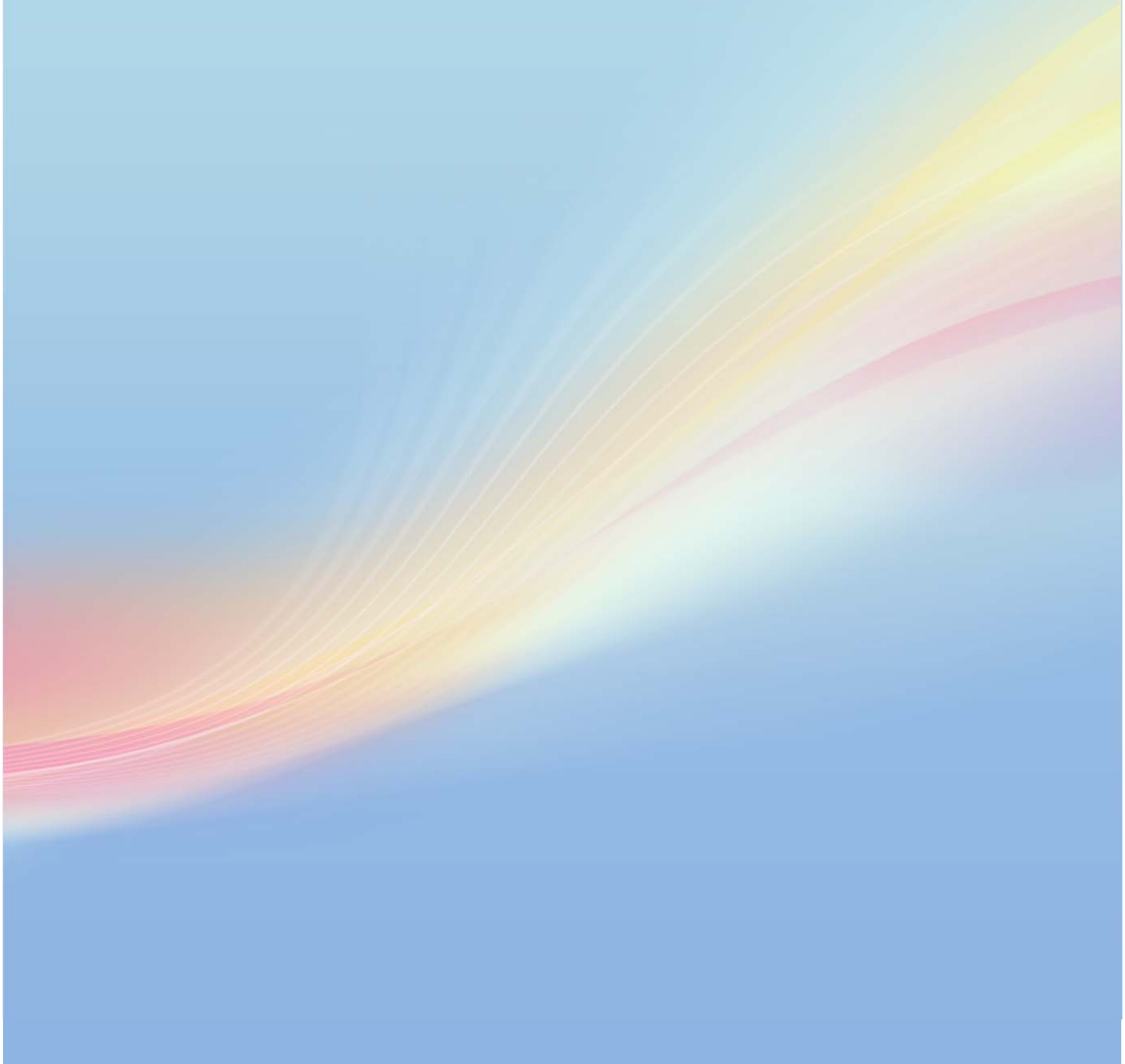


# Not Nuclear

SEB102 – Research Paper



## **Abstract**

Nuclear Power is being used as a renewable energy source across the globe. Many nations have been using nuclear power for decades. The benefits of nuclear power generally outweigh the risks. However, when disasters like Chernobyl, Three Mile Island and Fukushima happen. One must ask, is it still worth it? Is nuclear power worth the risk, and if so, why are so many countries phasing out their nuclear power?

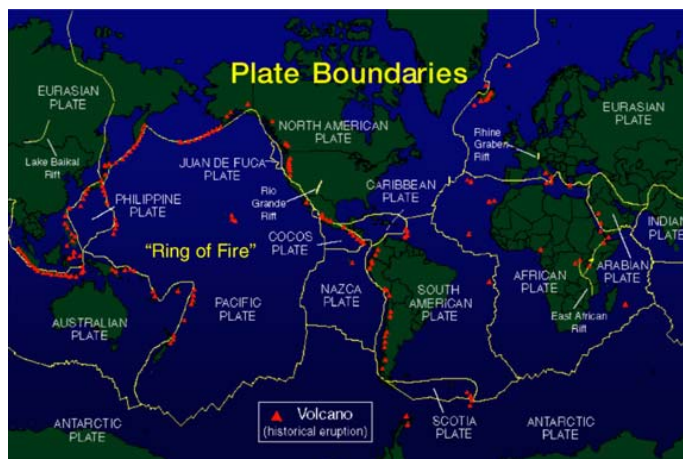
Australia has no nuclear power facilities in operation and producing energy, but we do have large expanses of unused desert area with the potential to be used for the production of solar energy. Solar energy and Wind turbines provide a more promising potential for renewable energy in Australia. Both provide clean and efficient energy without the risk of a nuclear accident. In the case of solar power, it is possible to be distributed as a domestic power source as well as on a state or federal scale.

Nuclear energy is recognized as an effective means of creating renewable energy without the production of greenhouse gases. There are 8 main countries around the world using nuclear power and between them there are approximately 441 power plants. There are many arguments for the benefit of nuclear power and the potentials it has to power large areas. However, while Nuclear energy is proving reliable, sustainable and a positive energy source for the future, it's safety is still concerning. The Fukushima Dai-Ichi plant in Japan went into meltdown in March of 2011, while it is agreeable that measures could have been taken to avoid the disaster, the reality is the area surrounding Fukushima will be uninhabitable for some time. Is this risk worth the energy outcomes of Nuclear power and if not what are the strongest contenders in the alternative energy source pool?

Australia currently has no nuclear power facilities operating at the present time and building nuclear reactors within Australia is not a high priority on the federal government's list of To-Do's. Australia is a major supplier of uranium to the global market, which accounts for 14% of the world's nuclear energy supply (Lincoln, 2012).

If Australia has such high deposits of natural uranium, why are there no operating nuclear energy facilities? While it may seem that nuclear energy is the best way forward for Australia in terms of renewable energy, this is not entirely the case.

Australia sits amidst the Indo-Australian tectonic plate. The Australian (or Indo-Australian plate) is in collision with three other plates, the Pacific, Eurasian and Antarctic plates. The image below (Figure 1) shows that none of the fault lines are found below the mainland of Australia.



(Figure 1 – Image resourced from: <http://www.newberrygeothermal.com/faq.htm>)

However, there are still earthquakes experienced by Australia, although they are usually between 4 and 7 on the Richter scale and are seldom felt. Similarly we are not at high risk of tsunamis. It would seem Australia is a perfect location for a nuclear energy plant.

While nuclear energy in theory provides a safe, renewable and cost effective power supply; there are other 'alternative' energy sources which offer the same benefits as nuclear power while also minimizing some of the more significant

risks. Three possible options for renewable energy within Australia are nuclear power, solar power and wind turbines. Three main categories can be used to determine the difference in benefits from the three energy sources they are; cost, energy efficiency and safety.

The first power source examined is nuclear energy. Fuel for nuclear plants is fairly inexpensive and Australia has a large supply of natural uranium. Nuclear energy doesn't produce any greenhouse gas emissions, it is easily transported once in energy form and the waste products are compact. Nuclear reactors continue to produce energy without concern for the weather (except extreme cases) and the power produced is extremely concentrated (*Hore-Lacy, 2006*). However, the expenditures of building nuclear facilities across Australia would be far higher than the competitors. The start up expenses are extremely high, as well as the maintenance emergency systems and radioactive waste disposal systems. The capital loss of building nuclear reactors combined with the level of health and safety risks outweigh the positive arguments.

Solar power has become more popular in Australia as the costs of installing and maintaining the grids has decreased. Solar energy is produced as the name suggests, from the sun. Sunlight is free and Australia has plenty. The climate and weather in Australia are more suited to solar energy than some countries that spend more than half the year under cloud cover. Solar energy produces no harmful byproducts or waste that needs storing. One significant advantage is the domestication of solar panels. While it's impractical and illogical to consider the population of Australia each with their own miniature nuclear reactor in the back yard or in the shed, solar power lends itself to being harnessed domestically. In theory this would allow each Australian home to be self-sufficient as far as power goes. While large areas of uninhabited land throughout the more rural areas of Australia could be fitted with solar grids.

It is significantly unlikely though that the governments of Australia would use the state and federal bank account to fund the installation of millions of homes with solar panels. Although the cost of solar energy has decreased it is still not necessarily affordable by every family in Australia.

Another disadvantage of solar energy is the dependence on the weather. While some energy could be stored, if long periods of cloud and rain cover persist, the amount of energy attained from the sun is likely to be insufficient in powering large areas including cities and homes.

Wind turbines have been used in some areas of Australia to produce clean and renewable energy. Wind is proving to be a reasonably priced renewable energy source. Similar to solar power it is free of any waste products and the safety concerns surrounding wind turbines are fairly minimal. Wind, like sunshine is natural and free so no 'fuel' costs factor in. There are some shortcomings as far as using wind a power source. Like solar energy, using wind to produce electricity requires leaving much to change. Wind is a natural phenomenon and is not necessarily consistent. There is no way to ensure regularity of wind. If combined with another energy source, and used as an alternative or back up wind turbines would be quite efficient.

When the three power sources are examined against one-another they all have pitfalls and benefits in different areas. Nuclear is long lasting but expensive and not necessarily safe, there is the waste storage to factor in and the potential for disaster. Solar and wind are safer and produce no harmful byproducts, but depend on the weather.

Nuclear energy is the best option for a renewable energy source. However, the dangers surrounding the safety of the workers, the people living in proximity to the plant and the ecosystems surrounding the plant are still too high. The disaster in Fukushima highlighted that not everything can be prepared for. Until such a time when nuclear energy can be safely contained and the risk of explosion, or meltdown are significantly lowered the way forward to nuclear power is research. If nuclear energy is continuously researched the potential for more advanced and safer reactors increases. If alternative energy sources are needed before such a time when nuclear energy can be guaranteed safe, with safe ways of disposing waste and minimal threats to the environment, solar

energy or wind turbines should be used throughout Australia instead. A combination of the two would provide the best likely energy production and minimize the detrimental effects the lack of weather conditions may have on the power production.

If continuing research is done on nuclear power and finding safer ways of producing nuclear energy, it may be the best option in the future. However, while there is still such a risk in comparison to other sources, these other options should be put into practice while nuclear is just researched. Not counting it out all together but put on the back burner. If nuclear is likely to produce more energy than the other two, maybe but is it worth it if there is an accident and people loose their lives, homes, and possessions while areas of land are not safe to use for years and years. Perspective = use what we know to be safe and research ways of making others safer for the future.

## **Bibliography**

1. Hore-Lacy, I. (2006). *Nuclear Energy in the 21st Century*. (8th). San Diego: Academic Press.
2. Lincoln, S. (2012, November 21). *Australian nuclear power: the facts, the costs, the pitfalls*. Retrieved 04 29, 2013, from The Punch: Australia's Best Conversation : <http://www.thepunch.com.au/articles/Australian-nuclear-power-the-facts-the-costs-the-pitfalls/>
3. Anthes, Gary H. *Computerworld* 32. 12 (Mar 23, 1998): 83-84. DOI: 00104841
4. Rogner, Holger. *DICE Report* 10. 4 (Winter 2012): 39-49. DOI: 16120663
5. Solar energy. (2012). *Pakistan & Gulf Economist*, 31(26), 31-32. Retrieved from <http://search.proquest.com/docview/1025766813?accountid=13380>
6. Nersesian, Roy L (01/01/2010). "Solar Energy" in *Energy for the 21st century : a comprehensive guide to conventional and alternative sources* , (p. 323).
7. A. R. Jha, Ph.D. (CRC Press 2010) "*Wind Turbine Technology*" DOI: 978-1-4398-1506-9