MINERALS COUNCIL OF AUSTRALIA

SUBMISSION ON
URANIUM AND NUCLEAR POWER
SENATE SELECT COMMITTEE ON FUEL AND ENERGY

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Overview

Tackling the national and global energy policy challenge will involve charting a careful balance between two potentially competing imperatives – securing future energy supply and reducing greenhouse gas emissions to minimise the impact of climate change.

First, continued global economic growth and modernisation will require access to affordable and reliable energy supplies. As the global economy continues to expand, industrialising economies, particularly in the Asia Pacific region, will require steady increases in energy supplies. Potential interruptions or threats to the secure, steady supply of energy raises the prospect of conflicts between nations involved in a contest for scarce energy supplies.

Second, the challenge of climate change posed by emissions from fossil fuels demands that nations work together to develop and adopt low emission energy technologies. The imperative therefore, both for Australia and other nations, will be to develop a diverse mix of energy sources to ensure that energy supplies are available to meet global demand while reducing greenhouse gas emissions and reducing the potential for dangerous climate change.

To meet these challenges, the Australian Government should remove remaining obstacles to the development of Australia's considerable uranium resources. Given the demonstrated safety and environmental performance of existing mines, the MCA does not consider there is any justification for restricting the establishment of further uranium mines in Australia.

An effective response to the twin challenges of energy security and managing climate change will also require the development and deployment of the full range of power generation technologies. There is no plausible justification for artificial restrictions on nuclear power provided it is safe, reliable, cost-competitive, and environmentally sustainable. There needs to be a rational reconsideration of the current prohibition on nuclear energy as a form of low emission power generation in Australia.

PART 1: BUILDING AUSTRALIA'S ENERGY SUPPLY CAPACITY

Australia's uranium endowment is substantial and cost-competitive...

Australia has the largest proportion of Economic Demonstrated Resources (EDR) of uranium in the world (38%), highlighting the strategic importance of Australia's uranium resources. EDR is a measure of the resources that are established, analytically demonstrated or assumed with reasonable certainty to be profitable for extraction or production under defined investment assumptions. Classifying a mineral resource as EDR reflects a high degree of certainty as to the size and quality of the resource and its economic viability. The international equivalent to EDR is Reasonably Assured Resources or RAR.

Australia's RAR of uranium, those that can be recovered at costs of up to $US80/kgU, have been estimated by Geoscience Australia to be 1,163,000 tonnes U (December 2008). This is an increase of 18 per cent over the previous year, due largely to revised resource estimates for Olympic Dam and Four Mile in South Australia and Ranger 3 in the Northern Territory. Canada and Kazakhstan have the second largest RARs of uranium each with around one third of Australia's RAR.

The total identified resources of Australian uranium (RAR and Inferred Resources) recoverable at costs less than $US80/kgU is 1,612,000 tonnes U, representing 33% of the world total.

A map indicating Australia's current uranium resources, mines and deposits is at Figure 1. Although 50 uranium deposits have been identified nationally, around 96% of Australia's total uranium resources in RAR are within six deposits:

- Olympic Dam in South Australia (the world's largest deposit);
- Ranger, Jabiluka and Koongarra in the Alligator Rivers region of the Northern Territory; and
- Kintyre and Yeelirrie in Western Australia.

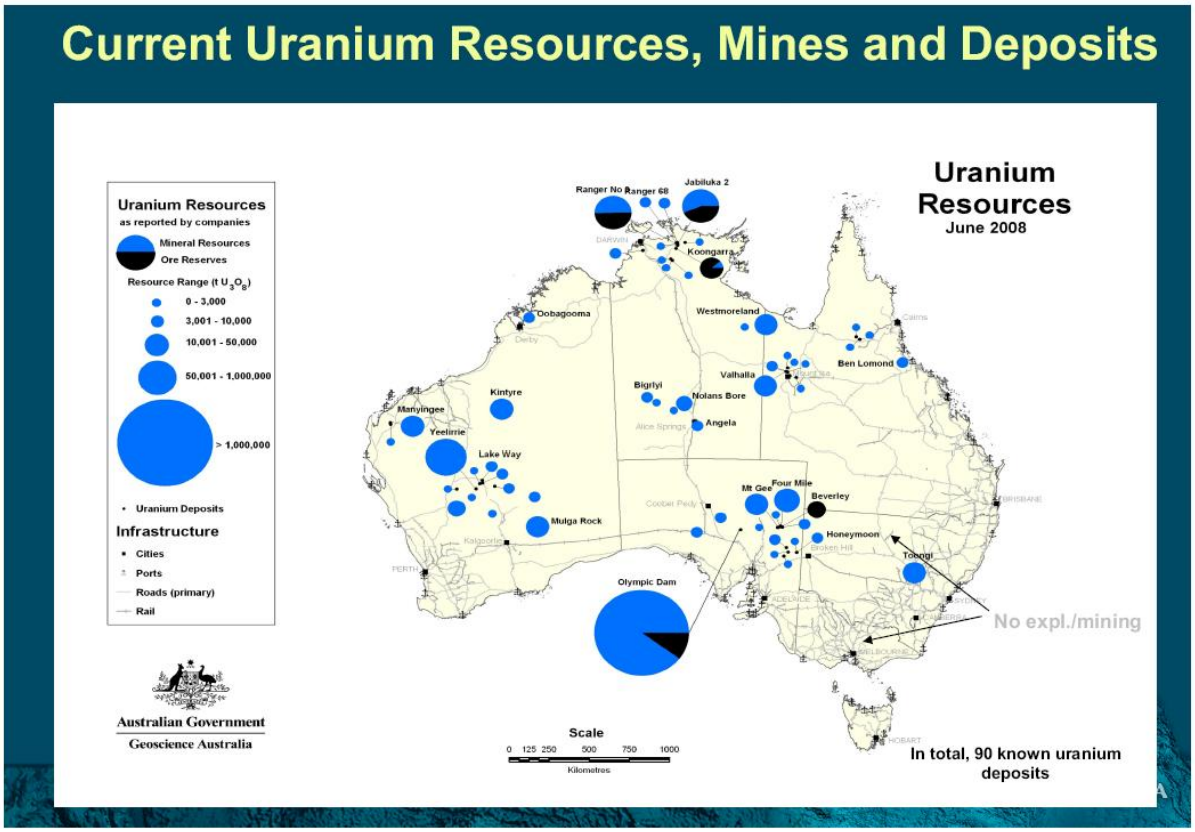
Currently, uranium mining occurs only in the Northern Territory and in South Australia. While Western Australia has recently changed its policy and will now allow uranium mining, the states of Queensland and Victoria have prohibited certain nuclear activities within their jurisdiction, including uranium mining. In Victoria this prohibition is legislated.

While there are currently only three operating uranium mines (Ranger, Olympic Dam and Beverley(South Australia)), environmental approval under the Environment Protection and Biodiversity Conservation (EPBC) ACT has been granted for two additional mines (Honeymoon and Four Mile) both in South Australia.

EPBC Act referrals still under consideration include Yeelirrie (Western Australia) and expansions at both Olympic Dam and Ranger.
Australia's uranium resources are not only the world's largest, but also the lowest-cost. In fact, nearly all (99 per cent) of Australia's 1,163,000 tonnes of RAR of uranium are recoverable at less than US$40/kg U. The spot price at 13 July 2009 was $US129/kgU ($US50/lb U_3O_8).

Australia currently produces uranium solely for export, with 10,707 tonnes of yellowcake sold to thirteen countries in 2008. Australia's uranium exports in 2008 were in excess of 20% of the world's annual production (44,019 tonnes U or 51,910 t U3O8), although annual world demand is in the order of 70,000 tonnes U. Figure 2 highlights the gap between primary production and commercial demand. The difference continues to be met by secondary sources of supply such as Russian and US Department of Energy stockpiles, reprocessed uranium and mixed oxide (uranium and plutonium) fuels, and Low Enriched Uranium produced by diluting Russian High Enriched Uranium (weapons grade uranium).

Figure 1



Source: McKay, Lambert, Carson, Australia's Uranium 2009 – Exploration, Resources and Production in an International Context, AusIMM International Uranium Conference, 10-11 June 2009, Darwin

Australia hosts the largest uranium resources, but is only the third largest producer...

In 2008, Australian yellowcake (U_3O_8) production totalled 9,944 t from the three operating mines, Ranger (5342 t), Olympic Dam (3943 t) and Beverley (659 t). Despite having the world's largest uranium resources, Australia's share of world production declined to 19.2% relegating Australia to third largest producer behind Canada (20%) and Kazakhstan (19.4%). This is because world demand and production has been increasing steadily in recent years (6% annual increase in production), and higher growth rates are predicted in the next few years. Other key uranium producing countries (and their share of world production) were Namibia (10%), Russia (8%), Uzbekistan ((5%), USA (3%) and Ukraine (2%).

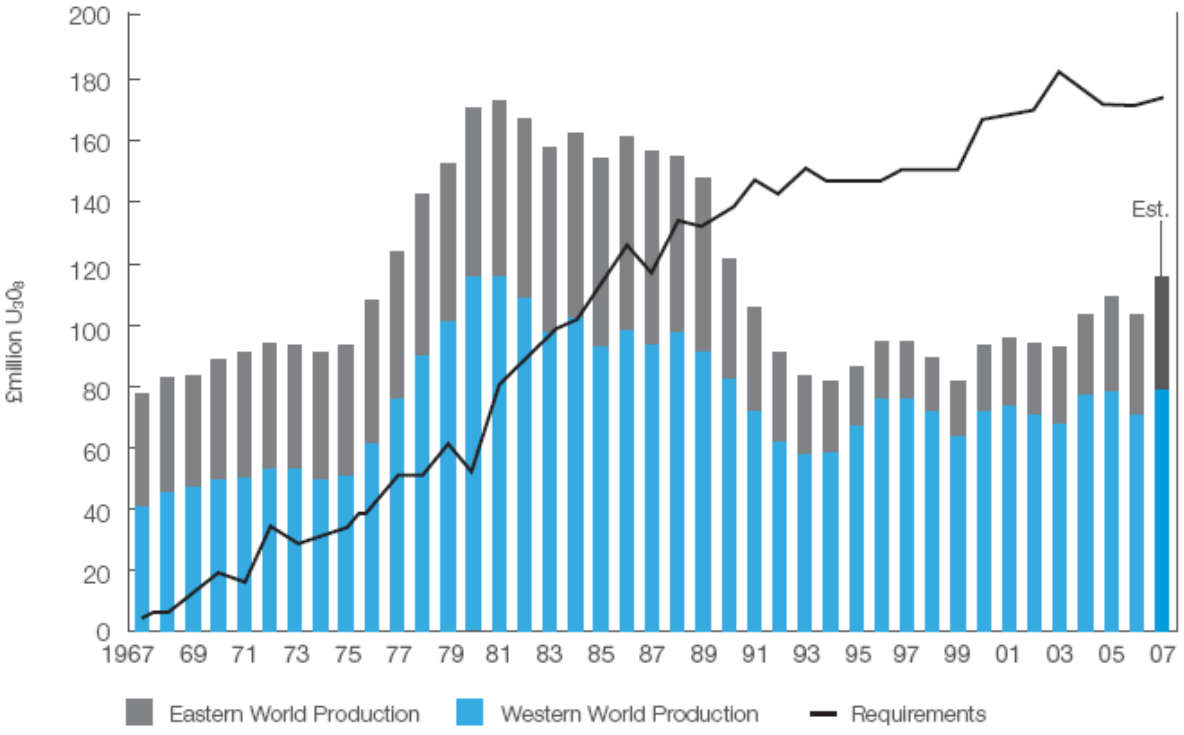
That 50 potential uranium deposits have already been identified, and that Australia is still underexplored for uranium underscores the significant potential for increases in Australian uranium production to meet burgeoning world demand. Australia is uniquely positioned to take advantage of the opportunity to increase its share of global supply. To artificially restrict Australia's uranium production is to deny Australians the opportunity to realise socio-economic benefits from legitimate exploitation of its natural resource endowment.

The greatest potential for production growth in the short term remains Olympic Dam, the largest uranium deposit in the world with reserves of 2.3 million tonnes of yellowcake. By comparison, all other uranium mines in the world top ten uranium deposits have reserves in the order of 250,000 tonnes yellowcake.

With demand increasing, there is substantial potential for growth...

Australia's potential was confirmed in the 2008 report *Outlook for the Uranium Industry* commissioned by the Australian Uranium Association. The Report indicated Australia's uranium industry has the potential to increase uranium exports to between 28,500 and 37,000 tonnes per annum by 2030, positioning Australia to contribute to the projected continuing increase in demand for uranium that a revitalised global nuclear power industry will generate.

Figure 2: Primary Production Compared to Commercial Demand



Source: UxC Consulting Company, 2007, www.uxc.com [January 2008], Roswell.

Planned Australian productive capacity to 2015 is indicated in Figure 3.

Expanding Australia's uranium industry has the potential to deliver socio-economic and environmental benefits to both Australia and the globe. On the basis of conservative scenarios, Australia's GDP could potentially increase between $14.2 billion and $17.4 billion in net present value terms to 2030, while avoiding globally between about 11 and 15 billion tonnes of greenhouse gas emissions in the period from 2008 to 2030. In a constrained supply future, in which WA and Queensland were not allowed to mine, Australia would export 28,500 tonnes by 2030 and the average annual Mt of CO_2 avoided between 2008 and 2030 would be 859[1], almost ten times Australia's CO_2 emissions reduction requirement by 2010 to meet its Kyoto target.

To take full advantage of Australia's endowment, unjustified regulatory obstacles should be removed...

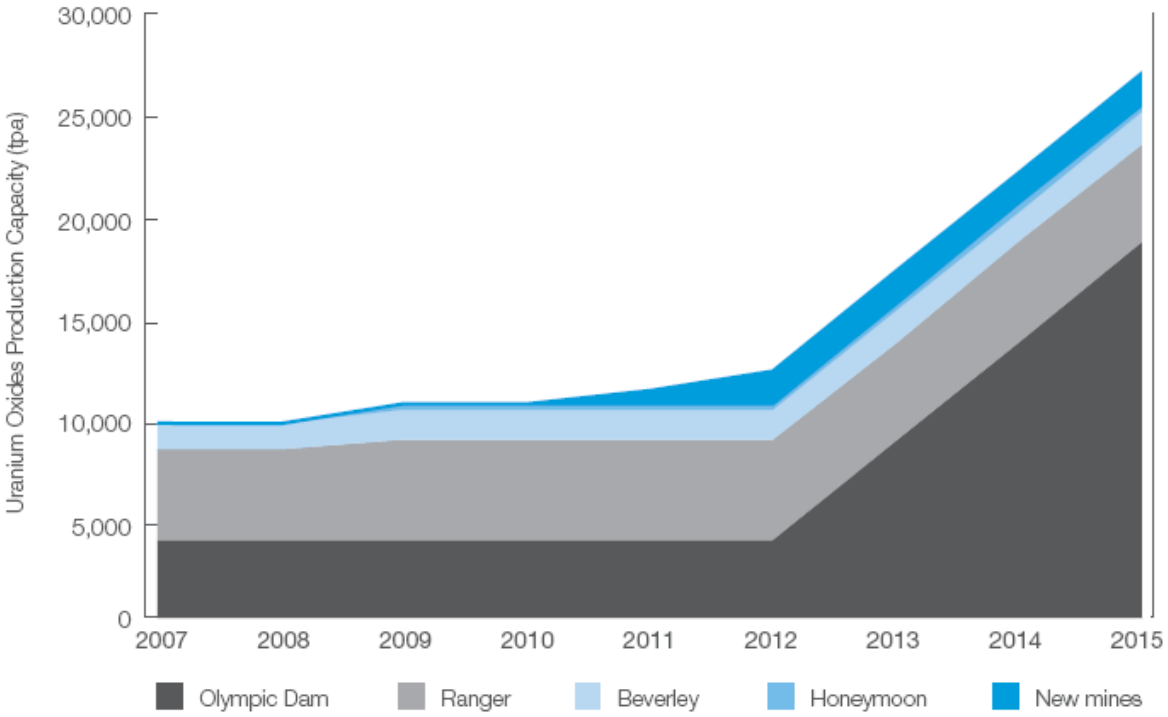
There is no uniform national regulatory approach to the current operation of uranium mining in Australia. The industry is subject to a differing array of cumbersome and duplicative Australian Government, State and Northern Territory laws and regulations governing mining and exploration permits and rights, safety and health, environmental issues and Native Title land rights. It is also subject to export controls and Australia's safeguards policies, which are administered by the Australian Government.

The complex issues relating to uranium mining and nuclear power have been the subject of three major reports in recent years:

- The Uranium Mining, Processing and Nuclear Energy Review (UMPNER) Inquiry chaired by Dr Ziggy Switkowski;
- The Uranium Industry Framework (UIF) Steering Committee Report undertaken jointly by industry and government; and
- The HOR Standing Committee on Industry and Resources Inquiry into Developing Australia's Non-Fossil Fuel Energy Industry

[1] Outlook for the Uranium Industry, Deloitte Insight Economics, April 2008

Figure 3: Planned Australian Productive Capacity to 2015



Source: Australian Bureau of Agricultural and Resource Economics, *ABARE's List of Major Minerals and Energy Projects*, October 2007, available at www.abare.gov.au

These reports highlighted, *inter alia*:

- the importance of removing unnecessary constraints impeding the expansion of uranium mining, such as overlapping and cumbersome regulations relating to the mining and transport of uranium ore;
- the need to identify skills and training requirements to address existing gaps and support a possible expanded nuclear energy industry

The Government subsequently committed to continuing the work of the UIF, in particular, on the removal of the impediments to growth of the Australian uranium industry identified in the Switkowski and UIF Reports. In addressing the Switkowski and UIF recommendations, the focus has been on regulation (including royalties), transport, skills and Indigenous engagement.

Key achievements to date include:

- an independent review on regulatory efficiency in uranium mining (currently awaiting a Government response);
- introduction of legislation for a uranium royalty regime in the Northern Territory;
- completion of a mapping model and information leaflet on the safe transport of uranium nationally and internationally;
- a definitive paper on the reporting of In Situ Leaching deposits under the Joint Ore Reserves Code (JORC);
- publication of a revised Radiation Workers Handbook.
- development of high level principles for Indigenous engagement;

Ongoing activities include:

- implementation of the *Review of Regulatory Efficiency in Uranium Mining* recommendations;
- launch of an Australian Radiation Dose Register (by September 2009);
- overcoming the delay and denial of uranium shipments both nationally and internationally;
- development of competencies for radiation safety training within a national framework; and
- finalisation of a DVD to provide information on radiation and other uranium issues to Indigenous communities, so they can make informed decisions.

The work of the UIF is critical in underpinning the expansion of the Australian uranium mining industry, and is expected to influence those state governments that continue to prohibit the mining of uranium within their jurisdiction.

On the basis of the demonstrated safety and environmental performance of existing mines and the rigor in Australia's regulatory arrangements and safeguards policies, the MCA considers there is no justification for restricting the establishment of further uranium mines in Australia.

Key elements of a reform agenda...

To be internationally competitive, the uranium industry in Australia needs an operating environment conducive to investment, growth and profitability and founded on sound policy principles:

- national consistency in regulatory arrangements and their administrative interpretation governing the exploration, mining, and transport of Australian uranium;
- a regulatory approach which adopts the concept of "minimum effective regulation"; and
- uranium stewardship approaches to apply to mining operations, production and transport of uranium oxide "yellowcake" concentrate and management of radioactive materials in the form of tailings produced from those operations.

The *Review of Regulatory Efficiency in Uranium Mining (December 2008)* jointly commissioned by the Commonwealth, South Australia and Northern Territory Governments made 17 recommendations for reform across 10 areas including land access, streamlining environmental approvals, incident reporting, stakeholder consultation, addressing transport impediments and transferring ownership of uranium in the Northern Territory to the NT Government.

Of critical importance to achieving an efficient regulatory regime for uranium mining are the following recommendations made by the *Regulatory Efficiency Review*:

- that the Commonwealth undertake negotiations with State governments directed towards the repeal of any legislation and elimination of regulations and policies that prevent exploration for, and mining of, uranium.
- subject to the provision of clear evidence that the actual risks involved in uranium mining are no greater than for other mines such as copper, gold or iron ore, the EPBC Act should be amended to remove the uranium mining and milling element of the nuclear trigger.
- that the Commonwealth continue to develop protocols and working arrangements with relevant States and Territories so that a single assessment process for proposed new or expanded uranium mines is undertaken where the EPBC Act is triggered.
- that the Commonwealth work through the CoAG process to ensure that uranium exporters have reasonable access to transport infrastructure (port facilities, rail and road) as they require, based on their commercial judgements.

The MCA supports the early implementation of all the Report's recommendations as the most effective way of streamlining regulation of uranium mining in Australia, while being consistent with the Government's policy to only allow uranium mining in accordance with world's leading practice.

An effective safeguards regime is essential...

For almost 50 years, nuclear power has been used to produce electricity and over this period, Australia has played an important international role in seeking international approaches to ensure uranium is only used for peaceful purposes.

Australia's uranium is sold strictly in accordance with Australia's nuclear safeguards policy, which ensures Australian uranium is not diverted from civil to military use. Australia is a party to the Non Proliferation Treaty (NPT) as a non-nuclear weapons state. Australia's safeguards agreement under the NPT came into force in 1974 and Australia was the first country to bring in to force the Additional Protocol in relation to the NPT – in 1997. Australia has also concluded bilateral safeguards agreements covering all customer countries for Australian uranium, most recently with China to allow for the export of Australian uranium for nuclear power purposes to the world's fastest growing economy.

The MCA supports Australia's Uranium Export Policy:

- Australian uranium exports require an approval from the Minister for Resources, Energy and Tourism and may only be exported for peaceful, non-explosive purposes under Australia's network of bilateral safeguards agreements, which provide for
    - coverage of uranium exports by International Atomic Energy Agency (IAEA) safeguards from the time they leave Australia (ownership may be retained by an Australian exporter for some time after the product is physically exported);
    - continuation of coverage by IAEA safeguards for the full life of the material or until it is legitimately removed from safeguards;
    - fallback safeguards for Australia in the event that IAEA safeguards no longer apply for any reason;
    - prior Australian consent for any transfer of Australian Obligated Nuclear Material (AONM) to a third party, for any enrichment beyond 20 per cent of uranium-235 and for reprocessing of AONM; and
    - physical security requirements for their transport (both on land and at sea);
- Australia retains the right to be selective as to the countries with which it is prepared to conclude safeguards arrangements;
- non-nuclear weapon state customer countries must, at a minimum, be a party to the Nuclear Non-proliferation Treaty (NPT) and accept full-scope IAEA safeguards applying to all their nuclear related activities. As of May 2005 they must also have the Additional Protocol to their safeguards agreement with the IAEA in full effect;
- nuclear weapon state customer countries must provide an assurance that AONM will not be diverted to non-peaceful or explosive uses and accept coverage of AONM by IAEA safeguards; and
- commercial contracts for the export of Australian uranium should include a clause noting that the contract is subject to the relevant bilateral safeguards arrangement.

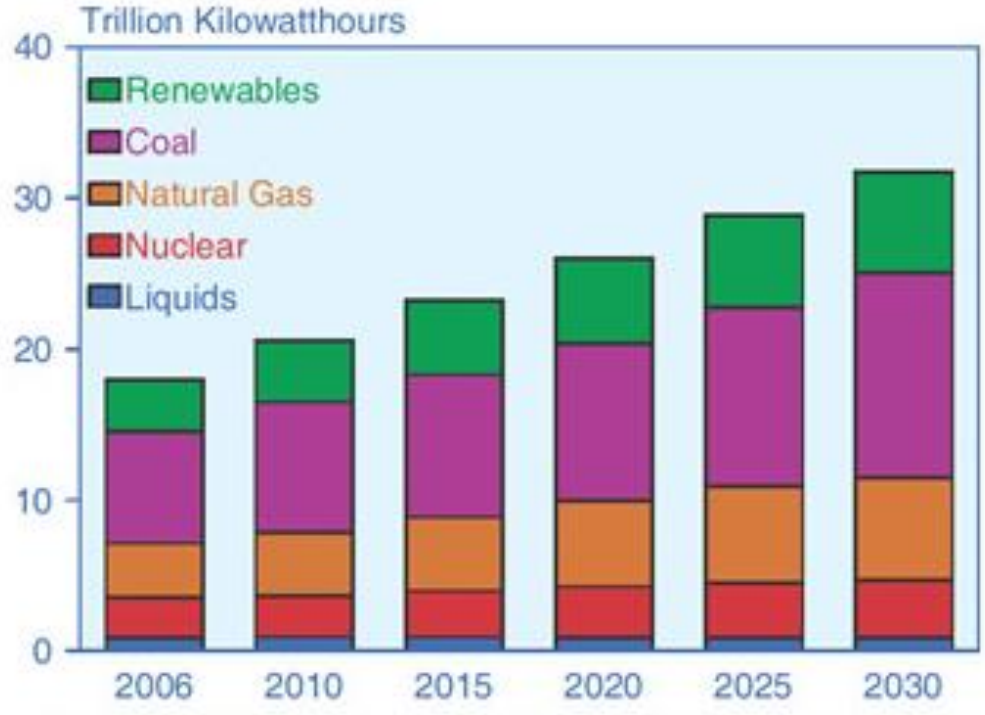
The MCA supports exports of uranium to countries that meet the Australian Government's and the International Atomic Energy Agency's stringent safeguard requirements.

PART 2: A DOMESTIC NUCLEAR ENERGY SECTOR

World energy demand is forecast to grow strongly by 2030...

World energy consumption has been rising steadily for many decades in most nations, and further increases in demand for energy are expected as the world's population continues to grow. According to the International Energy Agency forecasts, energy demand will grow by an average 1.7 per cent per year to 2030, requiring the expansion of all existing sources of energy supply.

Figure 4: World Electricity Generation by Fuel – 2006 to 2030



Source: (US) Energy Information Administration.

Nuclear energy already plays a significant role in global power generation, and is expanding...

Nuclear energy is an established part of the world's electricity mix providing over 15 per cent of the world's total electricity from nearly 440 nuclear power stations operating in 30 countries.

The expansion of nuclear energy has substantial international momentum. In addition to the existing capacity, 47 are under construction, a further 133 are planned, and there are proposals for an additional 282 plants.[2] As the International Energy Agency observed in its 2008 *World Energy Outlook*:

> Over the past few years a large number of countries have expressed renewed interest in building nuclear power plants, driven by concerns over energy security, surging fossil fuel prices and rising CO_2 emissions.[3]

China in particular, is undergoing a significant expansion of its nuclear energy capacity. China currently has 11 nuclear reactors in operation, a further 14 under construction and an additional 115 either planned or proposed.[4]
There is also substantial interest in an expansion of nuclear energy in the United States where 104 nuclear plants currently provide about 18 per cent of the USA's power needs. A recent (US) Congressional Research Service report noted that:

> The improved performance of existing reactors, the possibility of carbon dioxide controls, and the relatively high cost of natural gas — the favoured fuel for new power plants for most of the past 15 years — have prompted

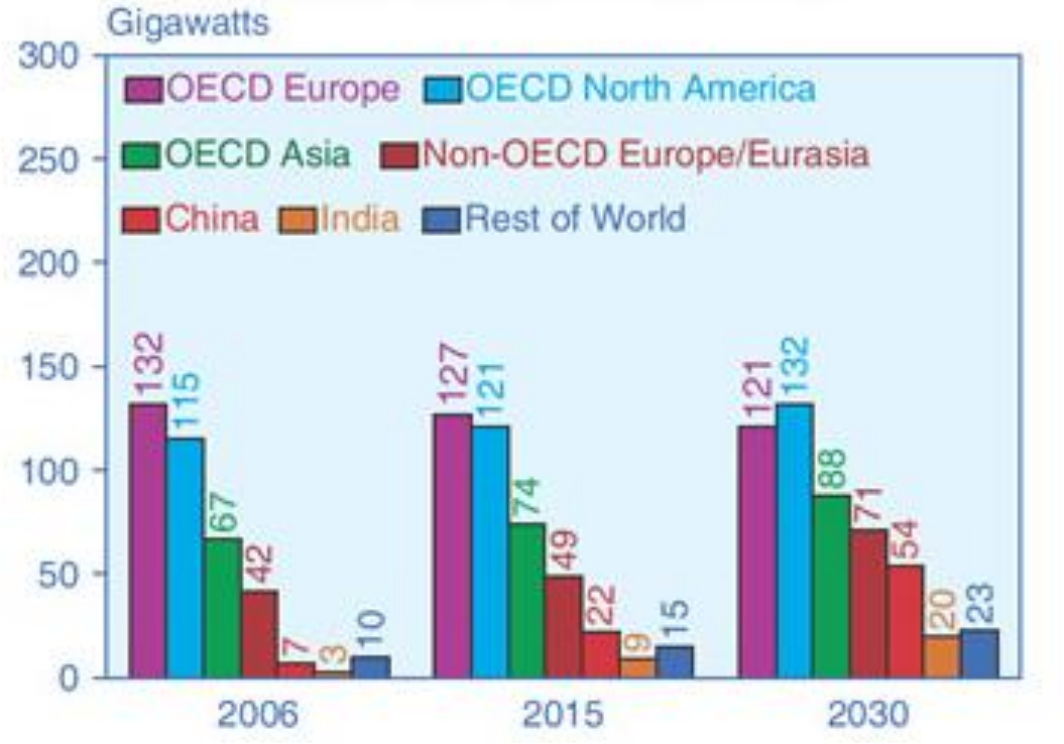
[2] World Nuclear Association, *World Nuclear Power Reactors 2008-09 and Uranium Requirements*, 1 July 2009.

[3] International Energy Agency, *World Energy Outlook*, 2008. p.147

[4] Ibid.

renewed electric industry consideration of the feasibility of building new reactors. Electric utilities and other firms have announced plans to apply for combined construction permits and operating licenses (COLs) for about 30 reactors.[5]

Figure 5: World Nuclear Energy Generating Capacity – 2006, 2015 and 2030



Source: (US) Energy Information Administration

Nuclear energy is one of the cleanest and most cost-competitive energy sources available...

Nuclear power does not generate direct greenhouse gas emissions. Research undertaken for the Uranium Mining, Processing and Nuclear Energy Review (UMPNER Review) noted that taking into account full life cycle contributions, GHG emissions from nuclear power are roughly comparable to renewable energy sources. This analysis is supported by other research. The Intergovernmental Panel on Climate Change (IPCC) Working Group III''s contribution to Fourth Assessment Report published in October 2007 concluded that greenhouse gas emissions from nuclear energy are similar to those for renewable energy sources, concluding that nuclear power is 'an effective GHG mitigation option'.[6] Similarly, a recent White Paper on Nuclear Power published by the British Government concluded that the CO_2 emissions from nuclear power stations are low, and about the same as those of wind-generated electricity.[7]

The UK White Paper also concluded that nuclear power is 'the most cost-effective low carbon generation technology', noting that nuclear power has an estimated abatement cost of 0.3 UK Sterling/tCO2 compared with onshore wind power with an estimated abatement cost of 50 UK Sterling/t CO2.[8]

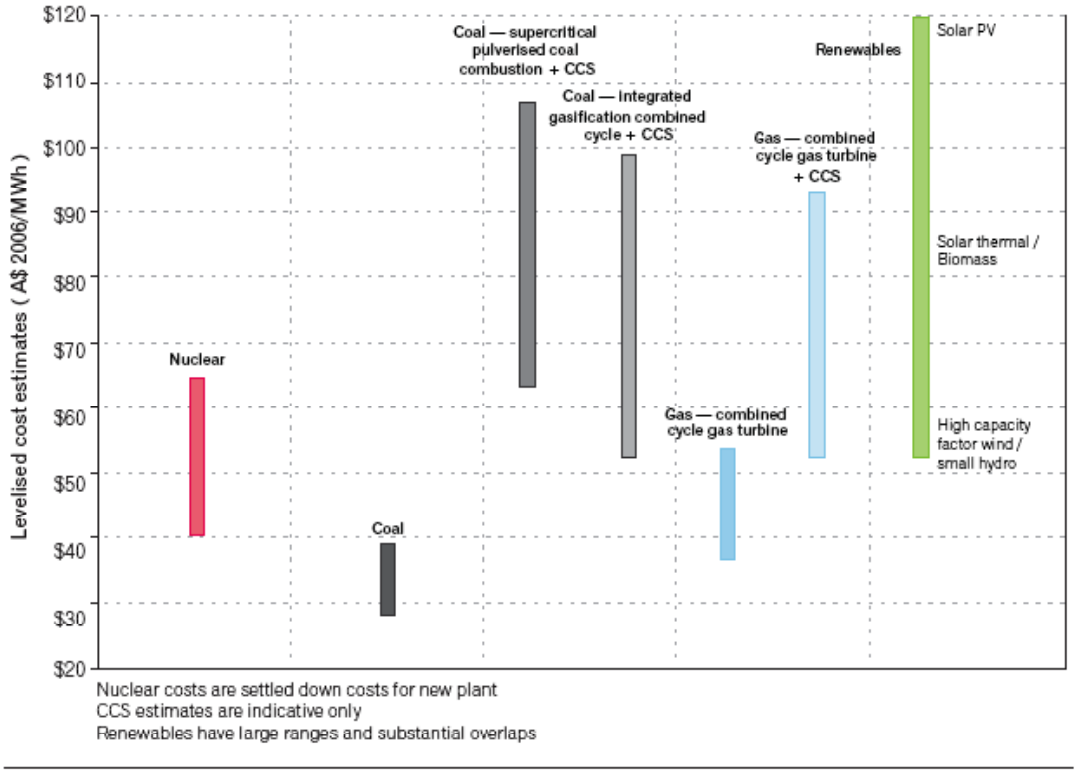
5 Mark Holt, 'Nuclear Energy Policy', *CRS Report for Congress*, September 2, 2008.

6 B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds), Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

7 United Kingdom Department for Business, Enterprise and Regulatory Reform, *Meeting the Energy Challenge: A White Paper on Nuclear Power*, January 2008.

8 Ibid, p.65.

Figure 6: Cost ranges for various power generation technologies



MWh = megawatt hours; PV = photovoltaic

Source: EPRI study[74]

Source: Uranium Mining, Processing and Nuclear Energy Review, 2006.

Nuclear energy will reduce the cost of meeting Australia's long-term GHG emissions reduction targets...

A genuine solution to climate change will require the development and deployment of a range of low emission generation technologies including clean coal technologies (CCS), renewable energy and nuclear power. There should be no artificial restrictions on low emissions power generation technologies provided they are safe, reliable, cost-competitive, and environmentally sustainable.

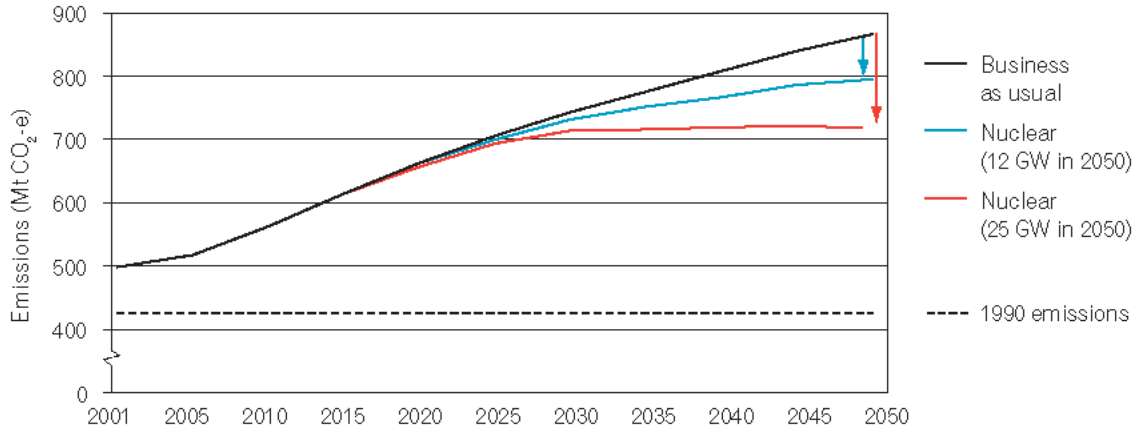
According to the UMPNER Review, the potential contribution of nuclear energy to GHG emissions reductions is considerable – between 8 and 17 per cent by 2050 (see Figure 7).[9] Separate analysis by CRA International found that the cost of reducing emissions from the electricity sector will be significantly lower if nuclear technology is available. Under one scenario, in which emissions were reduced to 25 per cent below 1990 levels by 2050, adding nuclear to the technology mix reduced total capital expenditure between 2010 and 2050 by 15 per cent (from $150 billion to $128 billion).

The development of nuclear energy will also contribute substantially to Australia's long term energy security, not least because Australia has substantial resources of uranium – 33 per cent of the world's 'Reasonably Assured Resources and Inferred Resources'.[10]

9 Commonwealth of Australia, *Uranium Mining, Processing and Nuclear Energy – Opportunities for Australia*?, Report to the Prime Minister by the Uranium Mining, Processing and Nuclear Energy Taskforce, December 2006.

10 Commonwealth of Australia, *Uranium Mining, Processing and Nuclear Energy – Opportunities for Australia*?, Report to the Prime Minister by the Uranium Mining, Processing and Nuclear Energy Taskforce, December 2006.

Figure 7: Potential to reduce Australia's emissions — illustrative scenarios to 2050



Source: UMPNER

Safety would be a primary consideration in developing a domestic nuclear energy capacity...

Operational safety, treatment of nuclear waste, and nuclear non-proliferation are fundamental community concerns associated with nuclear power.

The nuclear industry has a good health and safety performance, with more than 12,700 cumulative reactor-years of commercial operation in 30 countries, since the introduction of nuclear power. Ionising radiation and its health effects are well understood, and measures to protect workers and the public are based on well established international safety standards.

In the history of civil nuclear power, there have been only two major reactor accidents - Three Mile Island and Chernobyl. Chernobyl has been the only civilian nuclear accident involving major releases of radioactive elements.

Despite the excellent safety performance of the current mix of reactor designs now operating, advances in reactor design have been substantial. The development of "inherently safe" new generation reactors is well advanced and includes:

- **Fast Breeder Reactors** (FBRs) which can utilise depleted uranium (converting "fertile" Uranium 238 to fissile Plutonium 239), as well as burning long-lived radioactive waste (actinides) from conventional power reactors;
- **High Temperature Gas Cooled Reactors**, such as the Pebble Bed Modular Reactor, which have greatly improved thermal efficiency (around 45%), higher fuel burn-up rates and excellent proliferation resistance, as the fission products are contained within the fuel particles (unlike conventional fuel pellets);
- **Accelerator Driven Systems** (ADS), an alternative to FBRs, which can burn actinide waste from conventional reactors, and breed fissile material from fertile thorium or depleted uranium. The ADS uses a high energy accelerator to generate sufficient neutrons to sustain the nuclear reaction, but when switched off, the chain reaction stops conferring obvious safety benefits.

Further improvements are in prospect through the collaboration of leading nuclear technology nations in developing the next generation of nuclear technology systems. Key objectives will be to ensure high safety and reliability, minimisation and management of nuclear waste and increased assurance against diversion or theft of weapons-usable material.

The Australian Government should reconsider the blanket prohibition of nuclear energy...

In summary, an effective response to the twin challenges of energy security and climate change will require the development and deployment of the full range of power generation technologies. There is no plausible justification for artificial restrictions on low emissions power generation technologies – including nuclear energy - provided they are safe, reliable, cost-competitive, and environmentally sustainable. It is time for a rational reconsideration of the current prohibition on nuclear energy as a form of power generation in Australia. The MCA looks forward to playing a constructive role in this debate.