



COMMONWEALTH OF AUSTRALIA

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**HOUSE OF
REPRESENTATIVES**

STANDING COMMITTEE ON INDUSTRY AND RESOURCES

Reference: Developing Australia's non-fossil fuel energy industry

MONDAY, 5 SEPTEMBER 2005

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON INDUSTRY AND RESOURCES

Monday, 5 September 2005

Members: Mr Prosser (*Chair*), Mr Hatton (*Deputy Chair*), Mr Adams, Mrs Bronwyn Bishop, Mr Cadman, Mr Martin Ferguson, Mr Haase, Mr Katter, Miss Jackie Kelly and Mr Tollner

Members in attendance: Mr Cadman, Mr Martin Ferguson, Mr Haase, Mr Hatton, Mr Katter, Miss Jackie Kelly and Mr Prosser

Terms of reference for the inquiry:

To inquire into and report on the development of the non-fossil fuel energy industry in Australia.

The Committee shall commence its inquiry with a case study into the strategic importance of Australia's uranium resources. The case study shall have particular regard to the:

- a) global demand for Australia's uranium resources and associated supply issues;
- b) strategic importance of Australia's uranium resources and any relevant industry developments;
- c) potential implications for global greenhouse gas emission reductions from the further development and export of Australia's uranium resources; and
- d) current structure and regulatory environment of the uranium mining sector (noting the work that has been undertaken by other inquiries and reviews on these issues).

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Committee met at 9.31 am**LAMBERT, Dr Ian Bruce, Acting Chief, Minerals Division, Geoscience Australia****McKAY, Mr Aden Donald, Principal Geologist, Minerals Division, Geoscience Australia**

CHAIR (Mr Prosser)—I am pleased to declare open the third public hearing of the House of Representatives Standing Committee on Industry and Resources for its inquiry into the development of the non-fossil fuel energy industry in Australia. The committee has commenced its inquiry with a case study into the strategic importance of Australia's uranium resources. The inquiry was referred to the committee by the Minister for Industry, Tourism and Resources, the Hon. Ian Macfarlane, on 15 March 2005. I welcome witnesses from Geoscience Australia. Do you have any comments to make on the capacity in which you appear?

Dr Lambert—I lead the group in Geoscience Australia responsible for technical advice on minerals, including uranium.

CHAIR—Thank you for agreeing to give evidence before the public hearing today. Although the committee does not require you to give evidence under oath, I should advise you that the hearing is a formal proceeding of the parliament and remind you that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of the parliament. I also remind you that the committee prefers that all evidence be given in public. However, at any stage you may request that your evidence be given in private and the committee will then consider that request. I now invite you to make an opening statement. I believe then you want to talk through your presentation.

Dr Lambert—I would just like to introduce Geoscience Australia and our roles in relation to uranium. Geoscience Australia is the national geoscience and spatial information agency. We cover a whole lot of matters to do with onshore and offshore Australia. In terms of uranium, we have a number of specific activities. I represent Australia at the uranium group, which is the OECD Nuclear Energy Agency-AIEA group. That group produces each year a 'red book', *Uranium Resources, Production and Demand*, which is the definitive international book on things to do with the availability and the demand for uranium.

We also provide advice to the government when issues arise in relation to exploration and mining for uranium. For example, we had significant input into the technical side of the approval of Beverley and Honeymoon, passing comment on the proposals, and we would expect to do so in the future, given a potential major expansion of Olympic Dam.

I will just mention the uranium group. It brings together 44 different nations, including all of the former Eastern bloc nations. In a spirit of goodwill and cooperation, they provide information on their resources and future demand and their nuclear power programs. It is a very useful source of information on international things to do with uranium. I will leave my opening remarks there and, with the permission of the committee, Aden McKay will go through the overheads that you have in the handout.

Mr McKay—For the presentation, we have prepared a number of slides. Each of these slides is in front of you. As I proceed through this, I will draw your attention to each slide by referring to the name at the top of each slide.

Slides were then shown—

Mr McKay—On page 1, you can see what we hope to cover today in our outline: Australia's uranium resources, Australia's uranium production and a brief overview of exploration and potential and, finally, a few brief words on secondary suppliers of uranium. Across the page is the slide 'Uranium resources—mines and deposits'. This slide shows the location of our uranium deposits. It also shows the relative size of each of the deposits. The black represents ore reserves and the red represents mineral resources. The details for each of these are in the back as part of our submission today. You can see that Olympic Dam is very large—in fact, it is our largest uranium deposit. Also, in the eastern part of South Australia you will see that we have a group of deposits which are sandstone deposits, of which Honeymoon and Beverley are the best known. We have a group of deposits in the Northern Territory at Ranger and Jabiluka. And in Western Australia we have a group of deposits north of Kalgoorlie which are mainly calcrete deposits. The largest one of those is the Yeelirrie deposit.

The next slide is 'Uranium mines and significant deposits'. Just quickly, that shows you where the three operating mines are—they are shown in red. The new project at Honeymoon is in blue, and the other major deposits are shown in green. Before I comment on the next slide, 'Australia's uranium resources', I would like to clarify the issue of reporting uranium resources and the terminology that is associated with that. Uranium resources are reported at two levels of detail. The first is the detail of an individual deposit, and you have seen that already in the previous slide on resources. That is reported according to an Australasian code. The second level of detail is at a national level, and for that we adopt the international classification scheme which is that of the OECD Nuclear Energy Agency and the International Atomic Energy Agency.

Under this scheme, resources are divided into categories which reflect the level of confidence in the estimate provided. You will see terms like 'reasonably assured' and 'inferred'. They are then further subdivided into categories based on cost of production. You will see terms such as '\$US40' and '\$US80'. Referring to the slide: Australia's reasonably assured resources recoverable at costs of less than \$40 total 701,000 tonnes of uranium. This represents 40 per cent of world resources in this category.

Olympic Dam is by far our largest deposit of low-cost uranium. We estimate that it has 499,400 tonnes of uranium in reasonably assured resources at less than \$40. This represents 30 per cent of world resources in this category. Australia's total identified resources amount to just over a million tonnes. This represents 40 per cent of world resources in this category.

The next slide, which shows Australia's uranium resources recoverable at costs of \$40, tabulates resources in each of the states and territories. There is a lot of detail there, but the most important thing to note is that the majority of our resources are in South Australia. In fact, 75 per cent of our uranium resources are in South Australia, 19 per cent are in the Northern Territory and six per cent are in Western Australia.

The next slide, at the top of page 4, 'Uranium resources by country', gives you a very quick view of Australia's dominance in world resources. The vertical axis is thousands of tonnes of uranium resources, and you can see that Australia is by far the leading nation in world resources. The other 10 major countries are listed there.

The next slide is 'Australia's uranium production'. Very briefly, Australia's uranium production for calendar year 2004 amounted to 10,592 tonnes of uranium oxide, which was 22 per cent of world production. Underneath that you can see the production figures for Ranger, Olympic Dam and Beverley. Ranger has 11 per cent of world production and is the world's second largest uranium mine. Olympic Dam has nine per cent of world production, and Beverley has two per cent, but it should be said that Beverley is the world's largest in situ leach uranium mine. Australia is the world's second largest producer of uranium after Canada. The proposed expansion of Olympic Dam to 15,000 tonnes of uranium oxide would treble production from Olympic Dam and would double our current national production.

The next slide, at the top of page 5, shows our exploration expenditure and the development of low-cost resources over the period from 1967 through to 2004. The pink line is exploration expenditure expressed in constant 2003 dollars. The green line shows the growth of our low-cost resources over time. Very briefly, most of our uranium deposits were found in a narrow time span between 1968 and 1975, in which time approximately 50 deposits were discovered. Since 1980, we have had 20 years of declining exploration expenditure in uranium to reach the very low levels that it had in 2003. During that period of falling exploration expenditure, we had very few discoveries. There have been a number of technical successes, but only one has significant low-cost resources.

In 2004 there was quite an increase in exploration expenditure. This increase was in response to the rise in the uranium prices on the spot market. Currently, there are 40 companies exploring for uranium. Most of the activity in 2004 was in the Northern Territory and South Australia, with Arnhem Land in the Northern Territory, the Gawler Craton in South Australia and the Frome Embayment in South Australia being the main areas of activity. There is a map in our submission which shows those areas.

This next slide is 'Regions with high potential for uranium'. It shows the areas that Geoscience Australia has assessed as having high potential for further discoveries of uranium deposits. Exploration is currently under way in all of those areas, although, to our knowledge, there has not been much exploration in the Paterson province in Western Australia to date.

The last slide, which is 'secondary supplies of uranium', shows a green line on the graph, which shows world demand for uranium for electricity generation. You can see that that has increased with time. The dotted yellow line shows world mine production. That has generally levelled out in recent years. This shows that world mine production only accounts for about 60 per cent of total world demand. The remaining supply to meet total demand comes from secondary supplies. These secondary supplies represent about 40 per cent of total requirements.

These secondary supplies are low-enriched uranium, which is held by electricity utilities and conversion plants. They include highly enriched uranium from ex-military stockpiles in both the Russian Federation and the United States. They include re-enrichment of depleted uranium tailings.

Despite the importance of these secondary sources, there is a great deal of uncertainty about the quantities available on world markets. These secondary supplies have had a considerable impact on world markets and world prices in recent years. The Russian Federation, which previously has sold much of these secondary supplies into world markets, is now in recent years retaining those secondary supplies to meet its own demand for electricity generation. Much of these secondary supplies in recent years have no longer been available to the market.

In summary, there is an emerging consensus that, by about 2020, there will be a considerably greater requirement for primary uranium from mine production. Given the long lead times for environmental clearances and permitting of new uranium mines, new discoveries will be needed in the short to medium term.

CHAIR—Thank you. Has there been any analysis of the decline of the uranium from the secondary supplies and what will happen to the price, given that the price over the last number of years has basically trebled? What is the graph curve that has been looked at as to what prices will do?

Dr Lambert—Basically, secondary supplies are notorious in upsetting favourable trends in the uranium market, because they come on stream without a lot of notice. There is a general uncertainty about the total amounts available in secondary supplies as a sort of commercial-in-confidence—

CHAIR—But would that affect the spot market or the contract market?

Dr Lambert—It would affect initially the spot market, which in turn reflects the contract market. For example, I was at a meeting in Vienna in June, where one of the analysts was fearful of the US Department of Energy putting its stockpile onto the market. That is a very large amount of secondary supply, and the concern was that that would burst the price bubble. There is a history of uncertainty in this market, because of secondary supplies being uncertain.

A lot of nuclear warhead material from Russia was being made suitable for use in power plants and available on the open market, but recently Russia has found that it needs that for its own use and for the use of the countries around it that it supplies uranium for. As a result, that secondary supply has gone from being generally available to being available to those in Russia and to those in Russia's influence. So there are a number of factors that can influence the free market in uranium production from mines.

Mr McKay—Over the history of this since 1990, there have been secondary supplies from a variety of sources, as we listed, and these have always come as a shock to the market, in economic terms, in that the quantity of these was unknown and came as a shock. The most authoritative study in the availability of secondary supplies was done by the International Atomic Energy Agency, and that study showed that by 2020 these supplies will be at a very low and dwindling level. But that study by the IAEA was done in 1999-2000, so it is slightly dated now. I think it is fair to say that there is a great deal of uncertainty about the quantities that are available. To answer your question about what impact they have: they have an impact on the spot market, because these supplies are sold at market prices, and they are not sold at the cost to produce them. They might have been quite expensive to produce, but they are sold at the spot market price. So they have the most effect on the spot market.

Mr HATTON—The work of Geoscience Australia is particularly important for people who go out and look for new deposits. There have been a number of skilled geologists who have gone out of work in recent years. In the last parliament we looked at how to reignite this industry, and things changed very quickly. We have gone from slump to boom. What is the current state in terms of trained people coming back into the industry? We heard in previous evidence that many of those were lost, not many are being retrained back in and we need to retrain new people. What is your view?

Dr Lambert—Certainly there is a skills shortage. If we just look at our own needs, when we want to get a good young geophysicist or something like that, we cannot. There is definitely that skills shortage. In fact, going back one step further, there are no universities actually training in some of the key areas that we are interested in. But many of those who have been laid off in the past downturn have—those who have wanted to—have emerged as juniors and are very active in trying to get back into exploration. I have just come back from a New South Wales exploration conference where there were a whole lot of people who had been consultants for the last few years and now are emerging as principals of small companies. They were out and about and trying to use this upturn to help them with fundraising and so on. Some of them have got, at the best, limited funds for exploration. But at least they are back in employment and doing things.

Mr HATTON—So that ties in with the buying out of a lot of major Australian companies and the fact that they stopped exploring, so the people who had been working for them—

Dr Lambert—Yes. If you look at some of the statistics for major companies, what they were spending back in the early nineties and what they are spending now is an order of magnitude decrease in general. They are, in effect, too big to do exploration in their own right. They prefer to have good small companies working for them. They can have a loose or a somewhat tighter relationship with small companies—maybe seed funding—and then cherry-pick the results. That seems to be a model that has emerged.

Mr HATTON—The geospatial data that you supply has been critical in the past, but I imagine, in relation to the uranium industry and exploration, it is even more important because of the nature of the geology of the Gawler Craton and these other areas. Can you explain a bit more about that?

Dr Lambert—Let's go back one stage. One of the reasons that the major companies have been leaving is that most of the outcropping areas of Australia are explored to a mature state. There will be more discoveries, but they will be related to existing mineralisation. So the focus has to be on the covered areas like the Gawler Craton where you have deep weathering and sedimentary cover. The information available for those covered areas is limited, because of the fact that they are covered. We need a new generation of information. There are technologies now that could be flown. We have grown out of—not completely—the airborne magnetics and radiometrics of the last couple of decades. They have served us well, particularly in the near-surface environment, but now we have to look through the cover and get down to the rocks of 100 to 400 or 500 metres below the surface. We need to bring in a new set of technologies to do that. It is important to be able to identify palaeochannels in the Frome Embayment and to be able to identify the favourable alteration minerals in the Olympic Dam domain for that style of mineralisation. That requires a new generation. That is what we hope will eventually come to GA as a result of the various inquiries we have had in the last couple of years.

Mr HATTON—How available, implementable and costly are those technologies? Is there a nuclear element to them?

Dr Lambert—They are available. Their full potential needs to be demonstrated in regional survey environments, but they are widely available and used in highly detailed surveys by companies looking for specific features. In terms of their applicability to uranium, uranium is not vastly different from any other commodity. You need to know where there are favourable features. In the case of uranium, some of those features can be where there are graphitic rocks. Airborne EM, which we think is one of the new technologies that has to be flown regionally, does pick up graphite, and it is already used in, for example, the Ranger area as an exploration technique in detail. The new techniques will certainly have implications for uranium but, equally, for other commodities. In the rangeland, they will have implications for things like water and salinity, because they are also picked up in geophysical surveys.

Mr HATTON—In your evidence on pages 22 and 34 of your submission, you explain the significance of the brannerite rocks at Olympic Dam and the other mines that are close to there and the fact that you need technical advances to be able to extract brannerite. Could you tell us a bit more about that and about the extent to which the presence of that brannerite adds to tailing waste and would require additional energy inputs in order to extract it?

Mr McKay—Brannerite is a mineral that occurs in a number of deposits. Quite extensive metallurgical studies were carried out by the Australian Atomic Energy Commission during the 1970s. The aim was to try and recover brannerite from these deposits in the Mount Isa area—Valhalla, Skal, Anderson's Lode. That metallurgical research was quite extensive and the conclusion was that it is difficult to recover the uranium from brannerite with normal acid leach technology. The findings also concluded that there were other techniques which were applicable but were expensive, and those were techniques of leaching under elevated temperature and elevated pressure. Those techniques were investigated, but the economics of them were too expensive.

As the years have gone by, the first thing that has happened in the brannerite study is that the Olympic Dam uranium deposit, large as it is, occurs in a mixture of uraninite, which is the common variety of uranium from which it is easy to extract the uranium, and brannerite. In fact, about 30 per cent of the total uranium in normal Olympic Dam ore is locked into brannerite. Olympic Dam recoveries have been very poor by world standards. In fact, public documents show that their metallurgical recovery is only about 70 per cent. The remaining 30 per cent, which is locked up in brannerite, presently goes to the tailings. But in 2004 the company reported that it has started a metallurgical research program to investigate ways of recovering uranium from this brannerite. Indeed, it would be very significant. A breakthrough or improvements in the recovery from brannerite would have a major impact, because it would mean much greater production of uranium from mining the same amount of ore.

In the research to date, the company have tried heating the leach tailings to a temperature of 60 degrees. So they have elevated the temperature of the leach. In fact, they are having success. They have reported that their recoveries have gone up and they anticipate that with further ongoing research, this will improve to as much as 85 per cent, which would be a very significant impact.

The second thing to be said about the brannerite case is that a small company has gone back into those old deposits at Mount Isa—Valhalla and Skal and Anderson's Lode—and has spent quite an amount of money on metallurgical research. In its reports to the stock exchange, it has stated that it is achieving quite good recoveries, because almost all of those deposits are brannerite. The small company is achieving very good metallurgical recoveries from those brannerite ores using a variety of metallurgical techniques, such as elevated temperature and elevated pressure. In my view, the story of brannerite and improving the metallurgy is a very important research aspect in which breakthroughs will make a very significant change to our uranium resource production.

Mr HAASE—The slides tell a great deal but they do not tell everything. Could you explain your opinion of the amount of activity that has been going on internationally? I am looking at the estimates of the eventual world price and supply. You have a good slide there that endeavours to show the shortfall between mining and usage. What sort of activity is going on internationally that might improve international resources? There seems to be a great imbalance between the Australian known resources and the quantity elsewhere in the world. I wonder if that simply reflects the amount of work and exploration that has been done. Please give me your opinion on that.

Dr Lambert—One of the things that Canada has just done is a very detailed collaborative study involving government, the Geological Survey of Canada, companies and the state. It is a thorough study of the Athabasca Basin, where the main deposits occur in Canada. They have pulled it apart and done everything they possibly could to it—the sorts of things that we do here in Australia, depending on our level of resources. They have done seismic studies, airborne geophysical studies and a whole lot of pulling together of existing information. That has shown a number of areas of potential in that highly prospective Athabasca Basin.

The significance of the Athabasca Basin is that it has a number of extremely high-grade deposits, ones which can really turn the market on its head if they discover more of them. There are two mines coming on, at Macarthur River and Cigar Lake, and the head grade there is something like 20 per cent uranium. At Olympic Dam, we are talking about 500 parts per million—it is a huge difference. That area has those peculiarly high-grade ones. That is what they have done in Canada. They have tried to tease out every last bit of information and synthesise everything to help exploration in that area.

Moving further afield, an exploration hot spot where Canada is getting very busy is Kazakhstan. Kazakhstan has opened up for joint ventures for foreign investment. Canadian companies have certainly moved into Kazakhstan. Some are of the view that there is a bit too much hype about that country. Obviously, the logistics are very difficult there but it certainly has very significant known uranium. The most significant deposits are of the sandstone type like Beverley and Honeymoon but it has other styles of deposits as well.

Mr HAASE—Does that indicate that they would be suitable for in situ leaching?

Dr Lambert—It does, yes. They are amongst the leaders in using that technique. Mongolia is another country where there is significant known mineralisation and significant potential. Beyond that, countries like Russia and so on have looked pretty hard and long, and China is pulling out all stops trying to secure as much indigenous uranium as it can, but without a vast

amount of success so far. You will not see China on that slide because it has only recently started declaring its reserves and resources in the red book. It also does not have many, so it does not figure high.

Mr HAASE—And the South American continent?

Dr Lambert—There is not much there. There is some in Brazil and Argentina—enough for their indigenous requirements, but it is not significant.

Mr HAASE—Even though you mentioned South Africa, Namibia and Niger, a lot of the African continent is not covered. Has it been explored, to your knowledge?

Dr Lambert—To varying degrees. South Africa has the vast so-called Witwatersrand deposits in the Transvaal area that are basically gold mines but have uranium as a very valuable coproduct. The uranium production is dependent on the gold production. They are very vast deposits but, as I said, they are linked to gold production. Namibia certainly has one significant deposit, and other potential mines as well. There is a lot of French activity in Niger. COGEMA—or AREVA, as it is now called—is very active in that part of the world. Again, the logistics are very difficult, but there is uranium there.

Mr HAASE—So do you think the slide that you headed ‘Secondary supplies of uranium’, which is the only real clue to the gap between world usage and supply, reflects the future availability and demand situation?

Dr Lambert—It is meant to.

Mr HAASE—You mentioned the thorough search activity in Canada. Can you make any comment about whether that activity has been encouraged by what we term a flow-through share arrangement?

Dr Lambert—Not specifically.

Mr HAASE—That is fine; that is all I needed to know. What is the nature of the deposits that you mention in Western Australia, which you detail well? To your knowledge, is ISL appropriate for any of them?

Dr Lambert—They are calcrete deposits. They are very close to the surface. They would be bulldozed up and put through a plant, as I understand it.

Mr HAASE—In relation to the other nations that you have briefly touched on as regards their exploration, to your knowledge are those governments pro or anti uranium and nuclear energy? What influence does the national government philosophy bring to bear on the activity and exploration?

Dr Lambert—In Canada, the situation is fairly similar to here, in my assessment. They have a number of issues. There are a number of perennial opponents to uranium mining who have caused quite a lot of turmoil in permitting of some facilities and so on. That is an ongoing issue for the Canadians. Most nations are very supportive of indigenous supply. So there is a lot of

activity in almost every nation I can think of that has nuclear power to find their own uranium resources. As I said, China is a particular case in point. They have probably several thousand explorationists. They are not of the same ilk as our explorationists, perhaps. They have a team of many hundreds looking in Inner Mongolia. There are some down south and some out west. There are many, many people active in the search.

Mr HAASE—In terms of the philosophy of state governments in Australia today, even though there is some problem regarding mining, would you suggest that that has restricted exploration in any way? I am trying to establish your point of view about whether or not you think our known resources would be greater had there been a greater embracing of nuclear energy and uranium generally by Australian governments.

Dr Lambert—It is a difficult for scientists to answer. I would largely like to sidestep it, except to make the obvious observation that, if you look at south-eastern Australia, there are no deposits there. One factor in that has to be the fact that there has been no encouragement of uranium exploration in that part of the country.

Mr HAASE—Finally, you mentioned radiometrics. I took from that that you were suggesting that they might have been past their use-by date for going any deeper. What is the limitation of accurate imaging with radiometrics?

Dr Lambert—Radiometrics basically pick up the top 50 centimetres. To a certain extent, you can model what is happening beneath—

Mr HAASE—What is the term you use, then, for what was popularised a couple of years ago as ‘the ultrasound of the earth’ by some of our more colourful members?

Dr Lambert—That is airborne electromagnetics. That picks up conductors such as graphites and salt. It can go down hundreds of metres. It can be tuned. You get different systems for different applications.

Mr HAASE—Is that the sort of process that you would want Geoscience to be able to employ?

Dr Lambert—In terms of a regional precompetitive Geoscience, that would be one of the keys—to do regional airborne electromagnetics. You pick up the minerals; you pick up the graphite related to uranium; you pick up the salt and clays that influence groundwater quality.

Mr HAASE—And you are suggesting that that sort of exploration across Australia has not been done to any—

Dr Lambert—No, we just have a few limited studies of airborne electromagnetics.

Mr HAASE—Thank you.

Mr CADMAN—In your calculations of available resources, have you taken into account the possible breakthrough with the technology that you describe in respect of the heating of the brannerite?

Dr Lambert—In terms of reasonably assured resources in the low-cost category, brannerite would not fit in that low-cost category.

Mr CADMAN—Where would you classify it? I see you have a number of scales of classification.

Mr McKay—Presently the international resource classification scheme requires us to report recoverable resources. So those figures that you see there are reasonably assured or it is inferred that they are recoverable resources. That means that in the company's view, or in Geoscience Australia's view, they are recoverable. In the case of Olympic Dam, that brannerite mineralisation is not in our figures. It is not part of our resources because, from information that the company has supplied to us from its metallurgical departments, and from our visits to the mines, that is not recoverable—and it has not been; it has gone to the tailings. So it is not part of our resources.

Mr CADMAN—If that technological breakthrough were achieved, what would that do to world resources?

Dr Lambert—These steps reflect either new ore being drilled out or a technological breakthrough in the ability to free up more uranium.

Mr CADMAN—I am asking you to 'crystal ball' a little. If that technological breakthrough were proved achievable and practical, would that change the world balance?

Dr Lambert—We would have almost 30 per cent more low-cost resources.

Mr CADMAN—What about the other nations that are producers?

Mr McKay—The only other country in the world that has significant resources of brannerite is the Ukraine. The Ukraine produce uranium from their difficult ores. If this breakthrough comes, I think it would have a significant impact on the resources of the Ukraine but it would have a major impact on Australia's resources.

Mr CADMAN—What do we need to do to maximise Australia's development and production? What do we need to do to take advantage of that gap that may open up as secondary sources decline?

Dr Lambert—If there is an expansion at Olympic Dam, clearly it will have a very significant, positive effect on Australia's exports of uranium.

Mr CADMAN—I notice that some of the projects are held up because of negotiations with Indigenous communities and others on investment. There is a whole range of hold-ups.

Dr Lambert—Jabiluka would be probably the example you are referring to, because it is in that category. It is owned by the same company that owns Ranger. In an ideal world, it is not an advantage to have two mines competing against each other at any one time. So a phase-in of that second mine would be a very happy situation if that were to come about. Why haven't the resources of Yeelirrie—that great big black dot of reserves in Western Australia—been

developed? It is owned by the former Western Mining. Western Mining had Olympic Dam and that is the reason it was not developed.

CHAIR—Was that a state government ban?

Dr Lambert—No, Yeelirrie has been known since the seventies. The primary reason is that uranium is the flavour of the moment. It was not always the case. Western Mining had difficulty breaking into the uranium market. Now it can sell as much as it can produce, and that will continue, in my view. That does not mean that the company that owns Olympic Dam immediately wants to develop a second mine and flood the market. Obviously, opportunities coming up to 2015 to 2020 are going to be pretty rosy, as secondary suppliers really start to diminish, according to the forecasts. That is when there will really be time to make hay, if you want to bring on new resources at that stage. My view is that the expansion at Olympic Dam, which will basically double Australia's output, if it goes ahead, will see us through for a while. That does not mean there is no scope for a number of other deposits to be opened by other companies, provided they can break into the market.

CHAIR—We are out of time. There being no further questions, thank you for appearing before the committee today. Mr Haase, can you move that the additional material from Geoscience Australia tabled at today's hearing be received as evidence in the committee's inquiry and authorised for publication.

Mr HAASE—I so move.

CHAIR—There being no objection, it is so ordered.

[10.22 am]

DICKSON, Mr Andrew, Manager, Commodity Outlook Branch, Australian Bureau of Agricultural and Resource Economics

MOLLARD, Mr Will, Senior Commodity Analyst, Australian Bureau of Agricultural and Resource Economics

CHAIR—Thank you for agreeing to give evidence at the public hearing today. Although the committee does not require you to give evidence under oath, I should advise you that the hearing is a formal proceeding of the parliament. I further remind you that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of the parliament. The committee prefers all evidence to be given in public. However, at any stage you may request that your evidence be given in private and the committee will then consider your request. I invite you to make a brief opening statement before we proceed to questions.

Mr Dickson—We do not have an opening statement to make, other than to point out that the paper that was provided to the committee was authored by two officers at ABARE, Andrew Maurer and my colleague Will Mollard. Andrew Maurer could not be here today but Will is present. Will is ABARE's uranium analyst. I am here principally to support Will.

Mr HAASE—For the record, having already received the answer, I once again ask what today's price for uranium is.

Mr Mollard—It is over \$US30 a pound. That was the spot price on 25 August, and that is the price that is provided by the UXC consulting group.

Mr HAASE—In your submission you concern yourself with the decline in secondary supplies. I wonder if you would like to elaborate on that a little. With the fear of secondary supplies from the US coming onto the international market, I wonder if you might like to comment on the known volume of those supplies and explain why there is such great concern.

Mr Mollard—In the background that I have, the major forms of secondary supply are through recycling of used uranium through the reactors—so there are still recoverable amounts of U235 in fuel that has been used by these light water reactors. They can put that through, blend it with new uranium or with plutonium and put it back into the fuel cycle and it can be reused. The other major form of secondary supply of uranium is through the HEU feed deal, which was the agreement between Russia and the United States in 1993, basically to stop the proliferation of nuclear weapons in Russia. About 30 tonnes of highly enriched uranium is down-blended in Russia every year under the 20 years of that agreement. That is shipped to the United States and used in nuclear reactors in the United States.

In terms of secondary supplies of uranium in the United States, we have the United States Enrichment Corporation, which was formed more than 10 years ago. They were given a substantial quantity of secondary supplies of uranium. Most of that has been either delivered to power utilities in the United States or it is contracted for future delivery.

Perhaps the biggest risk factor regarding secondary supplies of uranium in the United States and Russia is if those governments decide to reduce their nuclear arsenals further, freeing up additional supplies of highly-enriched uranium. That is converted back to three to five per cent U235 and used by reactors. Although, from my research, the governments of those countries have not announced any plans to do that. Should they do so over the short, medium or longer term, that will free up additional secondary supplies.

Mr HAASE—How much storage of yellowcake or oxide does the US have? Do we know that?

Mr Mollard—We do. In 1999, representatives of the Russian government and the US government agreed that each country, until 2009, will hold a stockpile of up to 22,000 tonnes of uranium equivalent. That was under an additional treaty of the HEU feed deal, and that was signed in late 1999. In 2009, the US government would have 22,000 tonnes of uranium equivalent that could be released to the market. From indications that I have read from market commentators, I expect that they would do that in a manner that would minimise market impact.

Mr HAASE—For our benefit, could you explain something about the energy ratio for a nuclear power plant of highly enriched material compared with uranium oxide? It is something that I do not understand at this stage.

Mr Mollard—Would it be useful if I were to roughly explain the process from the mine level through to—

Mr HAASE—I think we understand the process. I certainly do not understand the equivalent energy content of the two distinctly different types.

Mr Mollard—The highly enriched uranium is above 80 per cent U235, whereas uranium used in a light water reactor—which is by far the most commonly used nuclear reactor around the world—needs around three to five per cent U235. So HEU, when it is down-blended, can create a massive quantity of what they call lower enriched uranium, which is three to five per cent.

Mr HAASE—If we are exporting thousands of tonnes of uranium oxide and there is storage of less than hundreds of tonnes of highly enriched material, what comparison might be made in more basic terms? For instance, Beverley mine was able to suggest that their annual output was about sufficient energy through known technology for about four million people and their energy needs. Could you compare that base image with reference to highly enriched material? I have no idea of the size of the stores of this material; what energy it would equate to; and, most importantly, how it would impact on the flow of mined material onto the world market.

Mr Mollard—The power that HEU or equivalent could generate and how many people it could provide for is not a number that I am familiar with. I can provide a ratio of what the secondary sources of highly enriched uranium are in mine output equivalent terms.

Mr HAASE—That would suit me fine. You can see how such a question is important.

Mr Mollard—A figure that I can provide is that 500 tonnes of highly enriched uranium is the equivalent to around 150,000 tonnes of natural uranium. To put that into perspective, that is over two years of mine output.

Mr HAASE—That is the perfect image that I wanted. Thank you.

Mr HATTON—Lots of people have made projections; it is a key part of your business. The International Atomic Energy Agency has made some projections as well for 2020, which is the year that people are focusing on. They think that the generating capacity will increase by 16.8 per cent by then because they expect 60 new plants to come on in the next 15 years. How reliable or sensible do you think that that estimate is and how does it stack up against other estimates or views that people have?

Mr Mollard—It is certainly more, shall I say ‘optimistic’ than the forecasts that the well-respected International Energy Agency are coming up with. The International Energy Agency report released in October 2004 indicated that, over that period, the share of nuclear energy as total electricity output will decline. Their next report is due to be released in one or two months. It will be interesting to see if the current environment of higher oil prices and these life extensions of nuclear reactors that we are seeing in the United States and some European Union countries will mean that they have updated those forecasts for 2020.

Mr HATTON—Part of the uncertainty rests on what Sweden is going to do, given that it has a proposal to eventually close down their production. It is not a case of when it will happen or even whether it will happen, even though they are determined to do it. What have you been able to pick up in terms of Britain’s intentions? They did declare that they were going to start closing down, but we have had contrary advice since then.

Mr Mollard—I am more familiar with the announced intentions to close reactors around the world. As far as I am aware, over the outlook period that we have looked at, there are no specific announced plans to shut down those reactors. Having said that, in my research three or four months ago there were indications that not only Great Britain but a number of other European Union countries will look at nuclear energy as a viable alternative or at least evaluate it. As I said, representatives of the United States and some European Union countries are trying to extend the life of the reactors by up to 20 years.

Mr CADMAN—To what extent does the enrichment process hold the key to production?

Mr Mollard—It affects both production and demand. That is probably one of the most important factors in what is going to happen to uranium prices over the longer term. Effectively, enrichment can be a substitute for mine output or natural uranium. I am not sure how familiar you are with the process, but basically enrichment deals with what is called separative work units. That is basically the amount of energy or the cost you save to take your natural uranium and convert it to the enriched product. What that means is that a reactor can purchase their uranium and say to the company enriching the product, ‘I want tails of 0.3 per cent uranium,’ and that is effectively waste. But when uranium prices increase, they might say, ‘I want 0.15 per cent of tails,’ so they reduce the leftover uranium. For that they are paying more for the separative work units. So when uranium prices increase and there is available enrichment

capacity, there is an incentive to minimise leftover uranium through paying more for the enrichment process.

Mr CADMAN—So this could be an attractive investment depending on the circumstances. Do you think there are likely to be many new entrants into the construction of enrichment plants?

Mr Mollard—My understanding is that there is not much excess enrichment capacity in the western countries. But, conceivably, they will evaluate the net present value or the economics of the investment in these companies and the continual increase in the fees they are receiving through enriching this product in the medium to longer term.

Mr CADMAN—So you are saying that they are operating at about peak?

Mr Mollard—My understanding is that, in western world countries, there is not much excess capability to conduct more enrichment or lower the tail assay.

Mr CADMAN—So if there were to be an expansion in the use of generation from this source, there would have to be a follow-on additional investment in enrichment processes?

Mr Mollard—To increase western world enrichment capacity, they will need further additional investment.

Mr CADMAN—Where would that be likely to occur?

Mr Mollard—Currently I think the enrichment plants are in the United States, Canada and Finland. As to where it would be, it would depend on a number of things. It could be the strength of the US dollar or that the companies have the capability to invest or that there are preferable sites in countries they want to invest in.

Mr CADMAN—Has Australia ever been considered as a likely site?

Mr Mollard—I am not sure.

Mr CADMAN—What would be your assessment if that were to occur? Is it a favourable site?

Mr Mollard—That is not a question I can answer, simply because of the myriad of factors that would affect whether a company wants to invest in Australia and whether they can see themselves maximising investment returns elsewhere.

Mr CADMAN—What are the basic requirements for a successful enrichment plant?

Mr Mollard—Again, that is not an area that we cover specifically.

Mr CADMAN—From your own knowledge and to the best of your ability, what are some of the factors that you think would be considered by a potential investor?

Mr Mollard—Sovereign risk—the political uncertainty in countries. Obviously the United States and Australia have less sovereign risk than an enrichment plant in—

Mr CADMAN—Iraq or somewhere like that.

Mr Mollard—Exactly. I would be looking at source of uranium. But, perhaps most importantly, I would want to know where the demand for that enriched product would be and the proximity to those markets.

Mr CADMAN—And transportation.

Mr Mollard—Indeed, with the transportation of products of this nature, the requirements are more stringent than if you are transporting, say, copper, zinc or base metals. Perhaps you would want to situate yourself where there were existing well-known supply routes so that you basically have the knowledge already there.

Mr MARTIN FERGUSON—Following up the issue raised by Mr Cadman, the truth is that in terms of uranium enrichment plants, companies' potential investment will be assessed in a similar way, for example, as for an aluminium-smelting plant. There will be all the same considerations: skills, tax regimes, sovereign risk et cetera. That is the truth of the matter, isn't it?

Mr Mollard—Exactly.

Mr MARTIN FERGUSON—The spot price at the moment has virtually trebled. You raised the question of Australia being a potential winner. Most of our uranium is sold on a long-term contractual basis at the moment. To your knowledge, when will the potential higher price to start kicking in as returns to Australian exporters?

Mr Mollard—I cannot give specifics as a lot of that in terms of sources that we access is under commercial contract and not freely available to the public. My understanding is that there is generally a component of these contracts that is up for negotiation each year. Indeed, they may have a fixed level of production they have contracted. If they produce more than that amount, that can be freed up for sale on the spot market. But, ultimately, to take advantage of high prices would mean increasing production and renegotiating those contracts. But, as I said, as for the exact dates of lease contracts, I cannot answer that.

Mr MARTIN FERGUSON—Our immediate attraction is the lower cost of production and the decline in secondary uranium resources for potential export growth. They are the two factors, aren't they?

Mr Mollard—Yes. Definitely the low cost is a large advantage. If prices ease, Australian producers will be able to maintain margins whereas those in other countries which have a high marginal cost of extraction will be more likely to close or reduce output.

Mr MARTIN FERGUSON—My final question partly touches on questions from some of the other members of the committee. You have had a more conservative assessment of the potential growth in demand. Isn't it true that, through agencies such as the International Energy

Agency, there is now some expectation that demand is going to grow with the construction of additional nuclear power plants, especially in Asia, and decisions in other countries to refurbish or not close down power plants? That is really where we are at in terms of international demand, potentially, isn't it?

Mr Mollard—Yes. The forecast I gave for the submission in May was growth of around one per cent in both years. The current forecast that has been generated is looking at three and two per cent over 2005 and 2006. We are not looking out further than that in the current forecast, but one of the major developments since the May submission is that TEPCO, the Tokyo Electric Power Company, in Japan has reopened a number of additional nuclear plants that were shut down around three years ago.

Mr KATTER—Did you say Japan?

Mr Mollard—The Tokyo Electric Power Company. They had a safety incident around two or three years ago which led to their closure of all their nuclear power facilities for safety checks. The last one of those—the Fukushima nuclear power plant—restarted production around two or three weeks ago. So they are now back up to operating all 17 of their nuclear power plants.

Mr KATTER—What would your figures be on the cost of power? As I understand it, the rule of thumb is 3c per kilowatt hour for coal, 6c for gas and about 10c for uranium, but I am not sure about the uranium figure. Do you people have a figure that you can quote for the cost of nuclear power?

Mr Mollard—The area that we are predominantly looking at is the relative cost because that will affect the viability or the incentive for people to build new reactors. As for the relative prices across the world, I cannot quote an exact figure.

Mr KATTER—Would you say that it is significantly more than gas and—

Mr Mollard—From what I have been reading lately, with the increase in oil prices and non-renewable energy, nuclear power is certainly becoming a more viable alternative, especially when they take into account the externalities or environmental costs involved in using some of these other alternative energy sources. When those things are taken into account, especially by countries that are signatories to the Kyoto protocol, nuclear energy becomes quite competitive. Nuclear plants involve a substantial upfront investment—more so, from my understanding, than for a number of other energy sources—and the construction of some of these plants takes upwards of 10 years.

Mr KATTER—There have been recent media reports—and this committee got a report about this—have indicated that China is looking at establishing 40 nuclear power stations and that India is looking at 17. What percentage of Australia's uranium production would be needed to fuel those 57 plants?

Mr Mollard—I will answer that first by telling you where uranium is currently exported. The majority of our uranium exports go to the United States, Japan, South Korea and a few European Union countries. I have read nothing to suggest that we would no longer supply those countries. Obviously we have long-term contracts with those countries but if we were to significantly

increase exports from Australia a lot of it would be likely to go to China, as with a lot of commodities at the moment. The exact figure on how much of Australia's uranium they would need is not a question I can answer at the moment.

CHAIR—Who supplies Britain with their uranium?

Mr Mollard—I think Canada supplies the majority of England's uranium.

CHAIR—About three years ago the Brits announced that they were going to phase out their nuclear power generation, is that still the case or are they now having a rethink on that matter?

Mr Mollard—There has been nothing definitive, one way or the other, that I have picked up on but I have read reports suggesting that England is looking into the viability of nuclear power as an option, particularly because of their Kyoto obligations. I have read nothing definitive either way about whether they are going to hasten the phase out or encourage the increased use of nuclear power.

CHAIR—So when they made the announcement it was quite obvious that they had not thought through the alternatives and what that would do for global warming.

Mr Mollard—That is right and it has been a trend, especially recently. The United States have what they call the 2010 deployment road map. Basically, that is an initiative designed to facilitate the implementation of advanced nuclear reactors in the United States by 2010. In a statement to the media around three or four months ago, President Bush said that, being a net importer of fossil fuels, they are looking into nuclear power to reduce their dependence on the fossil fuels they are importing from other countries.

Mr MARTIN FERGUSON—I think that the UK will produce a white paper on energy which would include some discussion about where it goes on nuclear, as I understand the situation.

Mr CADMAN—Wouldn't India be in line to follow China for demand?

Mr Mollard—India has announced their intention to significantly increase their use of nuclear power. In that way they are embracing what China is seeking to do.

Mr KATTER—With Russia and Mongolia having very restricted development of their mineral resources—they make up one-fifth of the world's land mass between the pair of them—is there the potential that they will come on downstream and destroy the uranium market? They have extensive uranium deposits.

Mr Mollard—Not to my knowledge. That might be a question that the Geoscience Australia people might be more familiar with. Mongolia has substantial deposits of copper, coal and base metals, but I am not aware that they have any substantial uranium deposits. I am also not aware that China have substantial uranium deposits. They do produce a small amount of uranium. My understanding is that, as with the growth of a lot of commodities we are currently seeing in China, it is likely that they will have to import uranium, or be an importer of uranium over the longer term.

Mr KATTER—But Russia has uranium deposits now. Would they be a potential supplier and competitor against us?

Mr Mollard—Russia currently produce a substantial quantitative secondary supply from down-blended nuclear weapons. They are also a producer of uranium, although not as much as Australia and Canada. My understanding is that they are also seeking to increase their use of nuclear power. They are seeking to build a number of nuclear reactors over the medium term. I think that is a factor in the current market, in that people are expecting that Russia will be needing to increase domestic use of uranium, so they may be exporting less uranium in the medium term.

Mr KATTER—Are people working and living back in Chernobyl now? People moved back into Nagasaki about two months later.

Mr Mollard—I am not sure.

Mr MARTIN FERGUSON—Just for the record, you sell uranium to the UK out of Ranger and Olympic Dam.

CHAIR—Thank you for agreeing to give evidence here today.

[11.00 am]

HOOKE, Mr Mitchell Harry, Chief Executive, Minerals Council of Australia

MORRIS, Mr Peter John, Senior Director, Economic Policy, Minerals Council of Australia

RAWSON, Mr Robert Norman, Director, Safety and Health, Minerals Council of Australia

CHAIR—Welcome. Thank you for agreeing to give evidence before the public hearing today. Although the committee does not require you to give evidence under oath, I advise you that hearings are a formal proceeding of the parliament. I remind you further that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of the parliament. I also remind you that the committee prefers all evidence to be given in public; however, at any stage, you may request that your evidence be given in private and the committee will consider that request. I now invite you to make a short opening statement.

Mr Hooke—We very much welcome this inquiry. You all know from previous presentations who the Minerals Council of Australia are. We are the peak national organisation representing the industry nationally and internationally in exploration and production to first-stage processing. The membership comprises somewhere in the order of 85 per cent to 90 per cent of production, probably more, as a proportion of exports. Our three fundamental planks of core business are public policy—we have a pretty competitive generic public policy—identifying and promoting good practice, and representing and being an overall advocate for the industry in terms of engagement with key opinion leaders like you.

This inquiry is timely for it provides an opportunity to review policies affecting Australia's uranium industry, which had their genesis in 1984 with the three mines policy—justification was founded in ideology, if not emotion, more so than sound science, valid data, risk assessment and good public policy. It is timely, for it comes at a time when the opportunity cost of persisting with such policies is arguably greater than at any time since they were introduced. The global spot price of uranium is currently around \$US30 a pound, which is about a 200 per cent increase since early 2003 when the global minerals market started its latest bull run. This is reflective of rising global demand for energy, an increased focus on all readily available sources of energy, diverse integrated sources towards a greater interdependence and at a time of tightening supply as weapons-grade uranium stocks are depleted. About 45 per cent of current uranium supply comes from diluted weapons-grade or inventory held by power utilities.

Global demand is driven by an increasing demand of the industrialising nations and there is no slowing in demand from developed economies. China, Russia, Finland, France and India are all building increased nuclear-generating capacity with about 60 new reactors. The world is increasingly focusing on climate change management, including greenhouse gas abatement. For some, the Kyoto protocol comes into force, which will require them to take the nuclear option if they are to meet their commitments. The maths is simple, and I am sure you have heard it: 22 tonnes of uranium or about 26 tonnes of U308 saves an emission of about a million tonnes of CO₂ relative to coal used in today's technologies. We recognise the precautionary principle of climate change. We are a strong supporter of a global solution to managing climate change. We

are committed to the development of new technologies for large-scale emission reductions and improvement in energy efficiency, cleaner production and alternative energy sources.

Australia is, and should be, well positioned to capture a large part of this burgeoning market. We have the largest proportion of economic demonstrated resources of any country in the world. Moreover, our resources are the lowest cost uranium resources in the world, being almost entirely recoverable at less than \$US29 a pound of U308. This inquiry is timely for the focus it provides in reflecting on the failures and inherent contradictions of a policy regime that merely serves to deny all Australians the benefits of converting an abundance of natural capital into societal capital.

Against any reasonable measures, the laws governing uranium mining in this country are found wanting. The no new mines policy manifest in the state legislature prohibiting certain nuclear activities in Queensland, New South Wales, Victoria and Western Australia is inherently flawed for several reasons. Firstly, there are no production restrictions on existing operations. It is quite absurd to be placing artificial limits on the number of mines but no such artificial limits on the size of current mines. As you would know well, our production of uranium last year reached a new record of 10,500 tonnes of U308—that is about 9,000 tonnes of uranium. Uranium exports represent our second-largest energy export in terms of energy content.

The second reason is that there is no discernible effect on nuclear power generation elsewhere. There are around 440 nuclear reactors worldwide producing about 16 per cent of the world's electricity. France gets over 75 per cent of its electricity from nuclear generation, and it is the world's largest exporter of electricity. As I indicated, the growth in the next few years is going to be quite incredible.

The third reason is that Australia's safeguard arrangements are far more effective in meeting what I presume is an underlying objective of those who seek to restrict mining to restrict nuclear weapons proliferation. Australia's uranium is, to the best of our knowledge, solely used for electricity production.

The fourth reason is that the industry's environmental and social stewardship performance has greatly improved, even to the point where the industry's performance is outstripping but complementary to the dictates of regulatory licence to operate. In this, the industry embraces continuous improvement in earning a social licence to operate, which is an unwritten social contract with the communities in which we operate. Those who have been following this industry know that we have a greatly improved safety performance. We are now engaging broader community and host community stakeholders. We are meeting the legitimate expectations and needs of the communities in which we operate. We have greatly enhanced Indigenous relations to the point where we are building and seeking to build sustainable communities beyond the life of the mine. There is a greater focus on community wellbeing, building sustainable communities, improved ecoefficiency and improved resource use. We are a global leader in reclamation and rehabilitation and have extended it to the point where we are now considering, in the planning, longer-term considerations of sustainable ecosystems.

Product and material stewardship is about material's life cycle, which is very important within the context of this inquiry. This is an industry that is embracing this concept quite deliberately and purposefully. There is a shared responsibility for a management strategy for the flow of

material through the life cycle of that material and the ecosystem. It requires said shared responsibility in mitigating negative environmental impacts and enhancing societal outcomes. The notion of shared responsibility extends through all actors in the chain—customers, suppliers and other participants—and therefore is a critical platform for understanding the life cycle of nuclear fuel, from mining through to waste management.

There is no greater testament of the industry's commitment to continuous improvement than the *Enduring Value* framework. For the record, I am showing the committee what *Enduring Value* looks like. This is our framework for sustainable development. It has four key platforms of principles, elements, guidance and capacity building, and essentially assists companies to translate the principles of sustainable development into operational practices. It embraces two fundamental planks: we are about continuous improvement beyond regulatory compliance and we are about a recognition that the industry's future is inseparable from the global pursuit of sustainable development.

The last reason that I would give is that the technology in nuclear power generation and waste management is now considered mature, greatly improving risk management in nuclear power generation. The industry has a relatively impressive safe record, which I again presume goes to an underlying objective of those who seek to restrict the mining of uranium.

In conclusion, I will be consistent with the terms of reference. Firstly, the global demand for mined uranium is increasing significantly. Secondly, Australia is well and should be better positioned to meet the burgeoning demand of global markets. Thirdly, there is simply no reasonable rationale for the existing restriction on uranium mining activities in Australia. Fourthly, Australia's safeguard policy is well constructed and, to the best of our knowledge, effective in reducing the use of Australia's uranium to power generation. Thus, we are advocating quite simply that uranium mining, in terms of exploration, production and processing, be treated no differently from any other mineral. We fully support the continuation of the Australian government's uranium export policy, Australia's approach to safeguards and the stipulation in these concerning the management of Australia's exported uranium, consistent with the United Nations Nuclear Non-proliferation Treaty.

CHAIR—Setting aside the Western Australian state government's ban on uranium mining, if one were to consider the very large deposits that Western Mining now BHP has in Western Australia, do you think it is likely that BHP would ever develop that mine in Western Australia, given its substantial investment in Olympic Dam?

Mr Hooke—I would imagine BHP Billiton would make a commercial decision—

CHAIR—That is the question I am asking.

Mr Hooke—It is not for me to make that judgment. I would imagine that BHP Billiton would make a commercial decision about bringing that mine on line in much the same way as it does now with other mines that it has whereby it has substantial deposits of minerals in other areas, in other countries and, indeed, in other regions of Australia. It brings those mines into operation consistent with the commercial dictates of the market and the opportunities that are there.

CHAIR—Evidence we have received from the Uranium Information Centre and Heathcote Resources went to the heart of the difficulties in shipping uranium. Basically, the common causes were the public perception of it but, more importantly, the availability of ships and shippers prepared to ship uranium. What evidence do you have in regard to solving that dilemma?

Mr Rawson—We are aware of some of the difficulties that are concerned, certainly an availability of shipping and also some ports putting restrictions on transiting, unloading and so forth. But, in response to the concerns raised by the industry the Australian government did make representations to the International Atomic Energy Agency and they, in fact, have an investigation under way into what they can do as an international body to improve the situation, raise awareness and try to bring some rationale into the shipping processes.

Mr Hooke—This circumstance could also be somewhat aggravated by the UN's reconsideration of the levels that require a declaration and labelling of shipping of naturally occurring radioactive materials known as NORMS. That is exactly what they are—naturally occurring. There is a proposition to drop the threshold limit to a point which would require a whole new wave of declaration on shipping and shipping practices for the transport of products that have very low background levels of naturally occurring radioactive materials. This is currently on the UN agenda and it is being contested quite rigorously by the industry from a very rational perspective of safety and health.

Mr Rawson—And from the Australian government in my understanding of the situation.

Mr Hooke—But that could aggravate the shipping availability.

Mr Rawson—Yes, the uranium miners do expect to have the various procedures put in place but there is an issue with these other very low levels of materials. If they also have to be regarded as radioactive materials and labelled and treated as such then that would put additional pressure on the transporting.

Mr HATTON—Your submission seems to me to have two bob each way on the key thing that we are looking at, which is the greenhouse effects of current usage. You say at page 1:

... there is sufficient scientific evidence to be concerned at the impacts of anthropogenic greenhouse gas emissions on the world's climate system although it is recognised their uncertainties in the science of climate change.

You do not say much more about that later. That to me is two bob each way. What do you really mean?

Mr Hooke—With respect, it is not that at all. We accept the precautionary principle and I am talking about the Rio declaration No. 15 not the subsequent European attempts to reinstrument it around the other way. Rio declaration No. 15 says that there is no basis for not doing something if the science is not sufficiently sound, or if there is this vague reason, what have you. So we accept that the precautionary principle says, 'You've got to get on with doing something.' That is the first point.

The second point is that the science is not sufficiently robust for us to be starting to determine what ought to be emission caps. If you are going to get into the position where you are going to start mandating some solutions—as distinct from just aspirational targets, which is the fundamental platform of the Kyoto protocol—and part of those solutions is going to be to put a price on carbon and introduce an emissions trading system and therefore mandate a carbon price, you need to be pretty confident about your science in terms of what those caps are going to be. If they are too tight, you will drive your economies into the ground. If they are too loose, you will not have the liquidity in the market to encourage the trading that you are looking for. So the question about the sufficiency of the science goes to the question of whether or not it is sufficiently rigorous to give us the indicators to what those caps ought to be. Plenty of scientists will tell you, straight up, that they are still not absolutely sure what the levels—the parts per million—of greenhouse gases or carbon dioxide in the atmosphere are that we ought to be looking at in terms of managing climate change. Do you want to add anything else to the two bob each way allegation?

Mr Morris—No, I think you have done it. That really is what the precautionary principle is all about—that we have sufficient scientific evidence to be concerned but, as Tony Blair has put it, we still need to take account of improved scientific evidence to have a better understanding not only of the abatement requirements around the world but also the adaptation points. One of the difficult areas is: what percentage increase in temperatures are we talking about? The range there is fairly significant. Just a one-degree average temperature increase is quite considerable, so if we are talking about two, three or four degrees then that is quite a considerable difference in average temperatures.

Mr HATTON—I suggest that that probably held up pretty well about four years ago in terms of where the argument was at, but there has been a rapid move and change in people's appreciation of what the situation is over the last four years, and that there is a solidification of opinion, not just in scientific circles but now increasingly in government circles, that this is happening a lot faster than was previously predicted.

Mr Hooke—But is the premise of your question that we are contesting the science and that therefore we do not think anything ought to happen?

Mr HATTON—That in that statement you are saying two things: the greenhouse effect is a bad thing but we really do not know to what extent it is really a problem. That seems to be what you are saying. So we need to do things about it but we do not really know if it is real. That is the point I was trying to get to.

Mr Hooke—That is not right. We accept the precautionary principles. We have accepted the anthropogenic influences on managing climate change. But we are actually in the business of solutions. If, as an industry, you are currently responsible for producing somewhere in the order of 80 to 90 per cent of current energy requirements around the world with fossil fuels, you cannot actually sit back on your haunches and think it is all going to be easy. We actually have to be part of the solution, not part of the problem. But we also cannot sit around with a greenwash kind of mentality, which is what the Kyoto protocol is about. If you want greenwash, that is the classic.

Mr KATTER—What does 'greenwash' mean?

Mr Hooke—Giving lip-service to the real objectives of what you are trying to achieve. It came from a position of the competitive advantage of competing nations and competing businesses, which is a pretty crumbly way to start a public policy. So it is about targets, not solutions. We are focused on solutions. We are focused on step-change technological improvement.

Mr HATTON—Prior to most countries in the world signing up to the Kyoto protocol, was there much in terms of solutions on offer? Hasn't that in fact been a generator for what has recently been announced by the United States, which has not signed up but which has got together with the other major producers and said, 'We actually need to change what we are doing; we need China and India, who are the biggest sources of energy use and electricity generation, to sign up to cleaner technical solutions and we will help them along the way'? Would that have happened if we had not had the Kyoto stuff? That is the key.

Mr MARTIN FERGUSON—Also, there is what the industry is doing on clean coal technology, sequestration et cetera and the significance of the Asia-Pacific partnership in really lifting the requirement for us to be part of solving this problem through our industry development and research.

Mr Hooke—That is a good point. We are not on a witch-hunt here. In fact, if you have a look at the speech I gave to the Pew centre, we said straight up front that we acknowledge the good things that have come out of Kyoto, which are actually what you have just said: focusing people's minds. But we are also not sitting back on a greenwash platform thinking that is actually going to do anything. That is the next fundamental platform—how you take the sponsoring of people's interests and awareness and a focus on what they have to do and move that on.

I would rather be working down the platform we are working down, the one that Martin Ferguson just talked about, than sitting back thinking that Kyoto is the answer to all our prayers. It is not. It may well have sponsored change, exactly as you say—and on that platform we agree. But we are now focused on what we can actually do.

Mr HATTON—I am not suggesting that. There is a comparable thing here. CFCs have now been legislated out because people realised their significance of the damage they were doing, so the practical steps have been taken. But there are a couple of associated issues. Given that we are looking particularly here at uranium, we do flog coal to the world in large measure. That is the core of our minerals export. We make a great deal of money. We are now aware that it has significant effects. People have spoken about a carbon tax. There is another possibility that we are looking at here, in using our uranium resources as we go forward—underpinning world energy production using nuclear energy. You can argue, and a lot of people have, that there is an embedded tax in relation to uranium, because the total cost of producing uranium—the export and the use of that and then the cost related to cleaning up what is produced by nuclear power—is contained in the uranium equation. We do not have the total cost of the use of fossil fuels for coal or any of the other fossil fuels. That part of the equation is not there. So, given that we are looking at (1) the current situation in relation to greenhouse gases, (2) the fact that we are exporting a lot of coal and uranium may be part of the solution to that cleaner future, do you think there is a differential in the two products we put out, in that one is effectively fully taxed and the other is not taxed, in terms of that carbon tax that people have spoken about?

Mr Hooke—We do not see energy sources as a substitution racket; we see them as complementary. The point you are talking about essentially goes to the age-old contest about how you price negative externalities, and that is very difficult to do. It is very difficult in terms of getting the market to pay. Even if you mandate it, essentially all you will be doing at the moment is raising revenue. It would be like taxing cigarettes: you are hardly likely to change behaviour; you will just raise revenue. The reason you will not change behaviour is essentially because the technologies are not there to do it.

A carbon price in an increasingly carbon constrained world? Absolutely. It is just a question of time, but that is the point. There is no point introducing a carbon price or a mandated carbon price until there is a circumstance where the technologies are there for people to actually change behaviour. At the moment they are not. Is there any shortage of commitment to the step-change technologies investment in both the public and private sectors? No, there is not. Therefore, why would you just tax people to reduce your international competitiveness in, as you said, ‘flogging’—we would actually like to think about marketing—our natural resources?

Mr HATTON—We used to flog it; now we market it.

Mr Hooke—We think we market it, and we are turning natural capital into societal capital. But the points you make are valid, if you do not mind me saying so—that is, how do you capture the negative externalities of essentially what is happening in the market? It is very difficult. Secondly, will there be a carbon price in an increasingly carbon constrained world? Yes, there will. Would you do it now? No, you would not; you would just raise revenue, and you would bludgeon yourselves and blow your feet off in terms of your international competitiveness. Is it best to let the market determine a carbon price, as it is now? Yes, it is. You are seeing that right now. What prospect is there of an emissions trading system in the future? Let us see how we go in terms of the step-change technologies. That goes back to the question you asked right at the outset—that is, is the science sufficiently rigorous for us now to determine what those caps should be? You cannot have a mandated trading system if you do not have a cap, because you have to have a cap in trade. If your science is not good enough to get it right, as I said, you will get adverse economic effects one way and insufficient liquidity in the market the other way.

Mr HATTON—How far down the road are we to marketing coal that is cleaner and has less effect on the environment. How far along are we in the work that is being done by CSIRO and industry on technical solutions for marketing coal? What is your view of that? One part of the question is how to lower the sulphur content and the other is how to clean it up. Are you aware of any technologies that have been developed very recently that could dramatically change the picture in regard to that?

Mr Hooke—Let me take those questions one at a time. The industry’s advancement in technology is pretty good. We already know how to do sequestration of carbon dioxide, just from learning what the oil industry is doing. There are already some geosequestration operations in the North Sea. I think there is one just off Greece. The technology is known. We know how to capture the flue gases, condense carbon dioxide to the point where it becomes a fluid and reinject it. We still have some way to go in determining its geological stability. There will questions of a transfer of contingent liability from the company to the society or what have you.

Mr HATTON—Because if it is not stable then we have events, as we have had in geological time, where you let carbon dioxide out and kill entire areas.

Mr Hooke—That is unlikely. I stand to be corrected, but my understanding of the science is that it is not going to go boom and kill entire areas. You will get trickles and bits and pieces. The question is how far advanced we are in the technology and understanding our capacity for geological stability. We are a fair way. We have the technology, we know the technology is there, and we know we have some fundamental questions to work through. Are the CRCs working collaboratively with industry and CSIRO going gangbusters? Yes, they are. COAL21 is a world leader as a partnership program in that respect.

Cost is the big issue. I think \$10 per tonne of carbon dioxide equivalent is something in the order of a 1c per kilowatt hour increase. This is where you start getting back to the point about capturing in price terms the negative externalities. If you want to take this debate further, we could start talking about state governments that regulate electricity prices and whether or not you have the market mechanisms whereby those costs can fully flow into the retail electricity market as distinct from the freewheeling wholesale electricity market. We should come to that another day.

I think the industry is well advanced in reducing the sulphur content of resultant fuels. Am I aware of other technologies? Yes, I am. The integrated combined gasification cycle technology is based on the Fischer-Tropsch technology, which is basically taking coal, coking it, stripping it down with -71 degrees methanol, getting it to a paraffin wax and putting the paraffin wax through a cobalt or nickel catalyst—I cannot remember which one it is. Then you get synthetic diesel, plastics, fertilisers and all the sorts of things that the South African industry has been doing since the Second World War on technology that was known before the Second World War.

The capital costs of bringing that stuff on are about \$US35 or \$US38 an oil barrel equivalent. Where oil prices are now brings on a whole new perspective of different energy sources. With a new paradigm of oil prices, all of a sudden you start bringing in a whole new range of synthetic fuels. I will be careful saying this—in South Africa they are burning coal that is very high in ash content, 45 per cent. Some people say they are burning dirt. The ash content of our lignite resources in Victoria would be about one or two per cent. The brown coal is higher in moisture content. We have about 800 years of brown coal. Work is already going on in Victoria to see whether or not we can start turning brown coal into synthetic diesel. The good thing about synthetic diesel is that it is about three parts per million sulphur, which is way below the threshold. I cannot remember what that was, but some of the old traditional fuels were about 1,500 parts per million sulphur. That was a very longwinded answer, but it was a very good question. The answer is: yes, there are a whole range of technologies that can come on board, and nuclear is one of them.

Mr HATTON—I want to make a point before I go to the next question. My point is about sequestered CO₂ escaping is that it has happened in geological times. In the period of the dinosaurs part of the localised problems, in terms of the extinction of a whole range of a species, indicated that sequestered CO₂ did escape, and escaped almost at once, because the areas were not geologically stable. That can happen. The question of geosequestration relies fundamentally on the stability of where you are putting it, but that is an associated problem.

Mr Hooke—What time scale are you putting on that? The time of the dinosaurs is a long time ago.

Mr HATTON—Yes, but it can happen again unless it is really geologically stable. If you have CO₂ trapped and it escapes in large amounts it will kill us straight up. There is work that has been produced to indicate that if it floods the atmosphere locally, as it has been able to do, that is a major reason for some of the localised effects where whole populations went. That is one of the reasons why people want to have it very secure and very stable. I want to go on to other ways of making coal safer and more usable. There have been some recent announcements. I do not know what the core of it is, but CSIRO has done work—

Mr Hooke—Do you mean safer or cleaner?

Mr HATTON—Cleaner, but safer as well, given that when you burn coal, and when you burn diesel or petrol, you produce particulates that can be carcinogenic. Are you aware of the work that has been done by the CSIRO that has only recently been announced where they have used hydrogen to provide a much higher, cleaner burn than with diesel and other fuels?

Mr Hooke—Yes.

Mr HATTON—That seems to be quite exciting in terms of those fuels, but also for other implementations of it where—if what they are indicating is right—it could be applied to normal diesel plants right around Australia and the world as well as to trucks and cars. A lot of the generation of these greenhouse effects could be ameliorated. Do you know more than I do about that?

Mr Hooke—We probably do not know more than you; it sounds like you are very well informed. The line of questioning here is, ‘How do we use our existing energy sources to the point where it is consistent with greenhouse abatement and managing climate change?’ As I said, we do not see any of these as a substitution racket. The rate of growth in demand of energy is increasing and, particularly in the industrialised and urbanising countries of China and India and other parts of Asia, there is going to be demand for all sources of energy. We are not looking at uranium as a substitute for coal or other sorts of energy, we are looking across the board and that includes some of the variable load capacity of renewables and maybe also the base load of hydro. It comes back to the fundamental thesis of whether there is work going on in step-change technologies, because we are not going to get within a bull’s roar of what the scientists are telling us we have to do in terms of reductions just through energy efficiency and ecoefficiency. So we have to make step-change technological improvements. That is the focus of our efforts. Yes, we are aware of hydrogen economy developments. Yes, we are aware of where nuclear energy fits into that equation as well and, yes, we are aware of some of the work that the CSIRO are doing. Are we in a position to rate that better than you? Probably not.

Mr Morris—I will just add that Australia is involved in the international hydrogen initiative with a number of other countries. There are some trials—I believe Perth has a number of buses now trialling the use of hydrogen—but there are limitations to the fuel. Greenland is leading the world perhaps in its trial. But our understanding is that it is a long way off before hydrogen becomes a significant fuel. We need to look for alternatives in the meantime. We are very conscious of the existing use of coal in the generation of electricity worldwide and the growth

expected, particularly in China and India. The Chinese growth is just extraordinary at the moment in their requirements for new coal-fired electricity. Despite the recent announcement of another 24 nuclear plants being proposed to be built in China—that is more than one a year for the next 20 years—there is still going to be a very significant need for coal. At the moment nuclear power in China is about 2 per cent of its total requirements and even with this increase the Chinese authorities are suggesting that it will only be about 4 per cent.

Mr Hooke—The other point to I would add to that, and it picks up on the points that Martin made, is that the Asia-Pacific Partnership on Clean Development and Climate goes to the fundamental thesis, that this is a global problem requiring a global solution and a heck of a lot of pretty smart, intelligent minds and resources.

Mr HAASE—I have a couple of lines of questioning. I was going to ask you what we ought to do to remove impediments to mining of uranium, apart from the various existing political philosophies around our nation, but it strikes me that the political impediments are probably the major ones. Do you have a view from council and, consequently, from your members as to how we break down that political resistance which is coming from an interpretation of public perception that Australia ought not be culpable in any way to providing uranium to a world that may use it for purposes other than power generation?

Mr Hooke—If you do not mind me saying so, that is a very good question. It goes to the fundamental issue that we are trying to tackle. I am not sure that there is any, to quote a famous line, ‘one shot in the locker’. There are no silver bullets. I think it is a composite of a whole range of strategies. One of them is continuing to emphasise the capability of Australia’s safeguard policies. The second is to explain what they actually mean in that we will not sell to countries that are not part of the non-proliferation treaty. Pakistan is a good example—they are not signatories to the non-proliferation treaty and they are not on our radar at all. The third is the kind of messages that people are getting now about how technologically advanced nuclear power generation is and the improvements in the industry’s capacity to manage risk of its relative safety performance and to manage waste.

I make the distinction with our role and responsibility: we are about mining uranium. Whether the Australian population wants to have nuclear power generation here is a matter for another debate. We distinguish between our roles and responsibilities in the production of uranium and its subsequent use or not here in Australia. But the public just put the two together, so that is the difficulty: differentiating between the two. I would be surprised if Bill and Betty in struggle street know that there are 440-odd nuclear power generators around the globe. I would be surprised if Bill and Betty in struggle street know that France has become the power-generating hub of Europe, notwithstanding France’s leanings to the left politically and, particularly, its socialisation of much of its economic activity and what you have now in Scandinavia, with Finland building new power generation reactors.

So there is an inherent contradiction and inconsistency, like there is in most public policy issues. I think where it is going at the moment, in terms of the population’s focus on where nuclear power can add environmental benefits such as mitigating greenhouse gas emissions. That has been a positive platform. I am also not sure that Bill and Betty in struggle street really care much about the policies on restricting uranium mining in Australia, so therefore it goes straight to the heart of the politics in state legislature.

Mr HAASE—Are your members, the council, of the opinion that government ought to be doing more or something different? Are they able to point out areas that we are not engaging in that would be helpful to the cause of overcoming public ignorance?

Mr Hooke—I do not think it is public ignorance. It is easier to sell fear than it is reason.

Mr HAASE—I perhaps should moderate that to public apathy.

Mr Hooke—Yes, but public apathy is overwhelmed somewhat by people saying, for either moral or ideological grounds, that they are opposed to uranium mining. It then becomes a platform: ‘We won’t have uranium mining.’ If you know nothing about uranium mining, it is very quick and very easy to jump to a conclusion that this stuff is ‘bad’.

Mr HAASE—So you have no silver bullet for us?

Mr Hooke—No, I do not have a silver bullet for you.

Mr HAASE—I will move on then.

Mr Hooke—I think the move by the federal minister to take responsibility for the granting of exploration and mining tenements in the Northern Territory was a good move. It was a good move, firstly, because it laid a foundation for the federal government’s position on uranium, and secondly, because it laid a foundation and built on that foundation a whole lot of the arguments we have just been talking about.

Mr HAASE—There has been a bit of coverage recently about the negotiations between Australia and China on future supply, as to whether or not inspections of those plants ought to be carried out on an ongoing basis by Australian authorities or international authorities. Does your membership have an opinion on that?

Mr Hooke—Not to my knowledge.

Mr Rawson—Normally the International Atomic Energy Agency would be the appropriate body.

Mr HAASE—Do you believe the international body ought to be appropriate body?

Mr Rawson—I cannot speak on behalf of the council but I personally think that that is more than adequate.

Mr HAASE—We will move straight on. You spoke a great deal, in response to Mr Hatton’s questions, about the comparative costs et cetera. I think for the first time as a witness you actually went through the fullness of those costs—not just the capital cost of equipment but the cost of the energy and the human and social cost in the provision of the energy source and the operation of that particular technology. Then there are the shutdown costs, the environmental costs and the costs to society of dealing with a possible change in weather condition plus the insurance costs. So there is a huge range of factors to be taken into account if society is to truly analyse the benefits of nuclear energy versus fossil fuel energy. Is that calculation something that

your council has done and can give a definitive answer on in terms of the dollar costs of units of electricity?

Mr Hooke—No, we have not.

Mr HAASE—I think we have heard all the preamble, but it would be a wonderful figure for us to have. I know Mr Ferguson has commented on this.

Mr Hooke—It is available. There are organisations that have attempted that analysis. Alan Moran at the Institute of Public Affairs has done that. I have an article here, which I am happy to table. I have read it and I have been through some of it. I am not an economist and I have not asked any of our economists to have a look at it because it goes to the fundamental thesis—that is, we are not in the business of a substitution racket for energy sources. The economics of that will be sorted out in the market. Some of those parameters would be nearly impossible to put a dollar figure on and, on the basis of continuous improvement in our environmental and social stewardship performance, we may start to mitigate a lot of those negative costs in much the same way as in the last decade, or decade and a half, we have moved from being the neighbour from hell and defined in terms of being regrettable, to being a good neighbour defined in terms of wealth generation and societal capital. That includes engaging with traditional owners and communities in which we operate, and improved environmental performance. So, like all these things, it is a moving feast.

Mr Rawson—If we are talking about the comparative costs of coal and nuclear power it depends very much on the locality. If you were digging up coal in the Hunter Valley, for example, and putting it into a power station it would be a lot cheaper than if the power station was well removed from coal fields where you require global transport and so forth. It is very difficult to draw those comparisons although some have attempted in the past to do so. It is not something, as Mr Hooke said, that is the focus of our council.

Mr HAASE—I find it interesting that you do not jump immediately to a conclusion and then endeavour to justify it. Do you think it is a very fine line?

Mr Hooke—I do not think we know.

Mr MARTIN FERGUSON—The US has entered into an agreement with India about peaceful cooperation on nuclear issues. The industry has historically always supported the view of the major political parties that we should not sell uranium to any country that is not a party to the nuclear non-proliferation treaty. Is that still the view of your industry?

Mr Hooke—Yes.

Mr MARTIN FERGUSON—That is pretty important because, obviously, China is potentially an export market, but India is not a party to the treaty. There has been some criticism of both the uranium industry and the minerals industry generally, criticism of your failure to properly consult and take Indigenous issues seriously, especially from the Friends of the Earth group. What do you say about this from an industry perspective? Have there been improvements over the last five or 10 years?

Mr Hooke—That is a good question. I think the criticism of the industry's performance in that area of a decade and a half ago is quite valid. You will find that the industry will tell you that it is quite valid. If you had to pick something that has been a paradigm shift in the operations of the Australian minerals industry, I suspect that would be right up the top. We currently have some 350-plus agreements on foot across 200 mining companies. They are, in the bulk, registered Indigenous land use agreements, and not one of them contested native title. We have not only proclaimed our respect for rights, cultures, interests and special connections to land and waters but also practised and performed it.

Some of our companies have individual agreements that are quite specific to uranium. You will all be well aware of the agreement at Jabiluka, between ERA and the Mirra people, which has a fundamental platform that they will reapply every four years for a consideration of opening up what is currently a mothballed project. That is a year ahead of what is written under legislation, which is five years, but this is not a deal under legislation; this has been a deal for a mutually beneficial relationship.

The memorandum of understanding that we have with the federal government, signed by three ministers, to move beyond corporate Indigenous employment programs to build sustainable communities beyond the life of the mine is a great platform. It will come from the bottom up. In other words, it will come from local communities identifying needs and expectations in terms of enterprise facilitation, Indigenous employment and the social fabric of society. It is not to be misconstrued like the way *Lateline* tried to promote it. In actual fact, it is a better platform for an engagement with government programs to deliver much better services. Your question is well framed: has the industry's social stewardship in that respect improved to the point where it is way beyond the regulatory requirements? The answer is yes. It is founded in mutually beneficial relationships and respect for culture, interests and rights.

Mr MARTIN FERGUSON—Let us talk about the issue of health and safety. I know the council has been doing some work on tracking the long-term health of resource workers. Have you found any particular weaknesses that we should be aware of with respect to uranium mining workers? Are there any recommendations we should be making?

Mr Rawson—The level of exposure of workers in the Australian uranium industry is well below the average annual limits of 20 millisieverts. As an example, in ERA's Ranger operation last year the maximum exposure of any individual was about four millisieverts, which is a fifth of that international limit. There has not been a problem in maintaining those low levels of exposure to workers in that designated industry.

Mr Hooke—In a generic sense, we think health has been the poor cousin of safety. We are in an industry that had an industrial safety record that a decade-plus ago was probably one of the worst in the country; it is now one of the best. But it is still short of our goal of zero harm. We do not think any accident—fatal or not—is justifiable. Therefore, zero harm is our goal. Safety is acute; health tends to be chronic, so health has not had quite the focus. We are rectifying that, not just in the work force but also in the surrounding communities. We have spent a fair amount of time and resources in trawling through 600 or 700 compounds and products. We are looking at musculoskeletal problems and particulates—going back to your question Deputy Chair. We are working through all of those sorts of aspects—noise, hearing loss—to get a handle on where we are going.

A lot of our companies are well advanced in that stuff. We are doing it from generic leadership and cultural aspects. The questions are well premised. Are we picking up on health where we think it has been the poor cousin of safety? Yes. Does that mean there have been major problems? It is a bit hard to put your finger on that because of the chronic effects.

Mr MARTIN FERGUSON—The Commonwealth basically picked up a determination to pursue mining in the Northern Territory, and there have been no problems with exploration. It has said its priorities are South Australia and the Northern Territory—not so much Western Australia and Queensland to date. The truth is there has been no clamouring from the industry to change exploration capacity in New South Wales and Victoria with uranium mining in recent times, has there?

Mr Hooke—Clamouring? I think you will find that industry—

Mr MARTIN FERGUSON—In essence, the priorities have been South Australia, Northern Territory, Western Australia and Queensland, haven't they?

Mr Hooke—The first two have been so largely because that is where you can mine. There is not much point getting into exploration big time if you cannot go and mine. The figures in our submission are that, since 1975, there have only been four further deposits that have been added to the 50 or so known ones.

Mr MARTIN FERGUSON—But the fact is that some mining has not occurred is also related to the price of uranium.

Mr Hooke—That is a fair point.

Mr MARTIN FERGUSON—It has only really become an issue in the last couple of years because of the huge jump in price.

Mr Hooke—That is certainly a fair point. Your point about price with regard to the industry not clamouring is a fair point. But the state Labor governments in those states have been pretty clear.

Mr MARTIN FERGUSON—There were conservative governments in Queensland and Western Australia in that period and mining did not go ahead.

Mr Rawson—I think it was the overhang of the market with the huge stockpiles that were held by the utilities and the diluted HEU which had a big impact. Certainly, the Northern Territory is one of the more prospective areas. I can recall—

Mr MARTIN FERGUSON—There is plenty of exploration going on.

Mr Rawson—Yes, but there have been plenty of mines too. I remember being involved in a rehabilitation exercise back in the eighties. We rehabilitated 33 former uranium mines. So it is not as if we have not had a history of uranium mining in the fifties. Some of them are pretty small, but it is a bit different from the three mines policy.

Mr MARTIN FERGUSON—There has been criticism to the effect that the operation of the Office of the Supervising Scientist is, in essence, controlled by the uranium mining industry, not an independent agency. What do you say about that?

Mr Hooke—I think anybody who knows Dr Batterham knows that he has performed that role without fear or favour. I take the perception point, but I think the practise is quite removed from the perception.

Miss JACKIE KELLY—Going back to the price at which a mine becomes viable, do you ever build into the price the actual disposal at the mining point of the waste after it is an output from the power station? That is an issue that Bill and Betty in struggle street understand and have an issue with.

Mr Hooke—We do not. We are exporting uranium.

Miss JACKIE KELLY—Should you?

Mr Hooke—The disposal of the waste is a matter for the offshore companies. The same applies to coal. There is no pricing on the waste, the ash or the flay ash either. Should we? I think that goes to the point I was making—you were not here—when I talked about material stewardship.

This is quite an exciting concept that is increasingly embraced across the industry—a shared responsibility by actors throughout the value chain, so the flow of material is all the way through. I chaired an international workshop here for the International Council on Mining and Metals on material stewardship, which is about product and process stewardship and as I said the flow of material through the life cycle. I suspect, as we work through that process, much of the kind of shared responsibility for those costs and also the design in terms of eco and energy efficiency comes to bear. Do I see the market picking that up down the track? Do I see material stewardship becoming a fundamental component? Yes, I do. The green lead BHP Billiton battery exercise is probably one of the better ones around, but there are other examples. But that is a good question.

Mr HATTON—Given the rough ride that there has been from slump to boom in the minerals area, given the changes in the ownership structure of the Australian industry and the fact that we have the development of juniors as the people who are charged with getting out and looking for new capacity and new resources, Geoscience Australia made the point today about their past exploration activity incapacities. It had basically reached the point where it was not going any further, because we need to look underneath the overburden. Regional airborne electromagnetics is fundamentally needed not only to look for further uranium finds by looking at the graphitic elements and so on but, more generally, that is where the game is. Could I get your view on that? It is a question of who pays and how much needs to be done, but have we reached the point, as they have described, where we need a much more costly approach to finding existing deposits at much deeper levels?

Mr Hooke—Much more costly, or much more sophisticated?

Mr HATTON—Both, they usually go hand-in-hand, like anything new.

Mr Hooke—Yes, we do. We support that very strongly. It is one of the four planks of our minerals exploration action agenda, which this committee knows very well: extra funding for precompetitive geoscientific data to improve the undercover exploration capacity and, to the extent possible, to do low-impact exploration. One of the things that Martin Ferguson's question about Indigenous relations and the building of mutually beneficial partnerships goes to is land access for exploration. Expedited procedures under the native title system come into play if the impact is low impact as defined under the act. The best low-impact activity is no drilling from their perspective. From our perspective, it probably means drilling. So, to the extent that we are able to build and improve the technologies to detect undercover deposits by airborne electromagnetics—I am very impressed, if you do not mind me saying so, with your technical knowledge on all this stuff—

Mr HATTON—We did an inquiry in the last parliament.

Mr Hooke—that is a fundamental platform and we would very strongly recommend and urge this parliament, as we have previously, that you back the increased resourcing for precompetitive geoscientific data for Geoscience Australia. It is not just that part of the technology, it is about improving the swapping of information and getting it to a position where it is readily and easily available for people who are looking to improve the granularity of exploration, if you like. So we have actually funded interoperability of spatial data which is the jargon for having computers in the states talk to computers in other places where people are actually doing the drilling and all that data can be put into a separate spot. So, firstly, we support that. Secondly, you are right; there is structural adjustment in the industry. Rationalisation and consolidation of the industry is pretty well back to the circumstances of the seventies.

Much of the exploration effort is essentially outsourced to junior companies. This goes to one of the other fundamental platforms of the exploration action agenda, which is flow-through shares and improved financing or being able to wash out the tax liabilities to investors. The juniors do not have income to offset these tax liabilities, so there is a market failure in terms of tax asymmetry. You know the arguments very well. There is a complement to all that stuff that you are talking about and, yes, we very much support it.

Mr KATTER—Does the minerals council have the resources to properly interface with the state government departments of mines and departments of the environment to get some clear thinking on this? The ball game has changed completely with the CO2 issue. Even the greenies down here have adopted an altogether different position on uranium mining to what they had before. I am not saying that they are in favour of it; but you people have the resources to do the educative job that needs to be done at a state level with the various government departments.

Mr Hooke—That is a good question. It picks up on what Barry Haase was asking before, and that is how do you get past that? The answer to your question is yes—not the Minerals Council of Australia per se but certainly our state related representative bodies. In Western Australia it is the Chamber Of Minerals and Energy of Western Australia; in Queensland it is the Queensland Resources Council, and so on. So the resources for advocacy are there.

I have always had a bit of a problem with public education programs. It kind of sounds arrogant to say we are going to go out and educate the public. The public usually comes to finding out about these things when something motivates them. Unfortunately most of that

motivation is founded on fear. Until state politicians start to talk about all the benefits and positives of nuclear power generation, it is unlikely that they are going to turn it around.

The idiocy of running a restriction on mining activities in Australia to try and influence nuclear power generation offshore beggars belief. That is the moral and ideological underpinning of a three mines policy. How could it be anything else? The debate about nuclear power generation here in Australia is a separate matter altogether. That is a separate debate altogether and the population will have that debate as and when they see fit. But the real issue is whether or not you are restricting uranium mining and, if you are, why. It has to take account of all five points that I made in my opening statement. If you can dismiss those in a policy advocacy sense then it begs the question: why is it that state governments persist with that policy?

Mr KATTER—On that issue, I was mines and energy minister in the Queensland government and we had discussions with the state chairman who was the head of Mount Isa Mines. I said ‘I have reserved \$2½ million a year, which cabinet will agree to but we want \$5 million off you people.’

Last week I had the TV switched on in the hotel room while I was working, and there were seven separate advertisements that night on environmental issues. They were getting money off governments to put their points of view seven times in one night—that is seven separate, entirely different advertisements just on one channel. To my knowledge we have none at all. People from the industry side of things say we should be developing and using our resources instead of locking them up. There was nothing from the other side. I think most people around this table have pretty sensible ideas, from my experience with them. But they have to react to the marketplace out there and if the marketplace is going in one direction it is pretty hard for anyone here to be going in a different direction.

Can we get any assistance from you people that way? We did not go to the mining council; we went to individual companies. Out of \$15,000 million a year in Queensland I would have thought a couple of million dollars would not be very difficult.

Mr Hooke—The answer is: of course you will get assistance, but assistance for what? I do not know what the message is targeted at. You know my background well and therefore you know I have a thing about blanket advertising and running out messages. If it is fear, it is much easier to grapple with. Secondly, I would be surprised if many of those kinds of advertisements really resonate. I take your point about the links between the messages and the perceptions of those messages and what are going to be the political drivers—absolutely. The question is: how much money are we going to pour into something which is really just doing the proverbial up against a brick wall.

Mr KATTER—The level of ignorance out there is colossal.

Mr Hooke—I understand that, but what is their need-to-know factor to turn that around? In other words, what are Bill and Betty in struggle street really going to connect with in the advertisements and what might we do that will turn that around? That is why it comes back to leadership with those governments saying, ‘A lot of the stuff you are hearing is actually fanciful, and the things you really need to be focusing on are this, this and this.’ We run it—we even provide assistance to run it—and I know it is always the integrity of the message more than it is

the progenitor of the message, otherwise you would not have an advertising industry, but again it really comes back to what is going to resonate with the people in the community. That is the challenge. That is why it is very important that the leadership in those states is front and centre. If the politicians are saying, 'We used to have this policy and we now see no justification for it,' that is worth a hell of a lot more than all the publicity that we could generate to pursue it. I have a golden rule: by the time I am advocating public policy through the public media I am nine-tenths shot.

CHAIR—Thank you for appearing before the committee. If the committee has any further questions, the secretary will contact you in due course. I ask Mr Haase to move that the document provided by the Minerals Council of Australia, entitled *The economics of nuclear power*, be received as evidence to the inquiry and authorised for publication.

Mr HAASE—I so move.

CHAIR—It is so carried.

Resolved (on motion by **Mr Hatton**):

That this committee authorises publication of the transcript of the evidence given before it at public hearing this day.

Committee adjourned at 12.07 pm