount of ash and the mobilisation of the contained uranium (100 tonnes/yr), thorium (240 tonnes/yr) and comparable amounts of heavy metals into the environment. The nuclear fuel

cycle discharges little CO2 and constitutes essentially no radiation hazard to the public under normal operation.

The disposal of nuclear waste is a tractable problem particularly for this country considering its geography and geology and given reasonable design requirements. Developments overseas will ensure that adequate methods of disposal will be available in this country when they are needed.

4. Economics

Estimates of nuclear generating costs for Australia show an advantage to present black coal plant technology of about 9.5¢A/kWh. However, overseas studies have shown that nuclear power is competitive with coal in many countries. Moreover, they would be competitive in this country if coal plant design requirements were the same and construction and operation were costed on a consistent basis. Then, any cost disadvantage of nuclear would be minimised or overcome when weighed against the environmental costs of coal plants.

Australia's reserves of uranium constitute some 23% or more of the world's resources. This is presently being exported unenhanced to countries with nuclear power programs. With its own nuclear power program there would be incentive for this country to establish a nuclear fuel industry here to supply all domestic needs for the foreseeable future. In addition, some of the uranium could be exported in this higher value form - thus helping to reduce local production costs.

5. Regulation and Safety

Nuclear regulation comparable with that done overseas has begun here with the creation of ARPANSA. The experience gained in this operation together with the wealth of experience generated elsewhere will provide a firm base for extension to a competent national nuclear regulatory regime when required.

Nuclear power reactor safety is important for public acceptance. The Chernobyl accident occurred in a reactor whose unique, and now superseded design, was a key factor in the disaster. The second worst accident was the recent tsunami-caused demolition of the Fukushima Daiichi station which released considerable radioactive contaminants but resulted in no associated deaths. Similarly the core melting at Three Mile Island proved damaging financially but with no measurable public health effects. The extensive experience gained with power reactors (over 14,800 reactor years) has shown that current designs coupled with responsible operation and regulation ensure that nuclear power plants can be operated at levels of safety comparable with or superior to other available modes of base-load generation. In addition, advanced reactor designs are now being developed and deployed that will provide even greater margins of safety.

6. References

1. "Electricity Generation Alternatives for Australia," J. Brough and J. Fredsall, ANF Discussion Paper, 31/5/01 (plus data updates).

2. Nuclear Electricity Gigawatts, C. Keay, Enlightenment Press 2002

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* Revised data obtained from World Nuclear Association, EPRI(2010), Aust. Dept of Climate Change and Energy Efficiency(2011).