SUBMISSION TO THE HOUSE OF REPRESENTATIVES STANDING COMMITTEE ON INDUSTRY AND RESOURCES

THE STRATEGIC IMPORTANCE OF AUSTRALIA'S URANIUM RESOURCES

NOVA ENERGY LIMITED

SUBMISSION BY NOVA ENERGY LIMITED

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SUMMARY

Nova Energy has been established as a uranium exploration and development company focused on the Lake Way and Centipede deposits (the Wiluna Uranium Assets) located in central Western Australia. Nova Energy intends to list on ASX in conjunction with a proposed $8m capital raising primarily to explore, evaluate and develop the Wiluna Uranium Assets and other potential uranium resources in the Wiluna region. Nova Energy has a secondary objective of identifying and evaluating other Australian and global uranium opportunities to complement the Wiluna Uranium Assets.

Nova Energy has been formed at a time of rapidly escalating uranium prices due to rising global demand and anticipated supply shortages. In 2004, world nuclear output rose to a record 2,696 million kWhr. The increasing efficiencies of existing reactors and the construction or planning of a further 65 reactors will see nuclear output rising by at least 45 percent to 3,900 million kWhr by 2025.

Nova Energy believes that a responsible and vibrant uranium industry, owned, managed and regulated in Australia, is critical to the augmentation of safe and cost effective energy globally over the ensuing generations.

Such an industry has significant potential. There is rapidly growing demand for electrical power in the developing economies of China and India and to a lesser extent the more advanced western hemisphere economies. Nuclear power is already the best choice for competitive long-term cost effective power in these countries, especially considering the need for reliable and independent base-load power (especially those countries with limited availability of carbon-based fuels). Nuclear power will always be part of the solution to energy needs – not the only solution. But there are major issues and limitations of renewable energy sources such as wind and solar, which will not be solved in the short-medium term, and even then will be very unlikely to satisfy future energy requirements. Nuclear power, and the uranium needed to supply it will address the very real global community concerns about CO_2 emissions and global warming from fossil fuels, helping many countries to address the specific requirements of the Kyoto Protocol.

Australia's uranium resources and mining industry are strategically valuable and sustainable. Their extraction will:

- **Generate significant income for the people of Australia through the development of a globally competitive industry whereby becoming an important contributor to the Australian economy, with sustained direct and indirect employment opportunities;**

- **Enable the Australian Government to contribute to the reduction of global greenhouse gas emissions without restricting the development of its other industries, including coal;**

- **Support the important ongoing development of regional communities across Australia, and provide additional opportunities for indigenous people both in employment, and in the operation of businesses to support this emerging industry;**

In addition, an Australian uranium industry will:

- Provide a pivotal leadership role in regard the supply of uranium to global energy producers;

- Reassure Australia's regional and global trading partners that their energy needs can be satisfied reliably from the supply of uranium from a geopolitically stable, transparent and secure location;

- Ensure that world's best practice is used to regulate health, safety and environmental issues within the industry;

- Result in sustained investment in Australia's resources from the global investment community at a time when a number of resources are reaching their production zenith due to limited exploration success and rising input costs (eg; Gold).

Section One
Global Demand for Australia's Uranium Resources & Associated Supply Issues

World Energy Demand

- Worldwide energy use will increase over 50 percent, from 404 quadrillion British thermal units (Btu) in 2001 to 623 quadrillion Btu in 2025[1] as per capita energy consumption in developing countries rises towards that of industrialised countries.
- World energy consumption has risen by 3.3 percent per annum for the past 30 years, faster than the annual rate of population growth (2.0 percent).
- China and India will account for 40 percent of the growth in world energy consumption.[1]
- The world's human population is projected to reach 7.5 billion by 2025, with around 90 percent of this growth expected to occur in developing countries such as China and India, and most of that is expected to be in urban areas.

World Energy demand will increase significantly in the next 20 years, with the majority of demand coming from China and India.

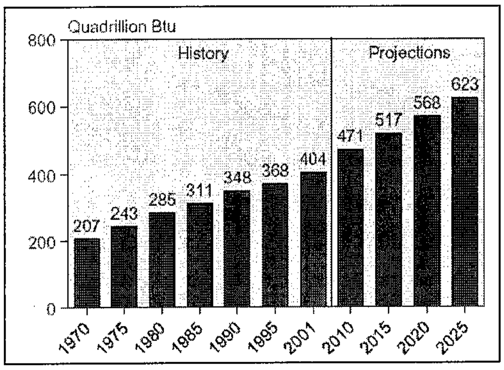

Figure 1 – World Marketed Energy Consumption, 1970-2025[1]

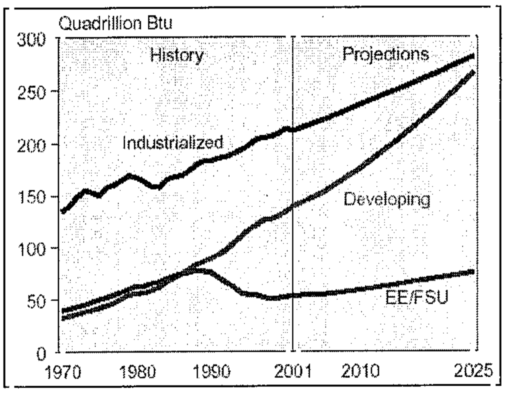

Figure 2 – World Marketed Energy Consumption by Region, 1970-2025[1]

World Energy Supply

- The supply of all primary energy sources will increase in order to meet future demand. However, there are many different estimates about the projected mix of these primary energy sources over the next 20 years.

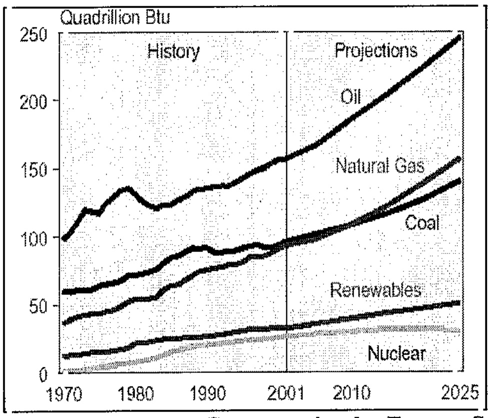

Figure 3 – World Marketed Energy Consumption by Energy Source, 1970-2025[1]

Primary energy supplies remain reliant on fossil fuels. However, Governments are considering different options for their countries' sustainable energy futures.

- If current trends continue, industrialised and developing countries will meet their increased demand primarily from fossil fuels such as oil, natural gas and coal.
- This profile has major implications, both in terms of the scale of growth in energy demand, and the consequences of relying on fossil fuels to provide a cost effective, clean source.

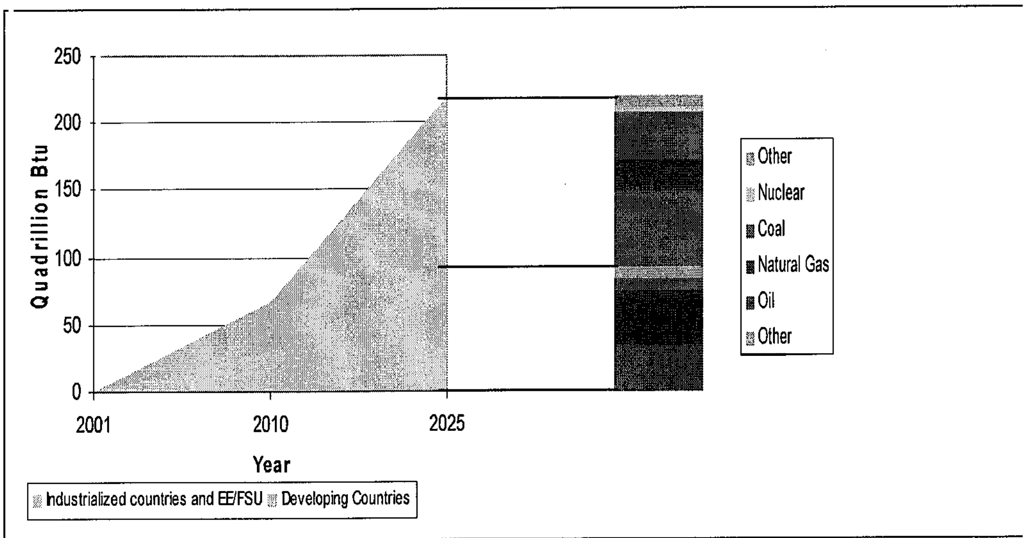

Figure 4 – Projected Cumulative Energy Consumption Increase from 2001 and Source[1]

- There are four broad options for a sustainable energy future[2]:

  1. **Renewable energies** (in particular, wind, solar, wave, geothermal, modern biomass and hydrogen from non-fossil fuel sources) with generally low or no emissions - they are, however, typically diffuse, intermittent and relatively expensive energy sources. Considerable technological advance in collection and storage technologies is needed, as is their harnessing in hybrid systems with conventional fuels.

  2. **Conservation and energy efficiency** represent substantial potential to improve energy intensity. This can reduce emissions, provided that demand does not negate these measures.

As electricity demand grows, particularly in the developing world, access to reliable sources of energy is encouraging a greater focus on alternatives to fossil fuels, which also address the environmental concerns associated with CO_2 and greenhouse gas emissions.

3. **Cleaner fossil fuels systems** - fossil fuels are the major source of energy. They are cost effective, and have long life reserves.

4. **Nuclear energy** is one of the few options available for bulk electricity supply without greenhouse gas emissions and there are extensive uranium resources worldwide.

World Electricity Demand

- Electricity generation accounts for about 40 percent of total primary energy supply.
- Total demand for electricity is expected to increase from 13,290 billion kilowatthours in 2001 to 23,072 kilowatthours in 2025, at a rate of 2.3 percent per annum.
- With the majority of this growth coming from the developing world, access to reliable supplies of electricity will be necessary to maintain these countries' growth.
- Fossil fuels (coal, gas and oil) provide the majority (65 percent) of total global electricity production, with coal accounting for 39 percent of all electricity generated.
- Hydro and other renewables provide 18 percent, and nuclear power generation provides 17 percent[3].
- Predictions often assume the continued reliance on fossil fuels. This is based on the assumption that fossil fuel prices will remain low relative to the costs of nuclear power and renewable energy sources.
- These costs are being revised with a better understanding of the environmental consequences of greenhouse gases and emissions, potentially changing the energy policies of countries worldwide.

Global Nuclear Energy Demand

Nuclear power accounts for 17 percent of global electricity generation – it is a crucial part of global energy needs now, and will grow in the future especially in economies close to Australia.

- The scale of the world's nuclear industry is considerable and growing. Worldwide, there are 440 operating nuclear power reactors in 31 countries with total installed capacity of 357,000 MWe.

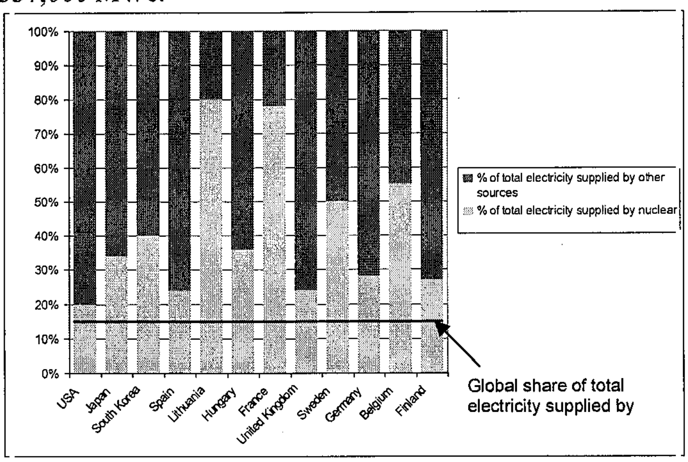

Figure 5 – Countries Dependent upon Nuclear Energy

Section One
Global Demand for Australia's Uranium Resources & Associated Supply Issues

- Nuclear energy accounts for 17 percent of global electricity supply.

- Nuclear energy is a major component of power generation in many countries - United States (20 percent of domestic electricity production), Germany (30 percent), Japan (34 percent), Hungary (36 percent), Sweden (46 percent), France (78 percent) and Lithuania (80 percent).

- The World Nuclear Association[4] (WNA) has prepared three scenarios for world nuclear generating capacity up to the year 2025. The base case or reference scenario has nuclear capacity increasing from 357GWe in 2002 to 438GWe in 2025, an annual average rate of growth of 0.9 percent. In the upper scenario, generating capacity increases to 549GWe by 2025.

- Demand is expected to be driven mainly by new reactors in China, India, South Korea, Eastern European states and Russia. Thirty-three reactors are currently under construction and a further 32 are firmly planned[5].

- Some Western countries, including the United Kingdom and Germany, plan to reduce reliance on nuclear energy and accelerate development of renewable sources such as solar and wind energy. However, there is considerable opposition to these policies because renewable energy sources cannot provide the large and (arguably more importantly) reliable base load energy requirements of modern industrial states. Parliamentary approval for a new reactor in Finland (the first in the European Union in a decade) on economic and energy security grounds is likely to be followed by government endorsement of new nuclear capacity in other European countries.

Drivers of Uranium Demand and Price

Uranium demand for electricity generation is growing rapidly. Excess supplies from inventories built up associated with weapons decommissioning are diminishing and the there is a major opportunity for primary mine production to ramp up to fill the shortfall in coming years.

- Fuel supplies to nuclear power facilities are classified as primary or secondary. Primary sources are derived directly from mines and generally delivered as U_3O_8 concentrates. Secondary supplies include:
  - Depleted uranium from enrichment
  - Reprocessed material from spent fuel
  - Unprocessed spent fuel
  - Highly enriched uranium (HEU) of military origin

- Since 1948, the relative availability of these fuel sources and the level of demand from military and domestic users have controlled the market price of primary uranium.

- Thomas L. Neff[6] breaks uranium price history into three periods:
  1. the weapons procurement era (1940-1969);
  2. the inventory accumulation era (1970-1984); and
  3. the inventory liquidation era (1985-2004).

- Prior to the inventory liquidation era, uranium was supplied almost entirely from mine production and the average spot price was $US54.18/lb U_3O_8 (in today's dollars), with a peak of $110/lb U_3O_8 in 1976.

- During the inventory liquidation era, spot prices fell to an average of $US14.57/lb U_3O_8 when huge quantities of Western and Russian inventory and secondary sources such as HEU and MOX (mixed oxide fuels) were sold. The effect of the inventory liquidation was to artificially depress the price of uranium in a period when mine supply was declining and demand increasing.

- Inventory drawdown is now in decline and the uranium market is entering an era in which mine production will again be the principal source of supply.

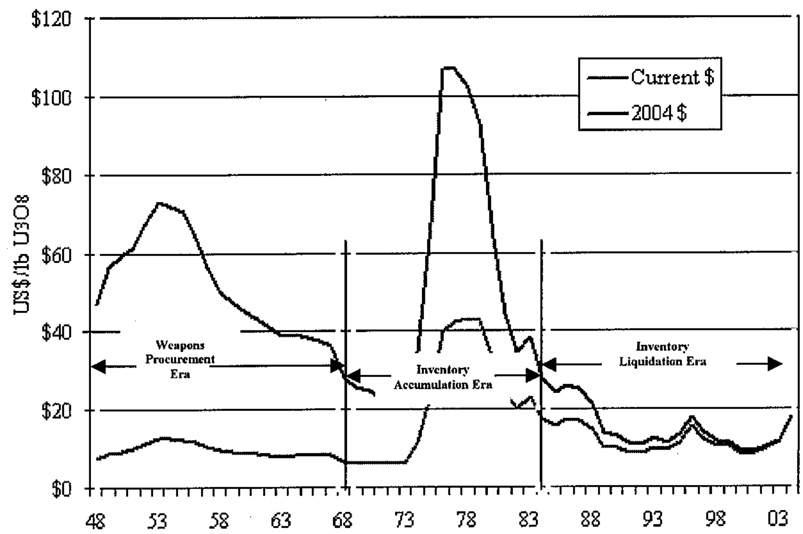

Figure 6 – Uranium spot price history in current actual and 2004 dollars. Source Combs J[7]

Global Nuclear Fuel and Uranium Demand

- The World Nuclear Authority[4] has developed three demand scenarios for uranium for the period 2003-2025, a reference case and upper and lower cases. The demand models take into account the life of existing reactors, construction of new reactors, improving load factors, length of reactor fuel cycles, tails assays, discharge burnup and enrichment levels.

- The reference (most likely) case sees demand increasing steadily from the current 68,000tU to 82,000tU by 2025. The upper case has demand rising to 102,540tU and the lower case has demand rising to 71,450tU by 2014 but then declining to 57,700tU by 2025. These curves are presented in Figures 7 & 8.

- Combining all primary and secondary uranium supply sources suggests that the world nuclear fuel market will be adequately supplied until 2010, but as indicated in Figures 7 and 8, the period beyond is clouded with uncertainty.

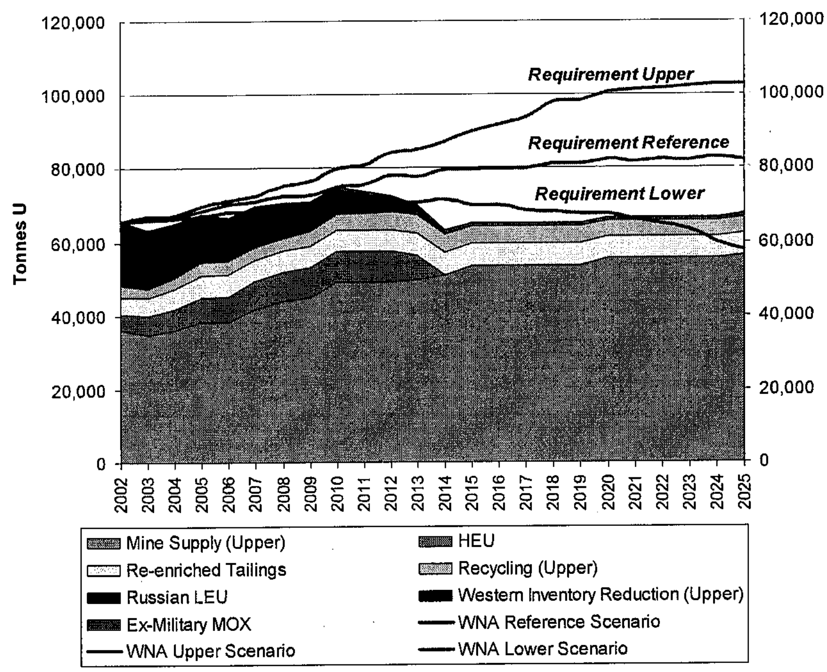

Figure 7 – Upper primary and secondary uranium supply forecast with requirement forecasts. Note divergence from approximately 2010. Source: WNA[8]

Prices for uranium are rising rapidly creating a major long term economic opportunity for those countries and companies with uranium resources to develop.

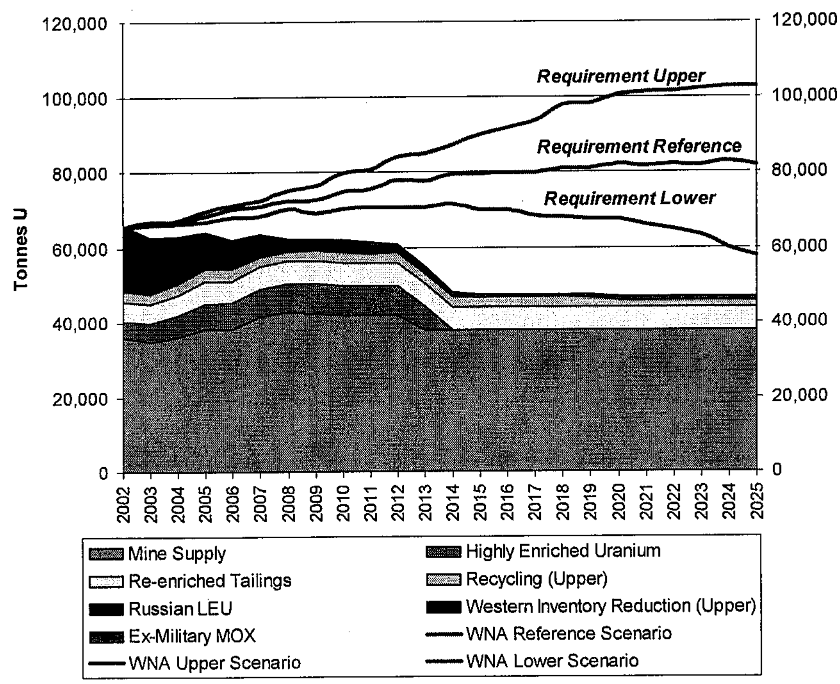

Figure 8 – Lower primary and secondary uranium supply forecast with requirement forecasts. Note divergence from 2002. Source: WNA[8]

- Primary production is dominated by a handful of large mines and a limited number of companies. In 2002, four companies (COGEMA, Cameco, Rio Tinto and WMC

Resources) supplied over 63 percent of Western world production from only eight mines located in Canada, Australia, Namibia, Niger and South Africa.

- The WNA forecasts of primary uranium production to 2025 indicate an upper forecast for production rising to 56,350tU (equivalent to 66,450t U_3O_8) with significant new production assumed from new or expanded mines in Australia (Olympic Dam, Jabiluka, Kintyre and Koongara), Canada (Midwest) and Namibia (Langer Heinrich). In the lower forecast, mine production is 37,900tU by 2025.

- Given the time taken to discover, gain regulatory approvals and develop new mines or to expand existing facilities, it is unlikely that significant supply from other primary production sources would be available within the next ten years.

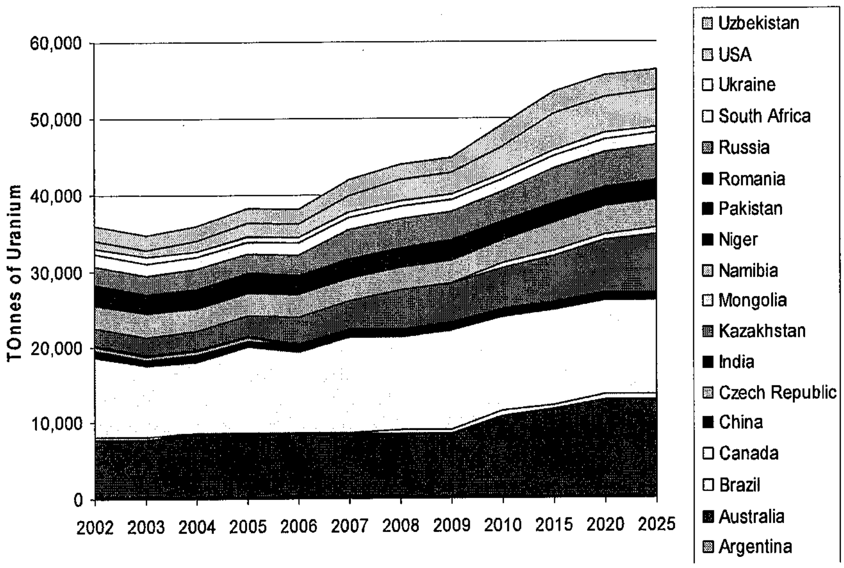

Figure 9 – Forecast and current primary uranium production. Source: World Nuclear Authority4

- The WNA anticipates long term secondary uranium supply of re-enriched tailings of at least 6,000tU until 2025. Long term supply of recycled fuel at similar levels to current (4,500tU) is also expected. Significant declines are expected for Western inventories, Russian LEU and HEU. These declines could accelerate if for strategic military and fuel supply reasons, both the US and Russia are unwilling to free-up inventories. Limited capacity of fuel conversion facilities may exacerbate the situation.

- The above analysis projection indicates the stage is set for a significant increase in spot and contract prices, perhaps matching or exceeding the highs of 1976.

- Spot prices have already more than doubled in the last two years. Most commodity analysts are bullish on the outlook for uranium. The Scotiabank Group recently stated: "uranium prices are continued to trend higher: spot U_3O_8 rose from an average of US$21.40 per pound in February to US$22.00 in March and to US$23.50 on April 18. Prices were only US$17.60 a year earlier and US$10.30 two years ago. We continue to rank uranium as a top commodity-pick over the balance of the decade." At the time of writing (11/05/05) the U_3O_8 spot price had reached $29/lb.

Section One
Global Demand for Australia's Uranium Resources & Associated Supply Issues

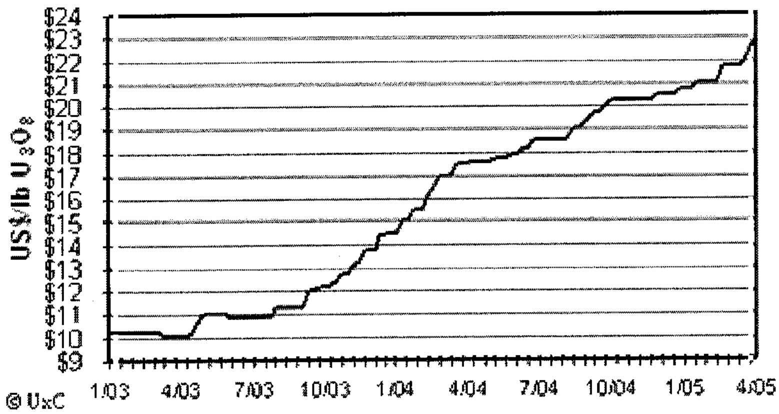

Figure 10 – Spot price of U_3O_8 in from January 2003 to April 2005.
Source: The Ux Consulting Company, LLC

Demand for Australian Uranium

Australia is already a significant supplier of uranium – yet the growing demand is providing an unparalleled opportunity for Australia to be the dominant supplier of a crucial global commodity.

- With such significant opportunities for increasing uranium supplies, Australia has a major opportunity to be the leading global supplier.
- It currently accounts for 22 percent of global supply of U_3O_8, exporting 9402 tonnes in 2004, worth over A$691 million at current prices (US$25.00 per pound), with Canada being the major supplier with over 30 percent.
- This is compared to Australia's uranium reserves of 28 percent of the global reserve base, or 40 percent of total low cost resources, compared to Canada's share of only 12 percent.
- Based on the WNA scenario's the economic potential for Australia is significant, with revenues close to A$2.0 billion per annum, which is a significant growth from where the industry is today.

	Ref Case	Upper Case
Global Uranium demand by 2025 (tonnes)	82,000	102,540
Demand met from mine supply (%)	80	80
U_3O_8 mined (tonnes)	77,400	96,700
Potential Australian share (based on current 22 percent share of global supply) (tonnes)	17,000	21,300
Potential Australia share (based on share of global reserves -28 percent) (tonnes)	21,700	27,100
A$ Value of revenues[1] (A$billion) (22 percent supply)	$1.3	$1.6
A$ Value of revenues (A$billion) (28 percent supply)	$1.6	$2.0

[1] Based on US$25.00 per pound for U3O8 and an exchange rate of $0.75

Section Two
Strategic Importance of Australia's Uranium Resources & Any Relevant Industry Developments

Australia as a Stable, Safe and Responsible Source of Uranium

Australia offers the most geopolitically stable location for the controlled mining and export of uranium to the regions in most need of ways to safely and cleanly develop energy supplies to improve their economic output and improve living conditions for millions of people.

- The Australian mining industry is a mature, high technology and heavily regulated industry that supplies a significant proportion of the world's raw materials.

- The stringent safety and environmental regulations imposed by Australia on uranium mining are likely to be greater than in developing nations that lack highly evolved safety cultures. Through the International Atomic Energy Authority, Australia is able to track the complete life-cycle of uranium and ensure that it is used for peaceful purposes only.

- Production from other states, particularly in Africa and Asia may not require such stringent tracking. The greater the percentage of uranium produced in Australia, the greater the degree of control on its usage.

- The growing shortfall in supply will need to be met by new mining production. Australia is uniquely placed – it is geographically well located close to the major growth areas. Australia is a stable, democratic state with highly developed land access and corporate laws.

- Australia contains close to 40 percent of the world's uranium resources. Australia currently supplies only 22 percent of global demand, less than is its proportional share based on its resources.

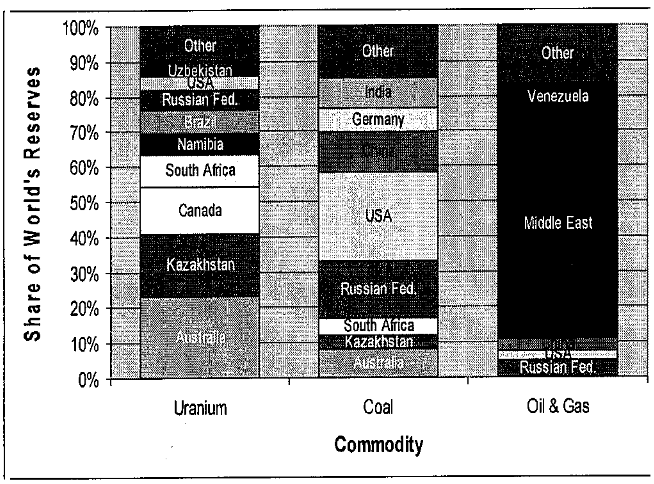

Figure 11 - Share of World's Reserves at end of 1999
(Source: 19th World Energy Council Survey of World Energy Resources)

- The other two countries with major resource bases, Kazakhstan and Canada, are either not as well regulated or are not as well placed to meet the growing demands in Asia.

- As the map below illustrates, Australia is uniquely placed to supply raw materials for the energy industry. Australia can offer secure long-term supply of uranium to the world's nuclear power industry and is committed to supply only to countries that are signatories to the Nuclear Non-Proliferation Treaty.

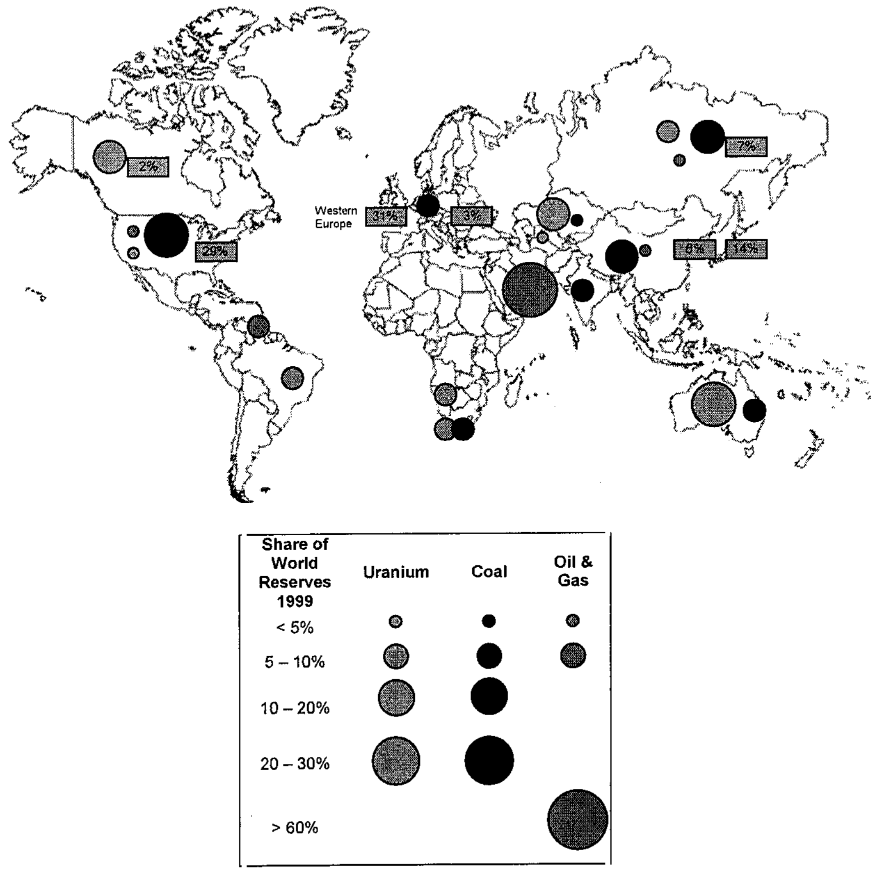

Figure 12 – Global Share of Reserves of Major Energy Supplies (note: % represent the share of consumption on uranium)

- As Asian countries seek to balance their energy requirements between fossil fuel and nuclear sources, Australia is uniquely able to supply both requirements, ensuring its own exports continue to grow to meet the regions changing needs.

- There are significant opportunities for Australian companies to increase their mining and export of uranium in coming years, especially from the Northern Territory, South Australia and Western Australia where the bulk of the resources are located. The timing and scale of this expansion will be influenced by government policy at a Commonwealth and State level.

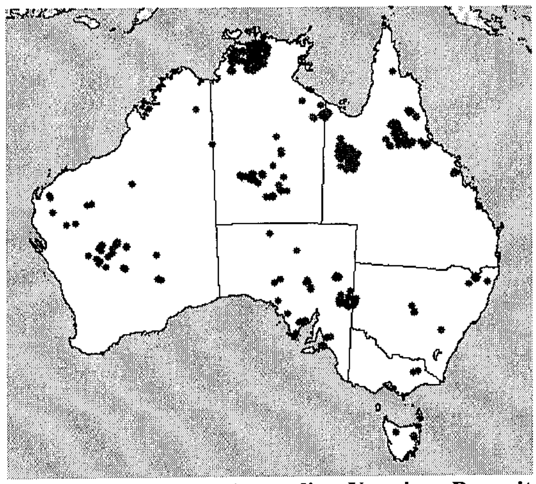

Figure 13 - Location of Known Australian Uranium Deposits, based on www.australianminesatlas.gov.au (6 May 2005)

- Western Australia provides a good example of how important these assets are.

Western Australia could supply an estimated 22,000 tonnes per annum of U_3O_8, with sales value of A$1.6 billion per annum. With a further A$1.5 billion from multiplier effects, the uranium industry would be a major influence on the economic performance of WA and Australia.

Significance of Uranium's potential to Western Australia's Mineral and Petroleum Industry

- As one of the most productive and diversified mineral and petroleum regions in the world, Western Australia's resources industry has a significant impact on both the State's and Country's economic position.

- WA's mineral and petroleum industry in 2003-04:
  - Consisted of 250 operating mines and 55 producing oilfields,
  - Generated A$26.4b in sales revenue[9],
  - Contributed 18 percent (A$14.4b) to the State's total factor income[10],
  - Contributed 44 percent to Australia's mineral and petroleum industry's total factor income[10],
  - Paid A$1b in royalties to the State's Consolidated Revenue Fund[9], and
  - Directly employed over 48,000 persons[9].

- The majority of sales revenue (A$24b) is generated by five commodities: petroleum (A$9.2b), iron ore (A$5.3b), nickel (A$3.3b), gold (A$3.1b) and alumina (A$3.1b).

- Despite significant uranium deposits being located in Western Australia, the commodity currently has no economic impact as the mining of uranium in Western Australia is banned in accordance with State Government Policy.

Uranium Deposits in Western Australia

- There are at least 30 uranium deposits in Western Australia, of which perhaps 10 may be economic at current uranium prices. Figure 14 details the location of the various deposits.

Section Two

Strategic Importance of Australia's Uranium Resources & Any Relevant Industry Developments

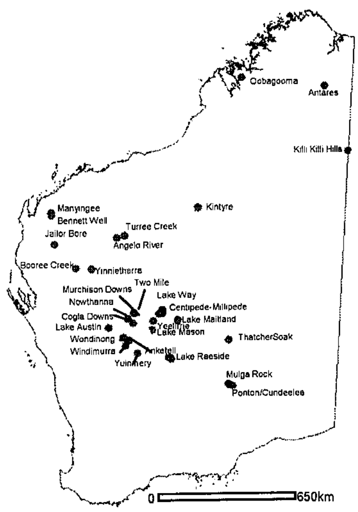

Figure 14 – Location of Uranium Deposits in Western Australia

- The total reserves and resources for the key uranium deposits is currently estimated at almost 190,000 tonnes of U_3O_8, detailed as follows:

Key Uranium Deposit	Grade U_3O_8	Estimate of Contained U_3O_8 (tonnes)
Kintyre	0.2% - 0.4%	35,000
Yeelirrie	0.15%	52,000
Manyingee	0.12%	7,860
Oobagooma	0.15%	9,950
Lake Maitland	0.52kg/t	7,860
Nowthanna	0.42kg/t	4,626
Lake Way	0.91 kg/t	3,960
Centipede-Millipede	1.07 kg/t	4,900
Mulga Rock	0.095%	46,000
Ponton/Cundeelee	0.1%	20,000

Table 2 - Summary of Resources Available from Western Australia's Key Uranium Deposits

- The estimated total of U_3O_8 in Western Australia's key uranium deposits is 4.3 times the size of the Ranger mine in the Northern Territory, which contains 43,895 tonnes of U_3O_8 and generated sales revenue of A$236m in 2004. For the past two years Ranger has produced over 5,000 tonnes of U_3O_8 per annum, the equivalent stripping rate of 11.6 percent of reserves per annum.

- Assuming an equivalent stripping rate for Western Australian key deposits as the Ranger mine (11.6 percent) would result in :
  - the State's annual U_3O_8 production being approximately 22,000 tonnes per annum.
  - If a long term export sales price for U_3O_8 of US$25/lb is adopted then Western Australian key uranium deposits would generate sales revenue of US$1.2 billion per annum (A$1.6 billion[11]).

- In 2003 ERA paid A$9.8 million in royalties to the Commonwealth Government in relation to the Ranger mine. A$7.6 million of Ranger royalties was ultimately distributed to Northern Territory based Aboriginal groups and A$2.2m was distributed to the Northern Territory Government.

- Assuming the equivalent royalty to production ratio for Western Australian key deposits as the Ranger mine would result in annual royalties payable of A$42 million.
- This indicates that uranium has the potential to be one of the highest sales revenue and seventh highest royalty generating commodities in the State, and a significant contributor to the national economy.
- One of the most common tools for measuring the economic impact of new projects and the additional economic activities which they trigger is the "multiplier effect".
- The main types of multipliers are:
  - Output Multiplier: Measures the relationship between the initial increase in output required from an industry and the total increase in output by all industries (includes direct, indirect and consumption induced effects on output). This multiplier involves double-counting as the increased output of one industry can be used as an input into another industry.
  - Gross Value-added Multiplier: Shows the relationship between the initial increase in output required from an industry and the total increase in gross value added by all industries. It generally reflects the sum of the compensation of employees, gross operating surplus and mixed income and taxes less subsidies.
  - Employment Multiplier: Calculates the number of full time equivalent (FTE) jobs created in an industry for every $1 million of expenditure.
- Multipliers for a state or region are generally smaller than the country's multipliers, as all the economic activity generated by the initial increase in demand would not necessarily be confined to the state or regional economy.
- By applying the multiplier effect to potential annual uranium sales revenue[12] the gross value-added impact would be A$1.5 billion for Western Australia and A$2 billion for Australia, as per the following table.

	Western Australia[13]			Australia[14]		
	Output	Gross Value added	Employ-ment	Output	Gross Value added	Employ-ment
Multiplier	2.03	0.92	10.2	2.59	1.25	13
Impact	A$3.3b	A$1.5b	16,320 FTE	A$4.1b	A$2.0b	20,800 FTE

Table 1 - Multiplier Effect on Sales Revenue from WA's Key Uranium Deposits[2]

- This includes resources from only ten key uranium deposits located in Western Australia.

[2] As the above calculations are indicative only they are designed to promote discussion on the economic impact of uranium mining in Western Australia as opposed to defining the exact economic impact. The basic calculations assume that all key WA uranium mines would have a mine life of between eight and nine years and all mines would operate simultaneously. The calculations also exclude capital construction costs and any future exploration which may disclose additional uranium reserves and deposits.

Industry Developments in Nuclear Energy – Changing Technology

- The potential growth in nuclear energy demands is also driving a more intense review of technological opportunities to make operations much safer.

- China, for example, has become a leader in the development of Pebble Bed Reactors (PBR), an inherently safe form of reactor design, immune from the possibility of "melt-down."

- Instead of the white-hot fuel rods used in conventional reactors, PBR's are powered by billiards-sized graphite balls packed with tiny flecks of uranium. Replacing the superhot water - intensely corrosive and highly radioactive - the core is bathed in inert helium. This gas can reach much higher temperatures without bursting pipes, which means a third more energy available to drive turbines.

- Without the water, there is no steam, and no expensive pressure dome to contain it in the event of a leak. And with the fuel sealed inside layers of graphite and impermeable silicon carbide - designed to last 1 million years – there is no steaming pool for spent fuel rods.

- Depleted balls can go straight into lead-lined steel bins for storage.

Nuclear Fuel Cycle – Waste Management[15]

- The amount of waste resulting from the end to end nuclear power process is relatively small. Much of the waste however is radioactive and therefore must be carefully managed and disposed to ensure the safeguarding of human health and to minimise the impact on the environment. This means isolating or diluting the waste so that the rate or concentration of any radionuclides returned to the biosphere is harmless and unable to cause harmful pollution.

- Radioactive waste is generally classified into three categories, according to the amount and types of radioactivity contained:
  - Low level waste (LLW)
  - Intermediate level waste (ILW)
  - High level waste (HLW)

- LLW contains small amounts of mostly short-lived radioactivity. It contains enough radioactive material to require action for the protection of people, but not so much that it requires shielding during handling or transporting, and is therefore suitable for shallow land burial. LLW is transported every day and is considered less hazardous than flammable and toxic liquids such as petrol. It is often compacted or incinerated prior to disposal to reduce its volume. LLW comprises some 90 percent of the volume of total radioactive waste but only 1 percent of the radioactivity.

- ILW contain higher amounts of radioactivity and requires shielding. It typically comprises resins, chemical sludges and reactor components, as well as contaminated materials from reactor decommissioning. ILW makes up some 7 percent of the volume of total radioactive waste and has 4 percent of the radioactivity. ILW is further categorised into "short lived" and "long lived" waste.

- If the waste contains more than 4,000 becquerel[16] (Bq) per gram of long-lived (over 30 year half-life[17]) alpha emitters it is categorized as "long lived" and requires more sophisticated handling and disposal. Long-lived ILW is disposed of deep underground in engineered geological repositories, or held in surface storage pending the development of such repositories. Some ILW may be solidified in concrete or bitumen prior to disposal.

- Generally short lived ILW (mainly from reactors) is buried, in a similar manner to LLW.

- Around the world, nuclear power generation produces approximately 150,000 cubic metres (equivalent to a 55m cube) of LLW and ILW each year, and radioisotopes in medicine and industry would add to this.

Ongoing technological change has created reactors that are far safer than facilities such as Chernobyl.

This innovation is also providing viable, safe ways to store waste products until they have degraded to original background radiation levels.

- HLW contains most of the radioactivity from the nuclear fuel cycle (accounting for 95 percent of the radioactivity produced in the process of electricity generation, but only 3 percent of the volume) and typically consists of the spent fuel from power reactors or the wastes left over from reprocessing spent fuel.

- It generates a considerable amount of heat and requires cooling, as well as special shielding during handling and transport. Such materials are shipped in special containers which prevent the radiation leaking out and which will not rupture in an accident.

- Approximately 200 tonnes of uranium oxide is required to keep a large (1,000 MWe) nuclear power reactor generating electricity for one year, which results in 25 tonnes to 30 tonnes of spent fuel taken from the reactor's core each year.

- Spent fuel assemblies are stored in special ponds which are usually located at the reactor site, to allow both their heat and radioactivity to decrease. Spent fuel can be stored safely in these ponds for long periods (several years), alternatively it can also be dry stored in engineered facilities, cooled by air. The longer spent fuel is stored the easier it is to handle, due to the reduction in radioactivity. Both storage methods however are intended only as an interim step before the fuel is either reprocessed or sent to final disposal.

- If the spent fuel is reprocessed, approximately 97 percent of the spent fuel can be recycled leaving only 3 percent as HLW. The separated waste is heated strongly to produce a dry powder which is vitrified by incorporating it into borosilicate (Pyrex) glass to immobilise the waste.

- A 1,000 MWe reactor would generate approximately three cubic metres of vitrified waste per annum. The glass is then poured into stainless steel canisters, each holding 400kg of glass. A year's waste from a 1,000 MWe reactor is contained in five tonnes of such glass or about 12 canisters, each being 1.3 metres high and 0.4 metres in diameter. These canisters can be readily transported and stored, with appropriate shielding.

- If spent fuel is not reprocessed the whole fuel assemblies are treated as HLW. This spent fuel takes up about nine times the volume of equivalent vitrified HLW which results from reprocessing and which is encapsulated ready for disposal.

- There is currently approximately 270,000 tonnes of spent fuel in storage, much of it at reactors. Each year a further 12,000 tonnes of spent fuel is generated of which 25 percent is reprocessed. France has two HLW vitrification plants and there are also plants in the UK and Belgium. The capacity of these plants is 2,500 canisters (1,000t) per annum.

- Final disposal of HLW is delayed to allow its radioactivity to decay. Hence canisters or spent fuel (encapsulated in corrosion resistant metals such as copper or stainless steel) is stored under water in special ponds or in dry concrete structures or casks for at least forty years after removal from the reactor. At this point less that one thousandth of its initial radioactivity remains and the HLW is much easier to handle. This provides a technical incentive to delay further action with HLW until the radioactivity has reduced to about 0.1 percent of its original level.

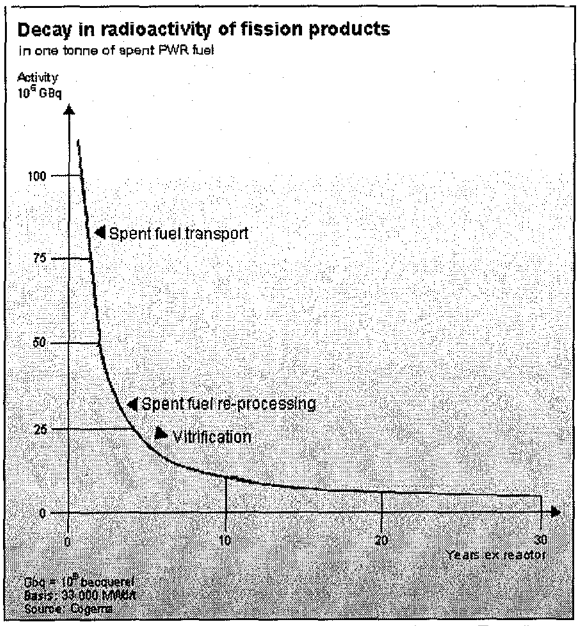

Figure 15 – Decay in Radioactivity of Fission Products

- The ultimate disposal of HLW requires its isolation from the environment for long periods. To date no country has undertaken ultimate disposal processes, with the first permanent disposal expected to occur about 2010 when the quantities to be disposed of will be sufficient to make it economically justifiable. The most favoured method is burial in dry, stable geological formations some 500 metres deep. After being buried for approximately 1,000 years most of the radioactivity will have decayed. The amount of radioactivity then remaining would be similar to that of the naturally occurring uranium ore from which the fuel originated, although it would be more concentrated.

- The cost of managing and disposing of nuclear power waste represents approximately 5 percent of the total cost of the energy generated, and financial provision is made by most nuclear utilities to build this cost into electricity tariffs. For instance, in the USA, consumers pay 0.1 cents per kilowatt hour, which utilities pay into a special fund. So far more than US$20b has been collected.

Mine Tailings

- Traditional uranium mining generates tailings, which contain virtually all the naturally occurring radioactive elements found in uranium ore. Strictly speaking these are not classified as radioactive wastes.

- Tailings are collected in engineered tailings dams and finally covered with a layer of clay and rock to inhibit the leakage of radon gas and ensure long term stability. In the short term, the tailings material is often covered with water.

Section Three
Potential implications for global greenhouse emission reductions from further development and export of Australia's uranium resources

Environmental Considerations

- For the last 50 years the development of nuclear power facilities has been determined mainly by economic and strategic factors, particularly in countries such as Japan and Sweden that have limited domestic supplies of hydrocarbon-based fuels.
- The environmental benefits of low CO_2 and SO_2 emissions have been an important but secondary consideration.
- The increasing concentration of CO_2 in the earth's atmosphere is a growing environmental concern.
- To the middle of the 20th century, deforestation, cement manufacturing and the burning of fossil fuels have been the main anthropogenic contributors. CO_2, along with methane and nitrous oxide, are the main contributors to the Greenhouse Effect, where heat is trapped in earth's atmosphere resulting in global warming.
- There is considerable scientific debate about the rate and timing of global warming, and the influence of mitigating factors (such as particulate pollution in the upper atmosphere and oceanic carbon sinks) but there is no doubt that CO_2 concentrations in the earth's atmosphere are continuing to rise rapidly.
- CO2 concentrations have increased some 31 percent since the Industrial Revolution.
- The most reliable contemporary data source is provided by the Mauna Loa Observatory in the Hawaiian Islands. Precise records demonstrate that CO_2 concentrations have increased from 315.98 parts per million in 1959 to 375.64 parts per million in 2003 – an 18.8 percent increase[18]. The rate of increase in this period is greater than at any time in the last 20,000 years, and possibly unprecendented in the history of Earth.

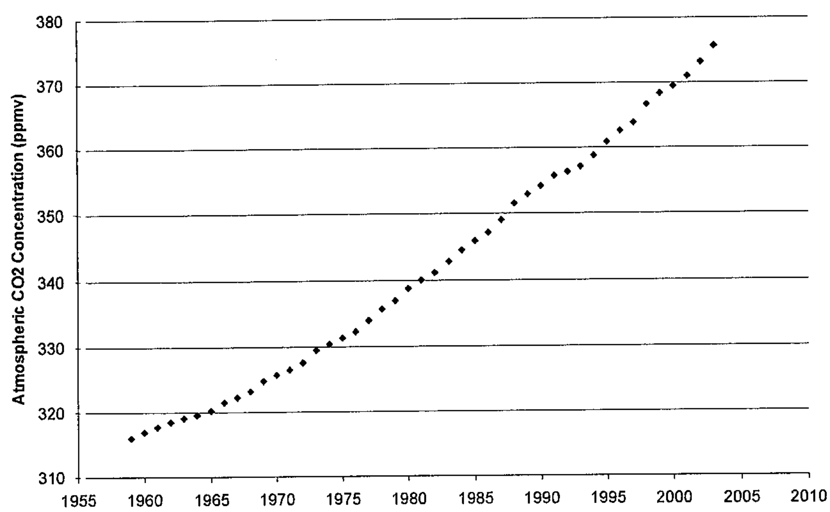

Figure 16 – Average annual atmospheric CO2 concentrations (parts per million volume) as measured at the Mauna Loa Observatory.
Source: C.D, Keeling & T.P.Whorf, and the Carbon Dioxide Research Group[8]

Section Three
Potential implications for global greenhouse emission reductions from further development and export of Australia's uranium resources

Nuclear generation offers large-scale carbon-free generation of electricity.

The Kyoto Protocol only applies to Annex I countries. Developing nations can to continue to grow their energy sector in fossil fuels without the constraints of Kyoto.

Australia's uranium is, potentially, a way to meet the energy demands of these developing countries that obviates their need to depend on fossil fuels and delivers a positive global outcome - more energy for less carbon.

- Along with new observations have come increasingly refined calculations of the heating effect of increased atmospheric CO_2. One of the most widely accepted models is that the earth's surface will warm by 4°C above the present average global temperature for a fourfold increase in CO_2 and by 6°C for an eightfold increase[8]. Such a high average global temperature has probably not occurred for tens of millions of years.

United Nations – the International Framework Convention on Climate Change

- The potentially catastrophic consequences of global warming have resulted in increased global debate on the significance of reducing the concentration of CO_2 in the earth's atmosphere.
- A key outcome of the Convention has been the Kyoto Protocol – the first attempt to achieve international agreements to mitigate climate change through reduction of greenhouse gases.
- The International Framework on Climate Change Convention (of which Kyoto Protocol is a key outcome) recognises the overwhelming importance of controlling and reducing greenhouse gas emissions, while also managing and enhancing carbon reservoirs and carbon sinks in forestry and agriculture (sequestration).
- The 1997 Kyoto Protocol shares the Convention's objective, principles and institutions, but significantly strengthens the Convention by committing Annex I Parties to individual, legally-binding targets to limit or reduce their greenhouse gas emissions.
- The individual targets for Annex I Parties add up to a total cut in greenhouse-gas emissions of 5.2 percent from 1990 levels by 2008-2012, with specific reduction targets varying from country to country.
- Following the inclusion of Russia in November 2004 the Kyoto Protocol now has 102 ratifications and has met the criteria to come into force. Two notable countries yet to ratify the Kyoto Protocol are the United States and Australia. These two countries have the highest CO_2 emissions per capita in the world (Figure 17) and would bear considerable economic stress if their reliance on carbon-generating fuels was reduced in accordance with Kyoto requirements.
- The Kyoto Protocol will place increasing pressure on signatories to actively pursue emissions reductions through decarbonation of the energy sector.
- The Kyoto Protocol encourages carbon trading between countries. This effectively places a tax on carbon emissions, increasing the cost of power generation from fossil fuels. This is likely to further improve the relative economics of nuclear power generation.
- The UIC notes that: "In the context of the Kyoto Protocol, a carbon cost of at least one US cent per kWh needs to be factored for coal generation, and at least half that for gas (on the basis of various proposals and European Union Emissions Trading Scheme transactions). This would effectively increase costs by 20 to 30 percent". Nuclear energy has extremely low cost for carbon emissions.
- The nuclear reactors currently operating are estimated to avoid 2.5 billion tonnes of carbon dioxide emissions on an annual basis.

- Every 22 tonnes of uranium used (26 t uranium oxide) saves one million tonnes of carbon dioxide emissions relative to coal.
- This is clearly illustrated in Figure 17 – Nuclear Power and CO_2 Emissions which shows that countries with a higher proportional share of nuclear energy are the lowest emitters of greenhouse gases.

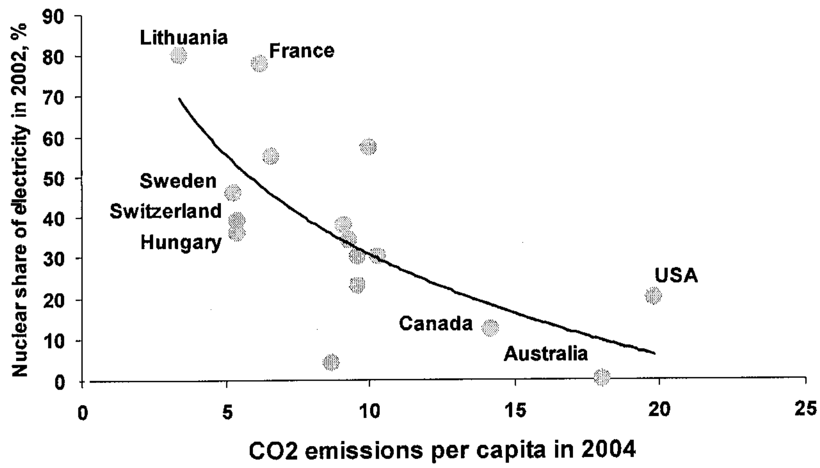

Figure 17 – Nuclear Power and CO_2 Emissions

- Australia's reliance on coal and gas for energy means that its performance in such comparisons is poor. Although the development of a uranium industry does not lead to the development of a nuclear power industry in Australia and hence local reductions in emissions, the growth of uranium exports will contribute to global greenhouse gas and CO_2 emissions reductions.

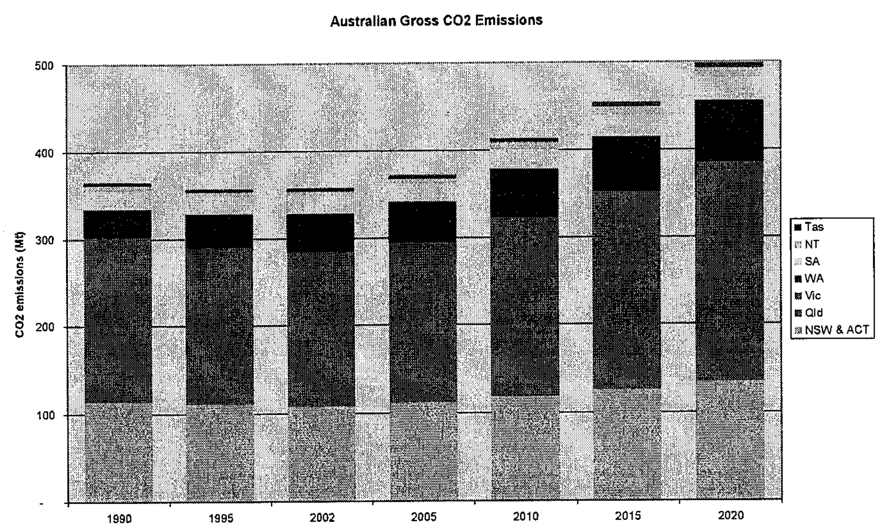

Figure 18 –CO_2 Emissions by State for Australia (Australian Energy National and State Projections to 2019-20, ABARE, August 2004)

- The largest growth in emissions per capita is in Western Australia and the Northern Territory, where some of the richest uranium deposits are located.

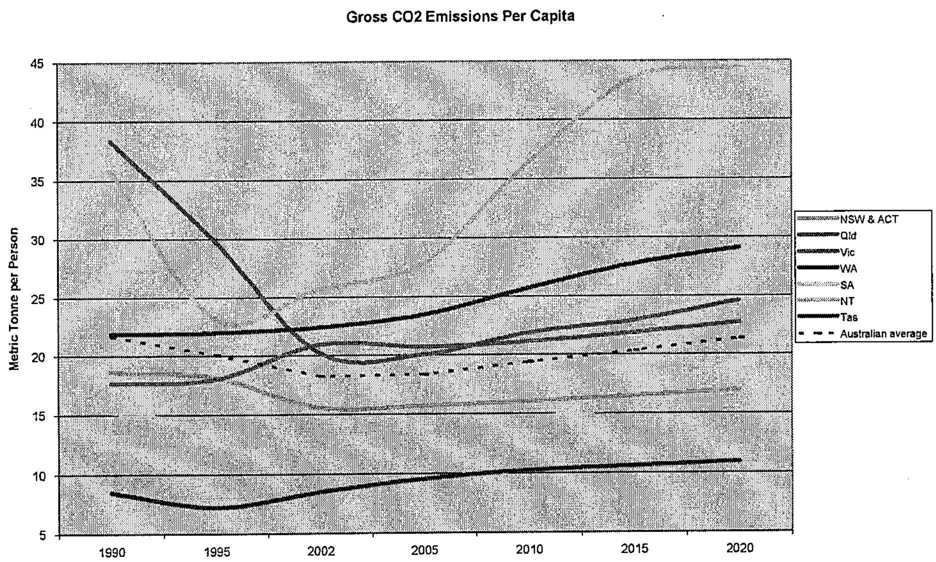

Figure 19 –CO_2 Change in Emissions per capita by State for Australia (Australian Energy National and State Projections to 2019-20, ABARE, August 2004)

Renewable energies are also part of the solution to the environmental concerns of CO_2 and greenhouse emissions.

However, they are not capable of providing the large base load capacity required for modern industrial societies.

As such, nuclear energy is the most important energy source to be developed along side renewable forms.

Impact of Renewable Energy Sources

- Demand for uranium will also be impacted by the growth of renewable forms of energy..
- As highlighted earlier, there are a range of estimates of energy demand, and where this demand will be met from. In almost any scenario, the world's reliance on non-fossil fuels, including renewable energy sources, will increase if energy usage behaviour is not changed.
- The US Department of Energy defines renewable energy as energy obtained from sources that are essentially inexhaustible (unlike, for example, the fossil fuels, of which there is a finite supply).
- Sources of renewable energy include wood, waste, geothermal, wind, photovoltaic and solar thermal energy, and are in line with an overall strategy of sustainable development.
- The International Energy Outlook 2004 projects that in 2025 renewable energy sources will remain at 8 percent of total world energy consumption, indicating little change from 2001[1] (refer Figures 20 and 21).

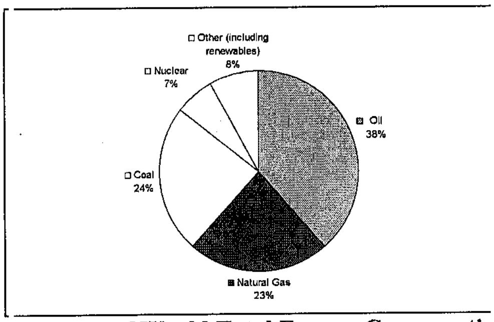

Figure 20 – Source of World Total Energy Consumption in 2001[1]

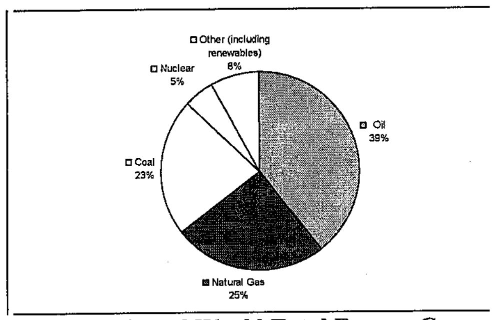

Figure 21 – Source of Projected World Total Energy Consumption in 2025[1]

- There are however varying opinions on how large a role renewable energy resources will play in the future.

- Exxon Mobil, consistent with the International Energy Outlook 2004, forecasts that in 2030 at least one third of worldwide energy will be generated from oil, due to the continued reliance on internal-combustion engines, and the volume of non-hydrocarbon energy will increase.

- Figure 22 details Exxon Mobil's forecast growth in non-hydrocarbon energy of approximately 40 percent from 2005 to 2030. Although the rate of increase is greatest for wind and solar energy, it is biomass, nuclear and hydro energy which are expected to provide the largest volumes of non-hydrocarbon energy in 2030[19].

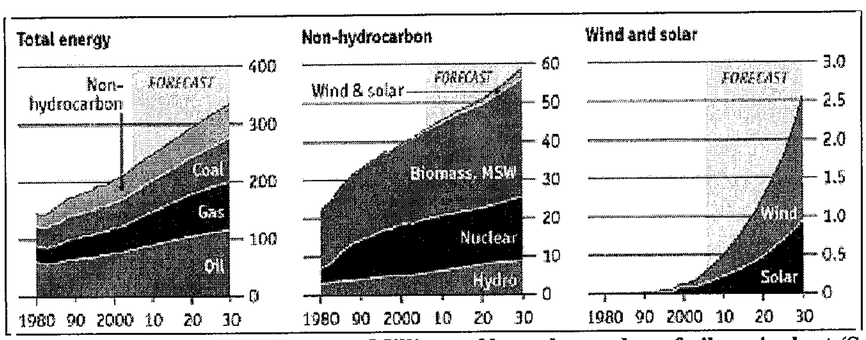

Figure 22 - Worldwide Energy Sources, Millions of barrels per day of oil equivalent (Source: Exxon Mobil)[3]

- Conversely, the European Renewable Energy Council (EREC), made up of major renewable energy suppliers, have indicated that by 2040 a share of renewable energy of between 27 percent to 50 percent of worldwide energy supply is possible[20]. EREC note that this is a very optimistic prediction, and given the various limits on renewable energy supply, this appears a debatable claim by an industry backed group. This is backed up by current experience in Germany, referred to in this submission..

- The greater share of 50 percent is assumed to be achievable if significant and contentious policy measures, such as the following, are implemented in the majority of countries worldwide:
  - Implementation of the Kyoto protocol or similar initiatives
  - Internalisation of external costs for conventional energy supply
  - Ending subsidies to conventional, polluting energy sources
  - Additional measures on the international level for climate protection
  - Promotion of and commitment to renewable energy sources

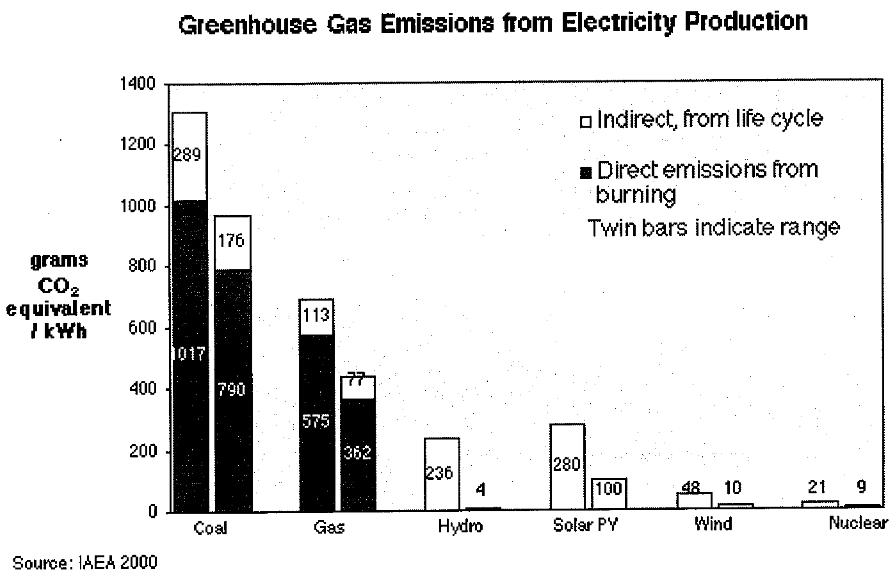

Figure 23 – Greenhouse Gas Emissions from Electricity Production (Source: IAEA 2000 - UIC)

- It is commonly assumed that developed countries will be able to meet part of their energy demand from renewable sources, with the most common acceptable sources of renewable energy being solar, wind, hydro, biomass or thermal.

- Increased reliance on hydrogen is also projected. However as hydrogen is only a carrier and not an energy source, quantities of hydrogen must be produced from a suitable energy source, such as solar or wind.

Limitation of Renewable Energy Sources

- Although the debate surrounds the proportion of world energy consumption which will be supplied by renewable energy sources in the future, there is general acceptance that it will not be possible to meet all future energy demands from renewable energy sources without resolving the significant technical challenges that currently exist.

- To develop systems in which the majority of energy is sourced from renewables, provision must be made for large fluctuations in energy production and for the need to store large quantities of energy. These problems make a significant difference to the viability of renewables due to the impact on efficiencies and costs.

- Although renewable energy sources are required to complement other energy sources, the following points indicate that it will not be possible to derive sufficient electricity or liquid fuels from renewable sources to sustain all of the present high per capita rates of consumption, let alone additional growth requirements.

  - Large fluctuations in energy production, for example variability and intermittency of wind energy or limited solar energy efficiency caused by winter solar incidence or night time.

  - Need to store energy to cope with timing inconsistencies of supply and demand, for example storage of solar energy for night use. Large storage volumes are required to store significant quantities of energy.

  - Significant loss factors during the process, including on transmission, inversion from DC to AC current and conversion for storage.

  - Many potential locations from where renewable energy, such as wind, hydro and thermal, may be sourced are significant distances from power grids making transport difficult and expensive.

  - Infrastructure requirements are expensive to install and maintain.

  - Low efficiency rates, for example solar energy generated compared to actual energy falling on solar panels.

  - Current technology requires large amounts of land to house infrastructure.

  - Difficult to extend the use of renewables on a large scale unless significant government policies are implemented, e.g. reducing carbon-emitting energy sources on the environment and subsidies.

  - Renewable energy is not expected to compete economically with fossil fuels in the mid-term forecasts.

  - The limitations of wind power are clearly demonstrated by Germany which now has over 17,000 wind turbines with capacity exceeding 14,350MW – the largest installed wind capacity in the world. In 2003, the turbines provided just 4 percent of Germany's demand for electricity.

  - As pointed out by E.ON Netz GmbH [21] the operator of the central electricity transport grid, periods of maximum demand often coincide with periods of minimum wind power (i.e. summer heatwaves). E.ON estimate that 80 percent back-up power (ostensively nuclear or carbon-based) is required to meet demand at all times: wind power reduces fuel consumption but does not remove the need for conventional base-load power sources.

Section Four
Current structure and regulatory environment of the uranium mining sector

Commonwealth, State and Territory Government policy and legislation is not aligned and does not provide a positive framework to develop the uranium industry.

A safe, productive and valuable industry can be developed when these various forms of Government work together to ensure a transparent and efficient method to licence and regulate the development of major projects.

Australian Government Policies

- The regulation of the uranium industry is extensive and has developed over the last 20 years.
- In 1983 the federal Labour government introduced the "three mines policy", restricting uranium production to the three sites already being mined: Ranger, Nabarlek and Olympic Dam. This policy was abandoned when the Coalition government was elected in March 1996.
- The current Australian government's policy is to develop the export potential of Australia's uranium industry by allowing mining and export of uranium under strict international agreements designed to prevent nuclear proliferation.
- The export of uranium is tightly controlled by international regulations. The Commonwealth Government controls all exports from Australia through its licensing process.
- Australian uranium goes only to countries that undertake to use it solely for peaceful purposes. Many of these countries have insufficient supplies of coal or hydroelectricity or choose to use nuclear energy because it is more economical and it reduces atmospheric pollution.
- The States and Territories control the licencing of uranium mining, and have a wide range of policies on the development of uranium mining.
- The lack of alignment between State and Federal policies is the greatest impediment to the industry's development.
- The Western Australian State Government has a policy of opposing uranium mining. The South Australian and Northern Territory governments permit mining.
- In early March, 2005 South Australia's Labour Premier Mike Rann called for the federal Labour Party to review its policy on uranium mining, as South Australia seeks to expand uranium mining, notably at Olympic Dam. This review has been encouraged by federal Labour MP Peter Garrett.
- It is important that current and future legislative and regulatory requirements maintain the highest possible standards of occupational and public safety and environmental protection.
- Nova Energy supports the positions proposed by the UIC Submission:
  - The industry would encourage the Committee to take into account the long experience of State (particularly South Australian) authorities, in regulating uranium mining and associated activities, including radiation protection. While there have been environmental and safety incidents, no adverse health or environmental effects have been demonstrated. One indicator of industry performance in relation to occupational health and safety is radiation exposure to mine and process plant workers. Such exposure is extensively monitored and regulated. The outcomes demonstrate that the industry has minimised exposures to levels well below those stipulated by international limits. Any radiation

exposures to the public as a result of the industry's activities are also kept well below these limits and are clearly insignificant.

- The industry would also urge governments at all levels to ensure that they do not impose reporting requirements on the industry that mitigate against public understanding of industry impacts. For example, some operations are required to publicly report spills that have no environmental or safety significance. Such reporting can lead to unnecessary public concern or misrepresentation of operational impacts. If corresponding requirements were placed on other industries handling hazardous materials there would be an outcry. The right of the public to be informed about matters that can affect safety or the environment is acknowledged but this needs to be balanced with the right of the industry to have its reputation protected from exaggerated or misleading public comment about its operations.

- The industry recognises the need to take action itself to encourage greater public understanding of its activities and its impacts. To this end, industry participants are considering the enhancement of a program of public education and information to augment work already being undertaken in this respect.

Many anti-nuclear groups raise issues which influence public policy decisions that are often emotive rather than fact based.

Nova Energy believes it is very important for the Committee to address these issues in its process to provide a fact based rational discussion for the Australian community.

Anti-uranium/nuclear policies

- Anti-nuclear groups and some political parties continue to assert strong objections to the mining and use of uranium and its by-products.

- Some of these concerns are legitimate and as such they are acknowledged by the international community, and authoritative bodies such as the IAEA have been formed to mitigate specific risks.

- Other concerns appear to be emotive rather than rational and may, deliberately or otherwise, engender community fear and distrust of uranium mining and nuclear power. This in turn influences political policy. Nova Energy believes it is very important for the Committee to address these issues in its process to provide a fact based discussion for the Australian community.

- Typical assertions by anti-nuclear groups and factual responses are listed below.

Anti-nuclear assertion 1 : Uranium mining is "dirty and unsafe"

  - The mining of any commodity in Australia is controlled by well established state and federal regulations.

  - Major uranium mines in Australia have ISO14001 certification, meaning that they operate within the world's highest safety and environmental standards.

  - Uranium mines are typically smaller than and less disruptive to the environment than bulk commodity mines (ie coal and iron ore).

  - Tailings facilities are constructed in accordance with strict design criteria and any leaks are monitored and controlled.

- Calcrete-hosted uranium deposits (of the time that Nova wishes to develop) are located close to the surface and tailings would have considerably lower radiation levels than the natural background levels of the deposits.

- Workers in uranium mines are monitored in accordance with radiological health standards to ensure that cumulative radiation exposure does not exceed safe levels.

Anti-nuclear assertion 2 : Nuclear energy is unsafe

- Nuclear reactors have now provided electricity to global communities for over 50 years, accumulating 11,500 reactors years.

- Injury and fatality rates are amongst the lowest in all industries.

- Early, relatively unsafe reactor designs (such as the Chernobyl type) are being modified or phased out. For example, to gain acceptance into the European Union, Bulgaria shut down its Kozloduy 1 & 2 reactors and Lithuania has agreed to shut down its Ignalia 1 reactor[4].

- These are expected to be replaced by new reactors compliant with global safety standards. New reactor designs such as the Pebble Bed Reactor are inherently safe even in the event of cooling failures.

Anti-nuclear assertion 3 : Nuclear power is expensive compared to other power sources

- Nuclear energy is competitive with other energy sources, but unlike coal-fired power stations, incorporates the cost of waste management into its overall cost. In contrast the disposal of CO_2 into the earth's atmosphere is essentially "free".

Anti-nuclear assertion 4 : There are considerable CO_2 emissions in the total nuclear cycle

- Carbon-based fuels are used in the mining, concentration and shipment of uranium, and in the construction of nuclear plants.

- Processing may use electricity derived from hydrocarbon-burning power facilities, depending on the location of the processing plant.

- Detailed studies from Japan, Sweden and Finland show that 6-26g of CO_2 is generated per nuclear kWhr. The equivalent figures for coal is 894-975g CO_2, and for wind power, 5.5-29g CO_2. [22].

Anti-nuclear assertion 5 : Nuclear waste cannot be safely transported or stored and poses a long term threat to the environment

- There are well established procedures for storing, shielding and transporting nuclear waste materials. The volume of these materials is relatively small and there are numerous remote, geologically stable locations that could act as long term repositories.

- The approval of such sites is a political rather than technical issue. Radiation levels of high grade wastes fall to that of natural uranium ores within 600 years – meaning that over time, underground nuclear wastes represent no greater hazard than a naturally occurring uranium deposits.

- Other forms of toxic industrial waste (containing mercury, arsenic and lead for example) do not degrade over time and represent a far greater containment problem for society.

Anti-nuclear assertion 6 : Energy conservation reduces the need for nuclear power

- Even if western countries reduce per capita power consumption through power conservation technologies, power demand in developing economies (particularly China and India) will continue to escalate.

- This demand is driven by the expansion of manufacturing industries, transport systems, lighting, hospitals, schools and other urban utilities, powered urban dwellings and increased usage of domestic items such as washing machines, televisions and refrigerators.

- Energy conservation strategies will have limited impact on the massive scale of development in these countries.

Anti-nuclear assertion 7 : Renewable energy is a viable alternative to nuclear energy

- Modern industrialised societies require permanent large-scale base-load power.

- This is currently provided by coal, oil and gas power plants, nuclear reactors and in some countries, hydroelectricity.

- Renewable sources such as wind and solar are intermittent and diffuse and provide only "top-up" supply to base-load systems. German experience demonstrates that even if installed wind power capacity was massively expanded to equal total electricity demand, 80 percent back-up power from conventional sources would still be required.

Anti-nuclear assertion 8 : More reactors will increase the risk of nuclear weapons proliferation

- Australian uranium is sold under the strict condition that it is used for electricity generation. The greater the production from western countries such as Australia and Canada, the greater the degree of control on its usage.

- Uranium used in nuclear reactors is enriched to 3.5-5 percent U-235. Highly specialised knowledge and technology is required to upgrade uranium to military specifications (90 percent U-235).

- There is no record of any uranium supplied for electricity generation being diverted and upgraded to weapons specifications. Plutonium obtained from reprocessing is not suitable for nuclear weapons.

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[9] Assuming an exchange rate of A$1 equal to between US$0.73 and US$0.76.
[10] Sales revenue has been used for all multiplier calculations as it would be difficult to determine the capital and operating expenditure required for each uranium operation.
[11] Multipliers for the Australian non-ferrous metal ores industry. ABS: 1996-1997 Multipliers for the 106 industries, Input-Output Sectors.
[12] This section has been prepared using information and facts contained on the Uranium Information Centre's website (www.uic.com.au).
[13] Becquerel is a measure of the amount of radioactive material which allows comparison between the typical radioactivity of some natural and other materials. A Becquerel is one atomic decay per second. Examples of radioactive materials: 1 kg of Australian uranium ore equals 500,000 Bq; 1 kg of uranium equals 25 million Bq; 1 kg of low level radioactive waste equals 1 million Bq.
[14] The half-life is the time taken for half of the atoms of a radioactive substance to decay, eg the half-life for U-238 is 4.47 billion years.
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[20] Australian National Accounts, State Accounts Australian 2003-04; Australian Bureau of Statistics Total factor income is equivalent to Gross Domestic Product less taxes plus subsidies on production and imports.
[21] Wind Power Report 2004. E.ON Netz GmbH. (Entry in Limitation of Renewables).