Australia Is the Only G20 Country with A Ban on Nuclear Energy but Plans to Store Radioactive Waste from Other Countries

Description

AUSTRALIA: It's lights out, wrote Dr. Graham Pinn, as Australia's unreliable electricity supply could have life-threatening significance if nuclear energy is not adopted.

As Australian electricity costs increase and the reliability of supply declines the failure to use the country's natural resources is increasingly irrational, it is based on ideology rather than practicality.

When ignoring the cataclysmic predictions of the Global Warming Brigade, using coal and nuclear power are sensible options for this country, if there is concern about increasing carbon dioxide levels then nuclear power is, even more, the logical solution.

Whenever this suggestion is made, ignorant scare-mongering is used to enforce this possible threat, few understand the different types of radiation or their effects. As a result, Australia is the only G20 country with a ban on nuclear energy.

Belatedly, a Senate Enquiry in 2019 and current renewed Coalition interest suggest it is time to change the legislation which made it illegal in Australia in 1998.

To put nuclear power in perspective it is necessary to review the history of its development.

By Dr. Graham Pinn

Albert Einstein was the first to consider nuclear fission as an option to release energy. His famous equation "E equals MC squared", suggested that splitting the atom and reducing its mass (M) could release massive amounts of energy (E); (the C in the equation being the speed of light).

Einstein was born in Germany but left to study in Switzerland. With Hitler's ascent to power and his own Jewish origins, he never returned to Germany but instead immigrated to the US and became a citizen. With his revolutionary theories and background, he was able to warn the American authorities of the wartime potential of nuclear fission research by Germany.

Einstein supported the construction of the first nuclear reactor, built in 1940, using uranium as fuel. As

well as Americans, scientists from the UK and Canada were also involved in the development.

Subsequently, under the hugely expensive Manhattan Project, the program was expanded to produce weapons-grade uranium for the production of a bomb. Initial testing was carried out in New Mexico in July 1945; the Trinity test site is now a major tourist attraction.

Subsequently, with Japan's refusal to surrender and the potential for the huge loss of life in an invasion (estimated at 1 million Americans), the decision was made to drop atom bombs on Japanese cities. The first bomb, dropped on Hiroshima from a B29 bomber on August 6th 1945, resulted in an estimated 80, 000 deaths.

President Truman called on Japan to surrender the next day. With no response, a second bomb was dropped on Nagasaki on August 9th, with an estimated 40,000 deaths. When the bombs exploded 50% of the energy was released as a blast effect and 40% as heat, this destroyed 90% of the buildings as well as causing mass deaths, 5% of the energy was released as gamma radiation resulting in another 40,000 delayed deaths.

A third bomb was due to be dropped a week later, the country still had a formidable military with over 5 million soldiers and 2 million navy personnel, but because of the threat, it offered a formal surrender on the 15th. Despite the death and destruction, both these cities are now thriving, with no increase in background radiation.

Long-term follow-up since 1975 by the joint US and Japanese Radiation Effects Research Foundation (RERF), has suggested less than one half of one per cent increase in tumour development over 550,000 patient years of observation.

Missile-delivered bombs are now infinitely more powerful but there has never been a further nuclear attack, the potential for retaliation is too awful to consider.

Misguided activists in the US and UK in the past campaigned for unilateral disarmament. Even at the height of the Cold War, the possession of weapons by East and West had the predicted deterrent effect and prevented World War Three.

Whether deterrence will continue as rogue states acquire these weapons, remains to be seen (there are still an estimated 10,000 operational weapons worldwide, coming down from a peak of around 60,000, North Korea has at least 10). What is beyond doubt is the consequence of a nuclear strike.

Natural levels of radiation are not associated with disease, but background levels do increase with altitude. Studies of airline staff have revealed a possible association with breast cancer and melanoma.

Other natural sources include granite stone which emits radon gas which can increase the risk of lung cancer, coal miners are exposed to more radiation than nuclear power plant workers; repeated X Rays can also increase risk.

Environmental agencies state that 85% of radiation comes from natural sources, 14% from X Rays and 1% from the nuclear industry. Apart from the nuclear bombs and missiles, the main health concern has now focused on accidents in nuclear reactors and the problem of the safe disposal of nuclear waste.

The first known radiation accident occurred in a remote part of Russia in 1957 in Kyshtyn — a closed

city and the site of nuclear weapons manufacture. Information is limited, but it is known that 10,000 people were evacuated and the exclusion zone turned into a “wildlife reserve”, which it remains to this day.

Several nuclear accidents were known to have occurred with planes carrying bombs in the cold war era. The best-documented example was the crash of an American B52 bomber in Palomares, Spain, in 1966. The plane carried four nuclear bombs, two of which leaked radiation on crashing and caused a small area of local contamination.

The first significant reactor accident was at Three Mile Island in the US in 1979, a mechanical failure complicated by human error resulted in a partial meltdown and the release of radioactive gas. This resulted in a three-week temporary evacuation of 150,000 people; there were no noted adverse health effects. The clean-up took until 1993.

In 1986 in Chernobyl, Ukraine, a human error in a testing procedure resulted in a reactor core meltdown and a major radiation release. Greenpeace estimated that a sensationalised 90,000 lives were lost and mass graves being dug, whereas it actually resulted in around 50 deaths, 500,000 evacuations, and a (preventable) increase in thyroid cancer in children,

A cloud of radioactivity spread across Western Europe but, apart from children being advised not to drink milk, there were no complications. A 30- kilometre exclusion zone persists around the site and the reactor has recently been entombed in a concrete sarcophagus to prevent further radiation leaks.

Without human habitation, wildlife has returned and bears and wolves have recolonised the area. There is still increased background radiation but adverse effects have not been noted in the wildlife, and tourists now visit the site.

The only other significant event has been at Fukushima in Japan. These reactors were inappropriately built near a fault line in the earth’s crust. An earthquake over 10 years ago in 2011 triggered a tsunami, which flooded the area and knocked out power. Three of the six reactors went into meltdown with radiation release. Half a million people were evacuated, 150,000 long-term.

There were no radiation deaths (as many as 150m were predicted) but the tsunami wave penetrated up to six miles inland with an estimated 20,000 loss of life. Again, there has been a subsequent increase in thyroid cancer in children (preventable by giving treatment with iodine). The exclusion zone is smaller than Chernobyl but leaks of radiation into the sea have caused concern with fish contamination. It is estimated the clean-up will take 40 years.

Another, less mentioned reactor at Onagawa, was only 130 kilometres away, it experienced the same quake and tsunami height but had no problems. It was built 15 meters above sea level, not 10 metres and had a better safety plan to cover this eventuality. The Japanese shut down their 37 reactors and increased the burning of coal to compensate, with electricity prices rising by 38%. An estimated 4,500 deaths are attributed to the subsequent lack of winter heating.

New developments in reactor design have dramatically improved safety. Small modular reactors (SMR) producing 50 to 300 Megawatts are now being designed for use in isolated areas, they are manufactured at a plant and pre-assembled. Their design means less likelihood of radioactive waste contamination.

Historically uranium has been used as fuel as its properties have been established in weapons research; thorium is an alternative fuel which has significant advantages in risk of meltdown, reduced waste production, no need for fuel enrichment and unsuitability for weapons development.

It also has an Australian advantage in that it doesn't use massive amounts of water for cooling, so can be built inland. Australia has around 20% of the world's known reserves. Prototype thorium reactors are being developed in many countries, with China due to start up its first trial reactor in Wuwei City, in Gansu province.

The early nuclear power stations were established in the 1950s with the first in the US producing electricity in 1951. There are now 450 worldwide with around 60 under construction and another 150 planned, the majority are in the US, France, China and Japan (which still has 42).

They provide 11% of the world's electricity and are the second most common source of low carbon power after hydroelectric at 30%.

China has 39 reactors with 21 reactors under construction and 38 more planned, India has 7 power plants with 22 reactors with 19 more planned, and Russia has 37 with 7 under construction and 26 more planned.

Even the global warming stalwart, the United Kingdom, has plans for 11 more nuclear reactors (World Nuclear Association, Nuclear Fuel Report, September 2015, updated report 2016). Nuclear power electricity generation in the Middle East is forecast to rise from 3.6 gigawatts to 14.1 by 2028 (World Nuclear Association).

Despite global warming activism, there is no sign of a reduction in the construction of coal-fired power stations, currently, there are an estimated 6,000 worldwide with over 600 under construction and hundreds more in planning (Global Plant Tracker Portal). China is building 300, India 130, and there are over 100 in various Asian countries. Japan, after its Fukushima scares, is building 10 more.

China continues to increase its CO2 production by 2% a year (more than Australia's total). The UK has only 4 plants still in operation, Germany plans to close all its 84 plants by 2038 (whilst relying on French nuclear power and Russian gas). Apart from increasing electricity costs, what global purpose does it serve shutting down one or two older coal-powered stations in Australia?

Worldwide total electricity supply is still primarily from "polluting" coal (40%) and gas (25%), with 15% hydro, 11% nuclear, 5% renewable and 5% oil generated. Other countries with nuclear reactors include Bangladesh, Pakistan, South Africa and Iran. Thirty countries in the Middle East, Africa, South America and Asia have plans for their development. It would seem that the economic advantages for electricity production out-way the concerns of pollution in many countries.

There is no planned nuclear development in Australia, but there are again moves afoot to store

radioactive waste from other countries – with the inevitable NIMBY (not in my back yard) response.

The Federal Labor party in June 2021 agreed to storage of waste in Australia, subject to traditional owner approval; the current plan is to develop a facility in Kimba, South Australia. So far 25 years of planning has failed to produce this permanent facility for even our own radioactive waste, 85% from the Lucas Heights facility (from the production of isotopes for medical diagnosis and treatment); waste is, temporarily, stored at 100 different locations in the country, a situation of potential risk.

Nuclear waste can remain radioactive for up to 20,000 years. Many countries have temporary storage facilities but these are filling up. A major permanent storage site is being developed in Onkalo, Finland, a stable country both geologically and politically. The waste will be stored in 45 Kilometres of tunnels underground.

Maralinga in South Australia, the site of the 7 nuclear tests carried out between 1956 and 1983, is considered the best option for a permanent storage facility. The site has been cleaned up twice (in 1957 and 2000). Access is now allowed, but not residence. There are ongoing legal proceedings about the contentious issue of compensation, but there has been no confirmation of disease in service personnel caused by the tests.

Five British tests were also carried out in the Montebello Islands and there is residual radioactivity there. The French conducted many tests (different references give a number between 27 and 181) on Mururowa atoll in French Polynesia, between 1966 and 1996; these were underground tests which have undermined much of the island, with minimal subsequent rectification and ongoing leakage of radioactive material into the ocean.

The first American test was in New Mexico, subsequent US tests were carried out between 1946 and 1962 on Bikini atoll in the Marshall Island. High levels of radiation remain and the islands are uninhabited (although wildlife is apparently thriving).

Three tests were also carried out on the Amchitka islands in Alaska, these were uninhabited islands and there is no residual radiation. Over a thousand US tests were carried out at Yucca flats, Nevada, around 100 feet above ground, the rest underground, the last being in 1992, just prior to the test ban treaty. The Baneberry test in 1970 produced an accidental release of radiation which contaminated 80 workers; a small increase in thyroid cancer has since been noted in the surrounding area.

Over 450 Russian tests were carried out underground between 1949 and 1989 at Sempalatinsk in Kazakhstan, with the end of the cold war the tunnels were sealed to prevent the removal of material. Information is scanty but an estimated 200,000 living in the vicinity may have been affected by radiation with increases in various cancers and genetic defects.

Overall, about 2000 nuclear tests have produced only small and localised effects on the environment.

The question for Australia is, with half the world’s known reserves of uranium and plentiful thorium, why has nuclear power been repeatedly rejected as an option.

This moratorium has also meant that nuclear power is unavailable for our military, limiting itsapplication to ships and submarines. With concerns about carbon dioxide levels, the nuclear questionshould again be put to the government.

Numerous surveys have been carried out to compare the price of production of electricity; these include the costs of manufacture and running.

In 2011 a French study of “levelised” cost of electricity suggested costs per megawatt-hour (MWh) at 20 Euros for hydro, 50 for nuclear, 70 for onshore wind and 290 Euros for solar power.

The International renewable energy agency (IRENA) in 2018 suggested the cost of solar and wind power had fallen significantly and had become comparable with coal, with gas still more expensive, and nuclear was for some reason not included. The many studies now available have produced inconsistent results, partially due to lack of local availability of the various alternatives and partially by not including subsidies or the cost of backup.

For example, in the US, natural gas produced by fracking is now cheap and plentiful, making the nuclear option less attractive. There is no doubt however that, until such time as battery storage is much cheaper and more efficient, renewable energy cannot provide reliable power and the cost of backup base load needs to be included in pricing.

Not only is intermittency of supply a problem, but there are also practical difficulties to be overcome. Robert Bryce, an energy analyst, has estimated the prospective increase in energy use would require an area the size of Germany to be turned into wind farms every year. To satisfy the world’s energy needs in 2050 we would require an area roughly the size of North America to be covered in solar panels and wind farms. Many in the Green movement are now realising that nuclear power is the only way of reducing CO2 levels.

The problem Australia has, as it shuts down supposedly polluting base load coal-generated power, is that electricity costs have exploded (more than doubled in 10 years, despite $60 billion in subsidies for renewables) and reliability of supply has fallen.

The planned closure of Liddell in 2023 will cut 2,000 MW of generation, equivalent to 93 million solar panels, covering 17,000 hectares and costing $20 billion (plus the cost of backup). This price rise is having a deleterious effect on what is left of manufacturing in this country and making it increasingly uncompetitive, with jobs going offshore to those countries with cheap coal-based electricity.

In 2015 the Australian Power Generation Technology CO2CRC report compared estimates of electricity production costs and showed coal from pre-existing power stations was still the cheapest energy source, with natural gas as an alternative (compiled from information from 40 independent organisations).

Australia vies with Indonesia as the world’s largest supplier of coal; it is also about to overtake Qatar as the world’s largest supplier of liquefied natural gas. The country also has the 3rd largest reserve of uranium, with at least 6 new deposits waiting to be developed and export demand increasing, currently 7,500 tonnes worth $750 million; fortunately.

Victoria is the only state to ban uranium exploration, all others allow exploration but only SA, Tasmania and NT allow mining. The recent government report, the Finkel report in 2017, again failing to list the nuclear option, suggests that by 2020 coal will still be cheaper (around $80 per MWh) when compared with solar plus storage (around $140 per MWh).

The Australian Energy Market Operator (AEMO) review in 2018 again failed to include the nuclear option; it suggested retail electricity prices would increase by 85% by 2040 if attempting a 50% reduction in CO2 emissions. By comparison, Energy power consulting in 2018 found that replacing coal with nuclear power would result in a minimal increase in electricity cost by 2040.

With wind power and solar, it is also necessary to include the cost of backup generation. The over-reliance on renewables has been amply demonstrated in Australia by the South Australian power failures; the last Northern Hemisphere cold winter caused crises with wind turbines frozen and solar panels buried under snow.

As winter approaches, the UK will again have power supply problems; the interconnector to France will be out of action for 6 months, so there is no longer backup nuclear power. Power prices and availability could become significant issues.

We have jumped the gun in going renewable and, if we continue to close down old coal power stations, will have a twenty-year power-generation gap for base-load power. Currently, with no new coal-fuelled power stations likely in Australia, the only option seems to be gas-powered generation with its lesser CO2 production.

Is there still a place for nuclear power, particularly the use of local SMRs to power more isolated areas of Australia? These modern reactors are safer and more flexible in usage and estimated costs are comparable, they are also easily transportable.

The exaggerated concerns about environmental pollution are exposed by the safety record with minimal loss of life and health with nuclear activity — by comparison, environmental pollution and destruction from wood burning for fuel cause far greater health issues.

The Fukushima event was caused by a natural disaster, not a nuclear accident and the last accidental radiation was nearly 30 years ago at Chernobyl. Vast numbers of people are killed every year by pollution from burning combustibles.

A study by Morton in 2015 compared nuclear power with other sources and showed natural gas kills 38 times as many people per KWH of electricity generated, biomass 63 times, petroleum 243 times and coal 387 times as many – perhaps a million deaths per year.

Most nuclear generation facilities were built in the ’60s and 70s. Later generation 3 facilities, as in Japan and Korea, have advanced safety features. Generation 4 designs, not yet built, are safer still and have led onto the small modular reactors (SMR) now used in many countries.

Another alternative option is the use of Thorium, instead of Uranium as fuel; experimental reactors in 35 countries have shown this fuel is much safer, produces less waste with a shorter half-life, and can also use the waste from the orthodox uranium reactors as fuel and cannot be used for bomb

production. Australia also has 20% of the world's reserves of Thorium.

Ultimately the question of Australia's nuclear power future should be one of cost, rather than ideology. The fact that new reactors are being built worldwide suggests there is still a cost advantage.

Twenty years ago, Australia had one of the cheapest electricity prices in the developed world, the current strategies have produced prices that have increased dramatically, with the worst-performing state (South Australia) being the leader in renewables.

The US energy administration in 2017 estimated Denmark, with its high reliance on wind power generation, to have the most expensive electricity price in the world at 45 US cents/kWh, (in comparison South Australia's costs were 47 cents/kWh). Other cost comparisons were New South Wales 39 cents, Queensland 35 cents, Victoria 34 cents, UK 31 cents, France (mainly nuclear power) 24 cents, and US 16 cents.

In South Australia highly polluting diesel power generation (consuming 80,000 litres per hour), and costing $110 million, is back-up for the closure of less polluting coal-fired production! The head-line producing battery alternative would power the state for an estimated 9 minutes. To adequately replace its energy supply would cost an estimated $6.5 trillion to supply the State for a day and a half.

As suggested by Ziggy Switkowski in his report as long ago as 2006, South Australia could be the place both for a storage facility and the first Australian nuclear reactor. He suggested nuclear power could deliver a third of Australia's electricity, with a resulting 18% reduction in CO2 emissions. Worldwide energy consumption is estimated to increase by 50% over the next 25 years, and this is before considering the massive increase in demand for electric cars.

Politics has intervened in Australia and even nuclear research facilities have now closed down; this country is the only G20 country without nuclear power.

The latest development in nuclear-powered submarines is the first step for this country, but which political party will be brave enough to suggest a new referendum on nuclear power?

The only practical solution to the climate change dilemma (so-called deep decarbonisation) worldwide is an expansion of nuclear power generation, estimated by Williams in 2014, to require an expansion of two or three times by 2050—not a contraction.

The number of power stations worldwide has increased significantly in the last 20 years. In Europe, renewable energy is backed up by nuclear power, in the UK nuclear provides 20% of electricity generation with a new reactor about to be built. France has 56 reactors producing 75% of the country's power and exports to other European countries. Worldwide there are 400 reactors with 100 more under construction.

In Australia, electricity costs will continue to rise unless all sources of power are included, and subsidies are ceased. Currently, the option of nuclear power was again under investigation by the Senate Committee which presented its findings in December 2019.

The report showed the option was viable in terms of cost, waste storage and safety, with SMR construction possible in as little as 4 years. The financial benefit of processing uranium in this country

was estimated at $2 billion as far back as 2006, and waste storage (investigated, but not enacted by the SA government) would also generate income.

The media fail to acknowledge the facts about radiation — 85% is natural background, 14% comes from X Rays and only 1% comes from the nuclear industry. Coal miners and airline pilots sustain more radiation than nuclear power workers.

A Royal Commission in 2016 supported the use of nuclear power but the Government gave up against opposition. After a Senate inquiry, nuclear waste storage was also approved in 2020 by the Federal and South Australian Governments, but it remains in limbo.

The latest NSW State inquiry in March and Federal Senate inquiry in December 2020, again confirmed support. The problem continues to be ideological and the Coalition Government remains unlikely to cancel the moratorium without bipartisan support from Labor.

With Climate Change back on the agenda, there is once more top-level discussion about promoting nuclear energy as a greenhouse gas reduction measure; the Minerals Council of Australia has estimated the reactors, in 31 countries, saved 2.2 billion tonnes of CO2 emissions in 2020. Meanwhile, we have a choice between affordable, reliable and renewable electricity, currently, we can have two out of three.

Should Australia finally hold a referendum on the matter, we might make some progress. The first step has perhaps taken place with the long-overdue decision to build nuclear submarines – less expensive to build, longer range of action, quieter and faster.

by Tyler Durden

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