

THE STRATEGIC IMPORTANCE OF AUSTRALIA'S URANIUM RESOURCES

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There is a massive worldwide need for cheap, clean energy. Nuclear power is mankind's single greatest opportunity to combat the looming environmental threat of global warming. And Australia holds all the keys to enable this fundamental change towards a better, cleaner future. By swiftly developing our latent capability, this country can become the world's primary source of responsible energy.

HEADING OFF THE ENVIRONMENTAL CRISIS

Whether signed up to the Kyoto agreement or not, everyone realises the detrimental impact that global warming is having on our natural environment. As science unravels the greenhouse mystery it is becoming increasingly clear that man made emissions are a significant contributing factor in the greenhouse gas equation.

There is an immediate need for sustainable clean power generation. The world's populations are heavily dependent on energy for their wealth and lifestyle.



Current power generation and consumption is heavily skewed toward developed countries. Of all the electricity generated across the world 75% is consumed by developed and industrialised countries while the remaining 25% is used in under-developed or developing countries. But demand by developing countries for power generation is constantly increasing as they look to improve their domestic economies through industrial development. China is a dramatic example where growth through industrial and infrastructural development brings increasing affluence and with affluence comes the demand for power, oil and metals. India and China have indicated that a substantial increase in power generation is needed to sustain their development plans. World economic growth to 2010 is forecast to average 3.5% yet developing countries like India and China have growth rates of 6.0% to 9.5%¹. These countries are power-houses of economic growth.

Growth sometimes comes at a cost, generally to the environment. India and China contribute about 19.0% of the world's gross domestic product, almost equivalent to the entire United States economy¹. They have about 37.5% of the world's population and have rapid rates of economic development. And these same countries already have environmental conditions that are approaching crisis point. China has 9 out of the 10 most polluted cities in the world. Approximately 70% of China's energy needs come from brown coal, the least efficient and dirtiest fossil fuel for energy generation².

Global demand for energy, driven principally by the high growth developing countries, is expected to treble by 2030.

¹ Penn and Fisher 2005, Australian Commodities, vol 12 No. 1 March 2005.

² Tackling the Growing pains development, in Journal of European Union Chamber of Commerce in China, September 2004.



Developing countries have an insatiable and essential need for power and it will continue to grow rapidly. If world economic growth is to be sustained then India and China must be allowed to prosper and major new power generation is a fundamental requirement for this to occur. The issue will always remain as other countries will follow this trend in the future.

MASSIVE GLOBAL OPPORTUNITY

What technology is available to reduce greenhouse gas emissions and how can we slow environmental damage? The main targets are cars and coal. Greenhouse gas emissions could drop by 7 billion tonnes per annum with the use of hybrid cars and uranium power generation technology.

There are about 600 million cars across the globe that generate somewhere in the region of 1.8 billion tonnes of carbon dioxide each year. Car companies like Toyota and Honda have developed the new hybrid car, a commercially viable innovation that will significantly reduce the consumption of fuel and substantially reduce or eliminate noxious car emissions. Hybrid cars could half car emissions to just 900 million tonnes just through a reduction in fuel consumption. They are essential to control domestic emissions.

But this is nothing compared to cutting down on coal . . .

Each year 2.4 billion tonnes of coal is produced across the world and this is projected to increase to 7 billion tonnes by 2030. Each tonne of coal produces approximately 3.8 tonnes of carbon dioxide as well as sulphur dioxide, ash and other metallic emissions. This means that coal use across the world today creates at least 9.1 billion tonnes of carbon dioxide. If uranium was to replace all coal fired power generation, carbon dioxide emissions could drop from



9.1 billion tonnes to just 3 billion tonnes, saving 6 billion tonnes of emissions³. Uranium represents the cleanest solution to electrical power generation – and produces no greenhouse gas emissions.

Nuclear power plants are the most efficient form of power generation. Approximately 15% of the world’s power generation comes from 440 nuclear power generation plants producing 365,560 MWe of electricity. A further 25 are under construction and will produce an additional 20,776 MWe of power⁴. Nuclear powered generating plants are highly efficient sources of electricity. They provide 10,000 times more energy per kilogram of fuel than traditional fossil fuel generation. This represents a super-efficient use of natural resources.

Rank	Fuel Source	Energy Output per kilogram of fuel source
1	Uranium	500,000 megajoules
2	Crude oil	45 megajoules
3	Natural Gas*	39 megajoules
4	Black Coal	30 megajoules
5	Firewood	16 megajoules
6	Brown Coal	9 megajoules

*Natural gas is measured per metre cubed of gas. Source <http://www.world-nuclear.org/education/whyu.htm>

The data on uranium as a clean source of power generation are undisputable.

Generating power from uranium must become an essential part of the process of sustaining economic growth, maintaining the developed world’s lifestyle, improving the living standards of developing economies and saving the environment. A cheap clean

³ Coal used for power generation represents 66% of total world coal consumption

⁴ Source from The Ux Consulting Company at <http://www.uxc.com/index.html>



source of power will allow these countries to develop their own natural resources and help lift their populations out of the poverty rut. It will also make a significant contribution to the reduction or possible stagnation of the greenhouse effect and drive world economic growth. The safe generation of power from nuclear fuel is the only commercially viable large scale source to stop the damaging progress of green house gas emissions.

RESPONSIBLE ENERGY

The environment cannot sustain an increase in fossil fuel power generation. The use of natural gas as a substitute for power generation is a stop gap limited by the relatively small resources and poor strategic location relative to centres of high potential economic growth. It is however a useful substitute in the short term and should be used wherever it is economically viable.

Radioactive waste products from nuclear power plants have a safe form of waste disposal. Nuclear power plants produce low volumes of radioactive waste products. For instance, if one tonne of enriched uranium was fed into a nuclear power reactor, 97% of this product can be re-cycled in the reaction process and “spent” into a relatively low level radioactive product. The remaining 3%, or 30 kilograms, is highly radioactive material that requires responsible and safe disposal. Therefore if the world was to use 100,000 tonnes of uranium in power generation each year, only 3,000 tonnes of highly radioactive waste would need careful waste disposal each year.

Nuclear energy is the only form of power generation that takes full responsibility for waste products. Radioactive waste is encapsulated into a borosilicate glass that is then sealed in stainless



steel canisters. Waste containers can then be stored underground and sealed preventing access, corrosion or environmental exposure. Australia is respected for its innovation in the field of nuclear waste disposal by developing an alternative storage process that uses synthetic rock to encapsulate the radioactive waste.

Australia also has ideal waste storage locations given the geological stability of many areas, large areas of ideal host rocks, and the remoteness of many locations from large populations. Deep burial in dry stable rock is the ideal location for radioactive storage as the product can naturally decay without causing any harmful effects on the environment. With a product as sensitive as radioactive waste, Australia could be the best place for waste storage given our ideal geological locations, political stability and responsible attitudes. It will be safe from illegitimate use if it is stored in Australia. The community has a right to know that nuclear waste can be safely disposed of.

Radioactive wastes disposal is safe but is overshadowed by fearful misconceptions. Fear of contamination from poorly stored waste and the threat of nuclear weapons prompt concern and protest around the world. Everyone has the right to know that all uranium is being used responsibly and that none is ever used for the generation of nuclear weapons. This is why Australia can and must contribute to the nuclear debate to ensure that our products go to responsible users who dispose of waste products appropriately. Nuclear power generation will increase. We need to be able to have input into the processes of regulation that ensures our products are never used for malicious means.



AUSTRALIA HOLDS ALL THE CARDS

Australia could be the world's responsible power source. Australia has approximately (and conservatively) 30% of the world's uranium resources but will only produce 20% of world production in 2004. A dramatic increase in price in the last 12 months has occurred in response to the depletion of stocks while supply between 1998 and 2004 grew at an average of 1.7% per annum. The current annual global demand for uranium is about 70,000 tonnes while supply from primary production is only 40,000 tonnes, resulting in a deficit of 30,000 tonnes per annum. Demand has been supplemented from the depletion of stocks from the disarmament of nuclear weapons; a good result. However based on a projected world economic growth of 3.0%, and (assuming) the adoption of a significant amount of nuclear power generation, the demand for uranium by 2050 could increase to between 150,000 and 250,000 tonnes per annum⁵. This equates to an average growth rate in the industry of 1.7% to 2.8% per annum. A significant change in world policy on nuclear power generation could see the growth rate at 5% per annum or higher.

AN ECONOMIC WINDFALL FOR AUSTRALIA

Economically, the revitalisation of the uranium industry in Australia could see our exports increase in value significantly. Between 2002 and 2004 our uranium exports generated about A\$400 million per annum in revenue when uranium prices were between US\$10 and US\$15 per lb. Uranium prices have now increased to almost US\$25 per lb which means our exports have grown in value to A\$650 million. If Australia was to supply half of the current world market deficit of 30,000 tonnes, our uranium industry could export 25,000 tonnes worth A\$1.7 billion per annum

⁵Analysis of Uranium Supply to 2050, International atomic energy agency, 2001



in direct revenue. This would generate hundreds of jobs and services and millions of dollars in additional exploration expenditure potentially worth billions of dollars. A responsible approach to our great natural resource could reap Australia major economic benefits.

Tonnes of uranium (U) resources		
		Cost under US\$80/kg
Rank	Country	Total
1	Australia	989,000
2	Kazakhstan	622,000
3	Canada	438,500
4	South Africa	298,500
5	Niger	227,000
6	Namibia	213,000
7	Russia	158,000
8	Brazil	143,000
9	Uzbekistan	93,000
10	Mongolia	62,000
	Total of other	147,500
TOTAL	TOTAL	3,391,500
Years of resources available if consumed at 70,000 tpa		48

Includes assumed resources plus and an additional estimation. Cost/kg is defined as the cost of recovery per kilogram of contained uranium in ore.
Source from <http://www.antenna.nl/wise/uranium/>

So Australia has the technical expertise to safely mine, process, manufacture and transport uranium products and the right geological conditions for the safe storage of radioactive waste products. With these resources at hand, we could become a major supplier of uranium products and a major participant in regulation



from a technical, statutory and environmental perspective. The challenge ahead for Australia is to consider the issues of product stewardship and the governing principles of product regulation that is needed to ensure that uranium products are manufactured, transported, used and disposed of in the most responsible manner. This is a resource to repository approach.

WHAT NEEDS TO BE DONE

The world is likely to adopt uranium as a source of power generation and Australia needs to make a contribution to ensure it is used responsibly. Australia has the most significant resources of uranium that, if exploited, could assist the world maintain strong rates of economic growth, facilitate the development of developing countries, improve living conditions for many people, and vastly improve the world's environmental condition.

Australia has a unique opportunity to contribute to an industry that will have major flow on benefits in the preservation of the natural environment. Our uranium resources are large, strategic and valuable and we have an opportunity to be a world leader in developing and maintaining the regulatory guidelines in uranium stewardship. Australia has the technical expertise to undertake the development of these resources and the ideal locations for the safe, responsible disposal of nuclear wastes. Our uranium resources will lead to both sustained world economic growth and environmental solutions. It is essential that we develop our uranium resources and promote further exploration and development as this will lead to sustainable development.

To facilitate this, the following actions need to be taken by the government of a sponsored government agent:



1. **Develop a report** that will provide a balanced view on all aspects of uranium. It should promote the clean, efficient, environmentally friendly, economically rational, and productive aspects of uranium mining, processing and usage and demonstrate how the small volumes of highly radioactive waste and the prevention of its use for nuclear weapons can be safely controlled.

2. **Promote uranium exploration and development** in Australia that results in sustainable, environmentally and socially responsible management. Australia's current uranium mines are professionally operated and maintained and new uranium mines should be similarly well managed. However there are inconsistencies between state and federal systems into the mining rights and the processes for uranium exploration and mining. One consistent system must be employed across Australia. Strategic uranium resources in Queensland and Western Australia should be released from the current embargo to allow mining to commence. These major strategic resources must have a minimum threshold of ownership of Australian owned and operated companies.

3. **Develop a policy** that outlines the stewardship issues and conditions of product ownership associated with uranium supply, usage, and disposal.

4. **Prepare guidelines for safe disposal and storage** of radioactive wastes and identify strategic waste disposal locations. Australia has ideal conditions for the safe economic disposal of uranium waste, and could become a leader in safe secure disposal. If Australia was to adopt nuclear power generation as an additional power source, we would have the capability to store our own waste products responsibly. Nuclear power generation facilities must store, at their cost, waste products into facilities that can



ensure that the products are stored safely. Storage costs would be borne by power generators.

AUSTRALIA'S URANIUM RESOURCES A STRATEGIC SOLUTION TO OPPORTUNITY

Through Australia's mineral wealth and technical expertise, we have the capability to reduce the rate at which greenhouse gas emissions are produced. We need to educate the population with a balanced view on how our resources can be used to prevent an environmental crisis. It is now time for us to work against the impacts of greenhouse gas emissions and save the environment from further damage. The time to act is now and Australia has the mineral resources and technical ability that will help the world solve part of the greenhouse equation.

We hold the key to;

- Major world-class strategic resources of uranium
- Fuel for efficient and plentiful power generation
- Contributing to world economic growth
- Environmentally responsible power generation
- Greenhouse gas emission control



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