

Discussion Paper - Uranium

Let them eat Yellow Cake – Is it Ethical to invest in Uranium mining?

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Table of Contents

Summary Position	3
1. Introduction	3
2. Technology – Boom, Gloom, For Whom?	3
3. Ethical Framework	5
3.1 Commands/Principles	5
3.2 Empirical Debate over Consequences of Renewed Investment in Nuclear Energy	5
4. Conclusions	10
Appendix A – CCSRI Paper	11
Brief factors for consideration in making an Ethical Investment Decision	11
Appendix B – Uranium Mining In Australia – Facts (CCSRI)	13
Ownership of Uranium Mines in Australia	13
World Reserves	13
Mines in Australia	14
Appendix C – Issues and Factors to consider in relation to investing in uranium mining (CCSRI)	15
Human Impact	15
Appendix 4 - Ethical Questions to consider and debate regarding Uranium (CCSRI)	16
Bibliography	17
Document History	18

Summary Position

Underweight companies that mine uranium in the Fund's screening process.

1. Introduction

I remember well a visit to the Palace of Versailles just outside Paris. After our eyes became glazed over by the glory of the gilt and white walls we ventured outside to the mock peasants village Marie Antoinette had built beside an idyllic little lake. This gave Marie the utopian view of the peasant life that she voiced when protesters cried for food – 'Let them eat cake!' she said. It wasn't as callous as it sounds, just calamitously out of touch with reality.

At the same time a Scottish gardener at Versailles kept a diary. He wrote about many things in his personal and working life but nothing happening in society or politics – except one reference to an angry crowd trampling his tulips in the Tuileries gardens. That was the day of the French Revolution! Christians too can be like that gardener, so intent on their personal and working lives or even their theological TULIPs, that they miss the larger picture.

The first episode reminds us, as Scripture does, that we always need to consider what are the real implications of our investments for the world's poor, including its energy poor. It is important to remember this when some are asking us, or them, the poor, to eat yellow cake, seeing uranium as a utopian technological fix for the world's acute energy and greenhouse/climate change problems. On the other hand, we need to be careful of doomsday apocalyptic scenarios, that prevent us taking effective action in the present. We need to be wary of both the boom and gloom views of technologies like nuclear energy and those who want a simple black and white command – 'you shall not' or 'you shall – use uranium'. This paper seeks to think theologically about technology and the environment in the context of our relationship with God, humanity and the earth, before applying Christian Super's 3 Cs ethical investment framework to the issue and finally raising some key questions that the draft CCSRI paper raises.

2. Technology – Boom, Gloom, For Whom?

Scripture presents us with an ethical framework based on right relationships with God, humanity and the earth, in that order (Gen 12:1-3). The Great Commandment in Mt 22 summarises the first two and the two halves of the Ten Commandments (Ex 20) and the Creation Commission for humans made in the image of God to have royal and responsible dominion or rule over the earth, summarises the last. Stewardship or responsible dominion is to be exercised in the context of shalom or the flourishing and reconciling of all three relationships.

How does technology in general, then nuclear energy in particular, fit in the context of these three relationships? Technological development is an expression of *Responsible Dominion* as my friend Ian Hore-Lacy, Director of Public Communications for the World Nuclear Association entitles his 2006 book. Ian and I would agree on the fundamental and neglected importance of the creation or dominion mandate. It is a reflection of our royal role within God's Kingdom. As Craig Bartholomewz and Mike Goheen entitle a chapter in their *The Drama of Scripture*, 'The Kingdom of God begins with Creation'.

Creation does not mean mere nature or 'we've gotta get ourselves back to the Garden' as the Woodstock generation sang. No, the bible begins with a garden and ends with a city containing a garden. Creation has within it a mandate to develop it, in imitation of God's dominion, into a culture reflecting those three right relationships. Technology is part of that culture.

However, this is where people disagree. Some stress the creation mandate of Gen 1:26-26 and relish the rule God has given us and stress our god-likeness; we are to 'play god' (see Andrew Dutney's *Playing God*). Others however stress Gen 3:5 and warn against us playing God, usurping God's unlimited knowledge of good and evil. Both are biblical and are important to hold in tension. The trick is to discern when we cross the line from one to the other; this applies to both biotechnology and nuclear technology.

Having dominion gives permission to name or exercise appropriate authority (under God) over creation. This is the foundation of scientific and technological knowledge. But the ecologically embarrassing and strenuous language of 'subduing the earth' (Gen 1:28) is really about agriculture, and is used in one place of treading grapes into wine, a technological change. This needs to be balanced by the Gen 2 emphasis on 'keeping' and preserving the Garden, just as God blesses and keeps us.

After the Fall the creation mandate continues but the blessing of work, dominion and technology has a cancer-like curse attached to it. Gen 4 lists new technologies/techniques like iron and music-making but also notes that the new technology of iron enables Lamech to wreak almost unlimited vengeance (Gen 4:21-24). Cain founds the first city, but as a retreat from God and the consequences of his own violence. Such technologically aided violence brings the judgement of the flood or the undoing of creation upon us. After a new start with Noah and the rainbow the creation mandate is adapted to a corrupt, violent world (Gen 9:1-7). But the new technology/technique of wine-making 'to make the heart merry', is still ambiguous, leading to Noah's drunkenness. In Gen 11 the technique of brick-making enables the building of the Tower of Babel, beyond the judgment of the flood and in search of a name or fame for themselves. Fortunately, as Luther says, God carves the crooked wood and makes it straight. In a form of divine alchemy he turns the city into the new Jerusalem.

All of this biblical theology should caution us against either one-sided or simplistic boom or gloom views of technology. Instead, as Jacques Ellul shows in his trilogy (*The Technological Society, The Technological System, The Technological Bluff*) we need to see technology like nuclear technology, not as a neutral piece of hardware, subject to use and abuse, but as part of a technique, the social software of a system, somewhere between Babylon and the new Jerusalem, moving toward one or the other. Rather than Boom or Gloom, the fallacy of technological neutrality, we need to always be asking 'for whom', who benefits by this technological development and who does it cost?

A boom view of nuclear technology in my view sees it as a quick technological fix to cover over the consequences of our economically reductionist, materialistic and ecologically and climatically destructive actions and profligate energy use (causing a probable 1-3 degree rise in temperatures in the next century. We (i.e. the West) can keep on growing in a God-like way. In terms of our character or virtue ethics this is the key Greek vice of hubris or Augustine's pride.

The gloom view of nuclear technology in my view fills the gap left by our abandonment of the doctrine of original sin (located in our connection to Adam) with a superstitious view of some substances, like uranium or nuclear energy, as evil in themselves. This seems to deny the original and ongoing goodness of creation. In looking at the possibility of investing in uranium mining or nuclear technologies we need to be aware of the ethical ambiguity – the blessing and curse – of all technologies/techniques – in the twilight between Babel and the New Jerusalem. But we need to be particularly beware of those technologies that promise to bring in the new Jerusalem.

3. Ethical Framework

3.1 Commands/Principles

The above ambiguity is exacerbated by the fact that there is no clear biblical command re uranium or nuclear energy. They weren't even aware of it. Certainly there is a command not to kill or murder which I with many would argue was violated with the deaths of hundreds of thousands from the atomic bombs dropped at Hiroshima and Nagasaki by the western powers.

However, it is too simplistic to equate uranium mining or nuclear power generation with atomic bombs. Nonetheless, in terms of the process, there are links that cannot be ignored. 'Four of the nine nuclear weapons states got their weapons from power reactors in India, Pakistan, South Africa and Israel'. And the possibility of rogue states such as North Korea and Iran doing the same is not comforting. This is worsened by the growing non-participation and enforcement of the Nuclear Non-Proliferation Treaty. It is made even worse by the miniaturisation of nuclear weapons into brief-case sized bombs and the prospect of terrorists getting hold of them.

Behind negative biblical commands like 'you shall not murder' however, lie broader positive principles such as those of our framework concerning stewardship of life and health and the earth. Nuclear energy needs to be evaluated in the light of such principles.

These biblical principles of stewardship have to be taken very seriously given the international consensus of scientists that in Paul Fraser's words (chief scientist of CSIRO Marine and Atmospheric Division) 'We are in line for the carbon dioxide future that we hope to avoid, a one to three-degree rise in temperature over the next century'. This will have consequences from considerable to catastrophic for low-lying lands, crops, tropical diseases, and especially for the poor.

3.2 Empirical Debate over Consequences of Renewed Investment in Nuclear Energy

The question then is what to do about it? After many years of stagnation in nuclear power generation due to safety, environmental and political considerations global warming, renewed interest in nuclear power and our uranium by the global giants of China and India and the 30% increase in the price of uranium has put it back on the agenda, even amongst some renowned environmentalists.

Most prominent is James Lovelock, the founder of the Gaia (a Greek mother goddess of nature) hypothesis that the world has a limited capacity to deal with pollution and will wreak vengeance if that is flouted. In his view nuclear energy is the only way to buy time to come up with longer-term solutions to prevent ecological catastrophe such as melting of the polar ice-caps etc.

Dr Clarence J. Hardy in his pro-nuclear paper to The Australian Ethical Investments Association (3/5/06) notes four perceived problems re nuclear energy with the following answers followed by responses from the same conference - 'Can Nuclear Energy really reduce CO2 emissions' by environmentalist Dr Mark Diesendorf Institute of Environmental Studies, Uni. of NSW and others.

A) Safety of reactors

'nuclear energy clearly has the lowest rate [of fatalities] compared with fossil fuels and hydro: averaged fatalities per Terrawatt year of energy are: LPG – 3280; hydro-883; oil - 418; coal – 342; gas – 85; nuclear- 8.

At Chernobyl 31 died immediately but many hundreds or thousands more arguably over the long-term. But 6000 coalminers died in China in 2005, 112 in the Australian coal industry in 25 years, 2900 Australian industrial deaths in 2005. 'A perspective is needed on safety'.

A comparative perspective is helpful but we need to take account of direct and immediate and indirect and long-term deaths. Having just written about Corporate Psychopathology, Limited Vision and the James Hardie Case' concerning asbestos (see Hynd, Barr and Preece, 'Theology in a Third Voice, ATF Press, 2006 ch. 10) and seen documentaries on the anniversary of Chernobyl and its ongoing legacy, and even today's (15/6/06) news of a reactor leak at Lucas Heights, I am still cautious re nuclear energy.

The statistics of relative indifference to human life in China (e.g. re coal mining) and India (cf Bhopal) and the relative lack of accountability and transparency in non or less democratic countries comparable in some ways to the former USSR demands caution.

While nuclear accidents have low probability they have potentially catastrophic consequences. The generation IV reactors cited as potentially much safer than current reactors don't yet exist and the US Department of Energy doesn't expect them to enter commercial service for several decades (School of Electrical Engineering and Telecommunications, Uni. of NSW).

To some extent the logic of Hardy's argument is like that of those justifying legalisation of marijuana e.g. we already have alcohol with all its deaths and health effects. Marijuana is better than that so let's legalise it, even though it adds substantially to the statistics for deaths by accident and to physical and mental health problems. Certainly we need to think in terms of comparative body counts but the comparisons need to take into account all the factors and potential factors including c and d below.

B) High capital costs (economics)

This is a half truth. 'Nuclear plants cost more to build than fossil fuel plants but their fuel costs are lower *and their waste costs are internalized into the cost of electricity paid by the user – the AMP ethical investment brief is completely wrong. Reliable published comparisons show the capital costs of windfarms are higher than nuclear plants per kWh delivered.* Nuclear power is therefore economic in many countries today using levelised costs and would be economic in almost all countries if external costs are included, especially the costs of carbon emissions'. Recent Scandinavian sources confirm the economic viability of nuclear energy.

However, as Diesendorf notes, this does not take into account:

- the hidden over-optimistic assumptions about performance (capacity factor);
- the extent of hidden government subsidies required by the industry for R&D, enrichment, insurance liability, wastes (no government or corporation can afford these because of the massive time projections – 10,000 years or more), decommissioning leading to a subsidy levy of 1.2 billion pounds p.a. based on electricity privatisation in UK equivalent to a subsidy of 3p/kWh (A6c/kWh) of nuclear electricity generated. Compare this with the average price of on-shore wind-power in UK currently of 3-4p/kWh:

e.g. the Canadian government's Nuclear Liability Act limits their 22 nuclear reactors' liability to a paltry \$75 million, hardly covering lawyers fees in the event of a major accident. The costs end up being externalised, ie being borne by victims and citizens. The Australian Federal Government's own report estimates it will have to pay insurance bills of up to \$400 million in case of terrorist attacks. Such subsidies and government –private partnerships are fraught with difficulties as we have seen recently regarding various road projects e.g. the Cross-city tunnel. The industry gets the profits and the government insures them against costs;

Further, 'since nukes have high capital cost and low operating cost, nuclear proponents choose unrealistically low interest/discount rate or accounting method that shrinks interest and capital repayments'.

There have been no new nuclear power stations in the US since 1978, initially because of the accident at Three Mile island, subsequently because of poor economics. Nuclear power dramatically increases electricity cost and debilitating debt in every free market country where it exists (Greenpeace Australia pacific)

A pro-nuclear MIT (2003) study estimates new nuclear electricity at US c/6.7c/kwh.

US windpower is currently 4-5 at excellent sites.

The only new western nuclear power station being built is in Finland. Nuclear advocates incorrectly claim it is cost effective under market conditions there. But it is a consortium with 40% government ownership. They do not sell on the open market but only to consortium members.

This entails a very low interest rate compared with the market.

C) Waste management

Anti-nuclear activists view this as the nuclear industry's achilles heel. But the nuclear industry claims [again] that 'management of waste is an advantage compared with fossil fuels. The spent fuel or high level waste may be highly radioactive but it is of relatively small volume and can be contained and disposed of underground both safely and economically. However, fear of radiation and the NIMBY syndrome and mistrust of governments and corporations have delayed this solution. NIMBY is now a major factor stopping windfarms also.

In the past CO2 was not seen as waste. Now it is 'it will entail large additional qdditional costs by the public or government subsidies. CO2 capture and disposal underground is not technically or economically feasible for fossil fuel stations at present.

In Lovelock's words:

'The quantity of nuclear waste is trivial, tiny. No great problem. It stays where it is and that's it. You just think of the carbon dioxide waste. Every year we produce in the world enough carbon dioxide that if you froze it solid to dry ice, it would make a mountain a mile high and 12 miles around the circumference. That is deadly waste and it will kill nearly all of us if we don't stop doing it.' ('I'm Happy to Have Nuclear Waste Buried in my Backyard', James Lovelock interviewed on ABC Lateline, cited in 'Cut & Paste', *The Australian*, 6/6/06, opinion).

Dr Jim Greenof Friends of the earth admits that compared to fossil waste volumes 'spent nuclear waste is tiny – about 200,000 tonnes globally. But that spent nuclear fuel contains enough plutonium to build about 160,000 nuclear weapons'.

Certainly CO2 waste must be dealt with urgently. New clean forms of coal power may be one way. Carbon sequestration underground may be another. But CO2 must be balanced against dUF6 or uranium hexafluoride waste. For every tonne of nuclear fuel there must be 9 tonnes of dUF6 waste. The US alone has 720,000 tonnes in temporary storage unable to be permanently stored at Yucca Mt due to protests. The US Department of Energy describes it as a 'future resource'. But 'the energy and capital cost of changing this poison into something benign makes the nuclear option a loser. Ask yourself, if there was a big buck to be made, would that "resource" still be there after six decades?' (Mining metallurgist Chris Shaw, 'Counting up the true cost of uranium enrichment', <http://www.onlineopinion.com.au/print.asp?article=4514> 29/5/06)

Australia has already faced major problems in disposal of nuclear waste. The ethical position, as Bob Hawke pointed out, is to only export what we're willing to store the waste from. Yet this is extremely problematic politically as is the nuclear energy option unless the storage problem is solved on our own soil. As the signs say 'we don't swim in your toilet so please don't pee in our pool'. If we don't urinate in others' pools neither should we urinate or nucleate in their lands.

D) Risks of proliferation of nuclear weapons and terrorism

James Lovelock says bluntly: 'Nuclear power is nothing about bombs. Modern nuclear reactors are useless for making bombs and the dangers are not real.'

However, Theodore Taylor, leading US nuclear bomb designer said in 1967 'with the spread of peaceful nuclear power, more and more countries have the opportunity to acquire bomb materials'. Dr Victor Galinsky of the US Nuclear Regulatory Commission said in 1977 'it is possible to use ... reactor-grade nuclear plutonium for nuclear warheads at all levels of technical sophistication ... even simple designs can serve as effective, highly powerful weapons'.

Updating this the US Department of Energy in 1997 said 'Fuel-grade and reactor grade [plutonium] can be used to make nuclear weapons'. See www.ccnr.org/Findings_plute.html/.

Despite Lovelock, whose pantheistic philosophy does not have much concern for human life, if there weren't links between nuclear energy and bombs why all the fuss over N. Korea and Iran?

Further, Bob Brown raises the prospect of a dangerous mix of jihadists and nuclear energy stalking Australia's future. Indonesian plans for 12 nuclear reactors in earthquake prone Java or floating reactors from Russia do not ease our anxieties ('Go for Clean and Green not Nuclear Greed, *The Australian*, 29/5/06, 12).

To Hardy's categories I would add

E) Opportunity Cost

opportunity cost in terms of lack of investment in both short-term viable renewable solutions and longer-term alternative, renewable energies

Greenpeace argues that even if global nuclear power doubled by 2050 'greenhouse gas emissions would fall by only about 5%, less than one tenth of the cut required to stabilise atmospheric concentrations of greenhouse gases'.

Van Leeuwen & Smith (2005) www.stormsmith.nl argue that uranium is counterproductive in terms of reducing CO2 emissions:

High-grade ore which contains 0.1% or more of yellowcake:

- Generates energy inputs in several years of operation (lifetime of 30 years);
- Produces CO₂ emissions much less than a gas-fired powerstation;
- But have only several decades of current operation

Low-grade ore which contains 0.01% or less of yellowcake:

- Has substantial energy inputs
- Similar CO₂ emissions to a gas-powered station
- There are vast reserves of low and v. low grade ore impossible to use.

Diesendorf argues that in response proponents of nuclear power:

- Obscure the difference between high and low-grade ores;

- Cite like Hardy a report from Swedish utility Vattenfall, that gets different results for high-grade-ore (This is unpublished and only available in brief summary form.)

Nor is nuclear power a solution for greenhouse pollution associated with the use of oil for transport [primarily], or the destruction of forests. And although new investment would probably prompt more exploration for uranium, a world-wide increase in industry activity could see reserves run out' e.g. a doubling of demand for nuclear power would lead to running out in 25 years.

The ACF's Erwin Jackson sees nuclear energy as 'an opportunity lost for the rest of the economy. 'Every time you discuss this and put money into this it is time and money that is not going into the things we know will cut emissions today'. (John Howard's Power Play, SMH, 10-11/6/06, 26).

These are spelt out in *A Clean Energy Future for Australia* by Saddler, Diesendorf and Denniss (2004). They propose using existing technology with small improvements, maintaining economic growth, emphasising energy efficiency, solar hot water, gas, bioenergy and wind. They project a 78% reduction in CO2 emissions from electricity generation from 2001 to 2040. 'There is a range of renewable energy sources cleaner and greener than nuclear power (School of Electrical Engineering and Telecommunications, Uni. of NSW)

If China and India are the wave of the future Australia should ride, or that the world economy and ecology must account for then we should note:

- China generates 2.3% of electricity from nuclear rising to 6% by 2020
- China's target for renewable energy is 12% by 2020 plus it has large bioenergy potential from existing crop residues
- India already has 5 GW wind power, growing rapidly
- By 2020 wind can supply 12% of world electricity and Denmark expects to get 29% by 2010.
- Sweden is shutting down its reactors, going oil-free and renewable

F) Distraction from Demand Reduction

Ethical advisers at the 3/5/06 Ethical Investment Association Conference were adamant that this was the major blind spot in the current debate. To give two examples: when I lived in LA from 1990-92 everyone used clothes dryers despite near constant sunshine. Similarly in our flat in Sydney, one of 130, everyone has a clothes dryer included free. We have not used and have no intention to use ours. We hang our washing off a line inside our fence. Yet no wonder we are now finding out counter-intuitively that government programs for more high and medium density housing are actually more energy inefficient compared with houses. Part of it is the dryer being used not the Hills Hoist. Further, our houses and flats are badly designed for reducing heat in summer and reducing heat loss in winter.

Nationally, reduced energy use between .5 and 1.5% could save power equal to that generated by up to 5 nuclear power stations. Just converting 80% of Australian electric hot water systems to solar or heat pump systems would be equal to building a nuclear power station (SMH, 10-11/6/06, 26).

Bob Brown argues that 'energy efficiency could free up to 30-50% of current power production for new use.' ('Go for Clean and Green not Nuclear Greed, *The Australian*, 29/5/06, 12).

4. Conclusions

Hardy concludes his case for nuclear energy. ‘The Nuclear industry has a good safety record compared with fossil fuels and hydro power; the industry is economic compared with fossil fuels and renewables in many countries and would be economic in all countries if economic constraints are placed on carbon emissions [which the Australian government is talking about].; nuclear wastes can be captured and disposed of underground safely and economically and the cost is internalised; the risks of proliferation and nuclear terrorism are small and consequences manageable compared with the high risks and consequences for other forms of mass destruction’.

‘Uranium/nuclear power is the only energy source that is currently available that is safe, economic and can provide the base load electricity needed for the world’s increasingly urban population. It is sustainable and ethical. Renewable energy sources cannot provide more than a small proportion of the world’s energy needs for economic and technical reasons.’

‘The ethical dilemma you face in advising your clients is assessing:

Potential problems for nuclear safety, waste management, proliferation and terrorism if nuclear power is expanded – versus

Almost certain problems of global warming and its huge worldwide consequences if we continue to rely on fossil fuels for the world’s increasing energy needs’.

Diesendorf summarises his case against nuclear energy with the following:

- Terrorist attacks on reactor, processing plant or transport inevitable
- Proliferation of nuclear weapons from ‘peaceful’ nuclear energy inevitable
- Poor nuclear economics revealed by competitive markets already in UK
- Rapid program of nuclear construction would produce spike in CO2 emissions
- With current technology and limited high-grade uranium reserves, nuclear energy is not a long term solution to the greenhouse problem

I would add that comforting comparisons between nuclear and coal industries are insufficient. Alternative cleaner and greener renewable forms of energy are necessary and available. The government (see recent 4 Corners) and the investment community should not desert the bed of the coal industry to fall into the bed of the nuclear industry. Other alternatives are available. Nuclear energy is neither a short-term or long-term technological fix.

Appendix A – CCSRI Paper



URANIUM MINING – AN ETHICAL QUANDARY!

DISCLAIMER: This paper is not to be regarded as investment advice and is the opinion of the authors. The information contained within this paper is as accurate as possible but cannot be guaranteed to be without error. The information contained within this paper is for the sole use of CCSRI members and should not be reproduced or distributed in any form.

The quandary most organisations face when considering the possibility of investing in uranium mining stocks is what is the ‘real’ impact of this mining on our communities and how should this frame the criteria upon which we as Christian Investors make wise investment decisions.

Therefore, how do Christian Investors make an informed decision about the positive and negative aspects of investing in uranium mining stocks?

This document has been prepared to provide some ideas on what to consider when making a decision about a contentious investment issue and some background information regarding uranium mining.

CCSRI recognises that the issue of whether to invest in uranium mining stocks has been brought to the forefront with the merger of Western Mining into BHP. This has renewed the debate about uranium and means that serious consideration about a ‘profit with principles’ approach is needed.

CCSRI understands the debate and the positive and negative aspects of investing in uranium mining. Every member must draw their own conclusion regarding this issue, as CCSRI does not profess to understand the in-depth values of our members nor their particular investment criteria and needs. We seek to present information to allow our members to approach their investment decisions and to provoke thought, dialogue and finally a decision.

Brief factors for consideration in making an Ethical Investment Decision

The factors below are very brief points for our members to consider when making decisions. There are professional advisers who can assist in more detailed information regarding this issue

How does my investment fit with my Christian values? Given the risk to benchmark, if divestment was considered, how can we engage with the company to encourage greater stewardship of the resources and potential hazards of use i.e. disposal of waste and proliferation of nuclear weapons?

- To what extent will my investment cause any adverse affect on society or the environment?
- Will my investment enhance either communities or the environment?
- How would my constituents feel about this type of investment?
- Will the investment be positive for future generations?
- Have I examined all aspects of the investment choice?

- Do the risks outweigh the benefits of the investments?
- What are the ethical risks?
- How can any of these risks be mitigated or removed?
- Who should make the decision about this investment? Should it be myself or should I consult others?
- What are the risks of making this investment both financially and ethically?
- How often should I review this investment decision?
- At what point should I revoke my decision about an investment choice?
- Are there other more socially responsible ways to receive an equivalent investment return?

Appendix B – Uranium Mining In Australia – Facts (CCSRI)

Ownership of Uranium Mines in Australia

Untangling the ownership of mines in Australia and what other assets they have may present one of the greatest challenges to the ethical investor.

The 3 Mines currently operating in Australia

Ranger: Energy Resources of Australia Pty Ltd

68.39% - [North Limited](#) , Melbourne (a majority stake in North Ltd has been acquired by [Rio Tinto](#) on 11 August, 2000) *)

10% - Japan Australia Uranium Resources Development Co Ltd. (JAURD; consists of [Kansai Electric Power Co](#) , [Kyushu Electric Power Co](#) , and [Shikoku Electric Power Co](#))

6.45% - [Cameco](#) **)

6.2% - [Uranengesellschaft](#)

1.3% - [COGEMA Australia](#)

0.5% - [OKG AB](#) , Sweden

Figures compiled by WISE Uranium Project

Olympic Dam: [WMC Resources LTD](#)

Beverly: [Heathgate Resources PTY LTD](#)

Rio Tinto a major investor in the Ranger mine is also a 60% shareholder in the Rossing Uranium mine in Namibia a mine that has been embroiled in controversy since the 70's

“Mined by virtual slave labour under brutal conditions, transported in secrecy to foreign countries, processed in unpublicized locations, marked with false labels and shipping orders, owned by a tangle of multinational corporations whose activities are only partially disclosed and used in part to build the nuclear power of an outlaw nation....

The commodity is uranium. It comes from Namibia. It is mined, shipped, processed and sold in direct violation of United Nations resolutions, of a Decree enacted by the United Nations Council for Namibia, the legal administering authority of the Territory, and of an advisory opinion of the International Court of Justice.” United Nations, 1982. 'Plunder of Namibian Uranium'. United Nations, New York, 1982

World Reserves

Known Recoverable Resources of Uranium

	tonnes U	percentage of world
Australia	989,000	28%
Kazakhstan	622,000	18%
Canada	439,000	12%

South Africa	298,000	8%
Namibia	213,000	6%
Russian Fed.	158,000	4%
Brazil	143,000	4%
USA	102,000	3%
Uzbekistan	93,000	3%
World total	3,537,000	

Mines in Australia

There are currently 3 working Uranium mines in Australia:

Ranger and the town of Jabiru are located approx 230Km east of Darwin surrounded by Kakadu National park.

Uranium was discovered in 1969 and the mine started operating in 1980 and Ranger currently produces over 4000 tonnes of Uranium Oxide concentrate per year.

Ranger is mined as an open pit and has a uranium recovery of 91 to 93 %

The ranger 1 ore body was mined out in December 1995 although some ore is still stockpiled.

Mining of the slightly larger Ranger 3 ore body in 1971, ERA have plans to begin mining operations and the trucking of ore to the current processing plant from the Ranger Nth (Jabiluka) or deposit located 20km to the North of the current site.

Olympic Dam and the town of Roxby Downs are located 560km north of Adelaide.

The worlds largest know deposit of Uranium ore is located approx 350m below the arid surface.

Olympic Dam is an underground mine recovering both Copper and Uranium.

Appendix C – Issues and Factors to consider in relation to investing in uranium mining (CCSRI)

Human Impact

Health

Mine Workers:

Uranium mining in Australia has potential to impact on mine workers health in a number of ways, the potential impacts will vary depending on the method of mining being undertaken:

(Australian Mines: Ranger: Open Pit, Olympic Dam; Underground/Bi-product, Beverly: ISL “In Situ Leach”)

Open Pit: For workers at mines such as Ranger exposure to dust or gamma radiation cause the greatest risk to health

Underground: In underground mines such as Olympic Dam inhalation of the progeny of the radioactive gas Radon poses the greatest health risks.

General Public:

The most threat posed from a working mine is through the ingestion of radionuclides (eg uranium or radium) in food or water, or in a rehabilitated site is inhalation of the progeny of the radioactive gas radon, through the inhalation of radioactive dust particles or direct irradiation. Long-term effects may be ground and surface water radionuclides finding their way into animals and plants that grow or feed at the site.

Environment

The following issue in relation to the effects of Green House Gas emissions is a positive impact of uranium on the environment.

Appendix 4 - Ethical Questions to consider and debate regarding Uranium (CCSRI)

Overall Ethical Questions: (Given the current corporate situation, this is particularly relevant to the Australian market)

- Is uranium the right investment for future generations?
- Is it the right investment for long-term shareholder wealth and for responsible investors who seek to reduce harm to the environment and to people?
- Is there a path for engaging with the company to reduce the potential for harm? I.e. meeting with the company and using the ECCR Report as the starting point for discussions on ethical issues, not just uranium. Note Srs of St Joseph are debating the same issue.
- Has the company demonstrated an ability to act sustainably and treat people and their places with integrity and respect in the past and is it a sustainable investment given that it is in a sector that is non renewable?

Other questions for consideration in relation to the Australian marketplace:

- How material are the intangible assets to the value of the BHP Billiton WMC merger?
- In wishing to defend the interests and reputation of the company, what, if any, impacts on BHP Billiton might there be in increasing its exposure to uranium in terms of shareholder value in the long term?
- What might the materiality of public reaction about nuclear energy and uranium issues be for shareholders who invest for the long term and who abide by ethical, environmental and social justice standards?
- Given ethical investor concerns with BHP Billiton' past record and conduct on issues at Ok Tedi, El Cerejon Norte, Gag Island and indigenous community issues what will exposure to new risks entail for long term investors?
- What assurances can be given on the increasing debate about the fact that uranium and disposal of waste is still not safe?
- What risks is the entity exposed to from environmental lobbyists gaining support from activists and companies nationally and overseas in the downstream supply chain in the coming months and years?
- To what extent will the merger process and social impacts, such as job losses, have on the share price of BHP Billiton and is this right?

The following website links provide a valuable resource to gain greater knowledge and understanding of the issues relating to uranium mining:

Summary of Resources Available in Major Deposits and Prospective Mines

<http://www.uic.com.au/pmine.htm>

Former Australian Uranium Mines

<http://www.uic.com.au/fmine.htm>

Uranium Mine Ownership - Australia

<http://www.antenna.nl/wise/uranium/uoaus.html>

Bibliography

Department of Environment and Heritage

<http://www.deh.gov.au/ssd/uranium-mining/>

Ethical Matters

<http://www.ethicalmatters.co.uk/articles.asp?itemID=183>

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