Nuclear Fuel Supply into the Future and the Global Nuclear Energy Partnership

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Thank you Murray for the very kind introduction. Just a clarification right off the start, some of you have a program that has my colleague's picture on it. That is David Doerksen, our Vice President of Marketing Strategy and Administration. David had to be at other meetings but thankfully for me he has passed it on (to me). For me, I am very pleased to be here, thank you for the opportunity to talk about a couple of topics that are certainly near and dear to my heart. I am very passionate about one being of course this nuclear business that we find ourselves in, but also the opportunities for this country within our business.

Those are the things that I planned to talk about today. I plan to talk about the nuclear renaissance; I think there has been no shortage of discussions over the last few days about what we find ourselves in, in terms of the opportunities for our industry. We'll talk about fuel supply within the nuclear renaissance obviously without that fuel supply, there can be no renaissance and maybe get into a little bit of some numbers around where we see the uranium and fuel supply industry going.

We'll talk about the Global Nuclear Energy Partnership (GNEP). For those that aren't familiar, it's a U.S lead multi-lateral initiative to look at two principals on proliferation and reducing the waste burden from our industry.

Lastly, to conclude, we'll talk about some uniquely Canadian opportunities within both what we call this nuclear renaissance, but also our partnership in GNEP.

"Leap of Faith"….. This is a leap year and I think today is the extra day that we all have this year. Leap of faith - again it's fair to say that the nuclear renaissance at least from a Cameco prospective, we're in it. I heard four challenges yesterday from one of the speakers that face us, and they were along the lines of capital cost, safety and then those two GNEP principals I just mentioned on proliferation and waste burden.

With respect to the capital issue, I think we are seeing that play out today. We've heard some quotes about cost over-runs with new build and some of the challenges with these first of a kind early sighting and the financiers having to come to the table, especially in this market, where we see checkbooks tightening and we see the equity capital markets tightening. It is a challenge in terms of the nuclear renaissance and how Cameco sees it. There are these hurdles that will lead to a cautious and calculated nuclear renaissance, a tempered one, but a still very exciting one.

So, in terms of our new build outlook right now, there is about 439-440 operators reactors operating in over thirty countries in the world. Over the next twenty years we see a net increase of somewhere around 146, so that's a net increase. About 198 new ones is what we're thinking, with about 52 being shut down. We expected that that will generate somewhere around 170 new gigawatts of electricity. Really in those numbers, those are fairly big numbers. With of course today, the majority of new reactors announced during construction being build in developing economies - most notably China, Russia and India.

If we look at why there is a nuclear renaissance and we'll look at this from a nuclear fuel perspective. There are a few good arguments: Firstly, fuel is a percentage of operating cost.

When we look at nuclear compared to some of its competitors, around 25% of the operating costs, (and this is operating costs) for nuclear is fuel cost. Coal is somewhere around three quarters of that cost, there's fuel and then gas up to 90% of operating cost is fuel. So nuclear is very competitive in this regard because the industry with having being able to provide large base load, is less susceptible to the volatility associated with natural resource prices. The volatility is always going to be there, but our industry is somewhat insulated from that.

Looking at it in absolute terms, in terms of cost per kilowatt hour, again, very competitive. Have to caveat this with the fact that this is an operating cost look, so it doesn't take into account the challenges associated with capital cost, that I just mentioned, but certainly very competitive when we look at it on an operating cost and kilowatt hour basis.

Again why renaissance? Nuclear fuel comes from some very stable regions on the planet. (We like to think we are back in Saskatchewan) and certainly over half of the uranium that's produced comes from Canada and Australia. That is in contrast to fossil fuels where the minority of fossil fuels are produced in what we call "Politically stable regions".

Again, why renaissance? It's a very, very concentrated form of energy. Eight of these pellets will power a home 2000 square feet or more, for a year. As I was looking at this picture and (this is not a satellite image - we should have a pen or something in there to show scale.) I think that for most that know these pellets are the size of this pointer. It's an incredibly concentrated form of energy.

The last one that i'll say on "Why a nuclear renaissance?", is the one that I think that's really been front and center over the talks in the last couple of days – It is very competitive when it comes to emissions (life cycle emissions) It certainly is one of the lowest emitters compared to the highest, a certain magnitude less.

From a Cameco perspective, we're in a nuclear renaissance and it's very exciting for us and I think that the things we are doing in Cameco are in that context.

We take a look at fuel supply for this nuclear renaissance. We know that uranium is abundant; it's all over the world. In terms of a reasonably assured-type resource estimate, we find it in these places and some of them are the usual suspects. Uranium is everywhere and indeed uranium is being produced from all of these regions.

If we look at Uranium resources in terms of quantum then, looking at this Reasonably Assured Resources category and if we add inferred resources to that se start to talk about it in terms of supply cost. In other words the uranium price that we would need to see some of these pounds come to market – it could go as high as fifty dollars a pound, that puts us in third, plus reasonably assured is somewhere around twelve billion pounds of uranium that we're quite confident is out there.

Looking at it another way; if we expand that view, we say, "Okay, we have reasonably assured resources, what about if we add prognosticated resources to that?" These are things like additional pounds that are estimated to be in the vicinity of existing ore bodies. These are things like speculative resources, not inferred but even beyond inferred to speculative.

Unconventional resources, the likes of Uranium from Phosphates (which we know has been done in the past), if we look at all of those and total them up, we get to somewhere around fifty-seven billion pounds of Uranium. If we divide that number by an annual consumption of somewhere around 185 million pounds (that's fairly close to current consumption) we come into these sort of order of magnitude type numbers We come up with 500 years of uranium production, so as a fuel industry we think there is significant resources on the planet to fuel the nuclear renaissance.

That's the longer term macro view if we look at it in the more near term (near to medium term), over the next 20 years, we expect that there will be about 4.5 billion pounds of Uranium required. That is to fuel those 439 reactors plus the new 150 odd reactors that we expect to be built. About 40% of that demand, we expect, can be fuelled from mines that are currently operating. In addition to then existing primary production, there's existing secondary supplies and we're talking about the continued draw-down of fuel inventories around the world, including things like recycling U.S and Russian weapons material and spent nuclear fuel. We think that can provide about another 17% of the nuclear fuel. That leaves about 43%, or about 1.9 billion pounds to be supplied by new production. There's lots of uranium out there but we have to find some of it, delineate some of it and we have to bring it to the market. 43% (a couple billion pounds), that has to come from new production.

Currently there are new mines under development and existing mines that are to be expanded, we expect that those developments could supply about another 25% of that total. This now leaves about 18%, 20% of the demand that will have to come from new production centers, production centers that will likely be developed in those regions of the world that I just had up on the screen and out of those reasonably assured resources that we were just talking about. That 20% will have to look to our geologists, our explorationists, to go out and find it over the coming few decades so that we can develop those pounds and bring them to market.

Again 40% mines currently operating, maybe 20% from existing secondary supplies, maybe around 25% from expanding or developing new mines that are currently under way, and maybe another 20% that will come from finding new deposits.

We've seen it before and i'm not trying to sort of underplay or not give credence to some of the actions that we need to take as an industry to bring fuel to the market in this near to medium term. In the past, we have seen price spikes in this industry and we have seen strong supply reactions to those price spikes. If we look back to the late 40's early 50's there was a price spike that in constant dollars terms, saw uranium prices go to somewhere around seventy-five dollars a pound and with the few year lag that you would expect, world production responded.

Similarly in the early 70's we saw uranium prices go to on a constant dollar basis, over one hundred dollars a pound. Again with the lag you would expect, we saw production react. In the following period (this is the end of the Cold War and former Soviet inventories entering the Western market and in addition to those inventories, we had the H.U program and the dismantling of nuclear warheads, to bring all of that inventory to the market, the result we say saw prices drop to the kind of levels that you see there, certainly less than ten dollars per pound. With those drying up and with the few events like, the McArthur River flood, like the GNSS canceling the Russian contracts. We saw a reaction in the _______ prices, sort of recognition that some of these secondary supplies were indeed drying up. We've seen a price reaction and we expect that there will be a production response similar to the two last production responses that we see here.

In terms of where new uranium is coming from at the moment……We have a few developments. We have Cameco, our own Scarlet Lake project, but in addition we see developments in Africa, a new mine in Namibia, a lot of exploration in Namibia, new mine in South Africa and an exploration there as well. There is new Australian production coming on stream, certainly significant new production from Kazakhstan and also new production from the United States.

Expanding new mines and also exploring – we call this the "Uranium Rush". Over the last five years, at least in Northern Saskatchewan, we have gone from what would have been a number of junior exploration companies that you could count on two hands, (so it's single digit type junior exploration companies), to this explosive growth to over four hundred junior companies exploring for uranium. Is all that money being poured into drilling, drill core and exploring? Probably not, but certainly there is more uranium exploration today than there has been over the last twenty years.

On the fuel supply piece, we see that there is abundance of uranium resources around the world. We do have a near to medium term supply, but there are new mines coming on. We have increased global exploration and for those reasons, we will have fuel for the nuclear renaissance without question.

We will talk about opportunities for this country; and i'll talk about it in the context of the nuclear renaissance, and then within the context of the Global Nuclear Energy Partnership, (GNEP). We will look at it from a nuclear fuel standpoint.

If we look at opportunities for this country- in terms of value added (we're using 2006 prices) for theses commodities, you say what does fuel bundle cost? This is of course on the light water side. Uranium is about one third of the cost of a fuel bundle, this is 2006 commodity prices. Conversion - really quite small, somewhere around 10% of the cost of producing a fuel bundle. Enrichment - close to half of the cost of producing a fuel bundle. Fuel Fabrication is around 15%.

Of course, we mine and mill uranium in this country, we convert with the Cameco's Blind River Facility and Port Hope facilities – very large converter. We don't enrich in this country and we do have fuel fabrication, we have heavy-water fuel fabrication. The obvious one that seems to stand out is, "Should we be enriching uranium in this country in terms of value added?" If we look at how much uranium we might have to enrich in terms of (and these numbers just blow me away every time I see them) as a nation, we have about 900 million of those pounds of reasonably assured resources. As equivalent to twenty-six billion barrels of oil (this is on energy content) another way, seven and a half billion tons of coal. An incredible number of resources that we can bring to the world, in terms of value added, we saw that big opportunity exists with enrichment.

I'd like to spend a few moments talking about enrichment and at least as a Canadian, why I think we should be doing that in this country. Certainly new enrichment capacity is going to be required to fuel this nuclear renaissance. We see commercial enrichers deploying new enrichment and plans to build new facilities in North America. There are some uniquely Canadian benefits that I think we can bring into this enrichment business.

As I just showed, we have a very large uranium resource that we can process in this country. We have the UF6 conversion capacity and the reason that UF6 conversion exists, is so that you can turn uranium into a gaseous form because that's what the enrichment process requires. We have conversion in this country and we offer a very secure fuel supply. This is a good place to do business.

It's for all those reasons that this moratorium (and the moratorium - i'll say a few words about that for those that are not familiar yet - It's a group of eight industrialized nations -(the G8) currently have a moratorium on deploying new enrichment in countries that don't already have it. It is meant to be a non-proliferation type initiative where the current enriching countries are saying, "We will supply enriched fuel to the rest of the word". You look at our situation here in Canada and I'll speak as a Canadian right now, this is where our investor relations people tend to break into a sweat…speak as a Canadian, this really bugs me, you know, what better place to build an enrichment plant than this country. I'll talk a little bit about (at least why) I believe that to be true.

If we talk about deploying enrichment in Canada from a non-proliferation point of view again, what better place? Not politically motivated necessarily. Canada already has this incredible reputation that we've earned with respect to non-proliferation in safeguards. We of course, are signatories to the Non-Proliferation Treaty. We have this agreement between Canada and the IAEA (International Atomic Energy Agency) for the application of safeguards in connection with that Non-Proliferation Treaty that supplies to all of our nuclear and industrial sites. Canada, being the first to sign this additional protocol that allows the IAEA these enhanced rights to come into our nuclear sites and inspect them. Pop- inspections and things like that. We already are doing these things, what better place to deploy new enrichment?

As a country there are also some benefits that could be enjoyed by having that extra value at its step. I'll try and be as clear as mud on this picture, but really there is a trade-off that can exist between uranium and the measure of enrichment (which is called separative work units). The trade-off is that to produce (the example here we have) is 100 kg of uranium. To produce this amount of uranium, there are many different recipes that you can use to produce that 100 kg. You can; use more uranium and less separative work, or less uranium and more separative work.

What it has to do with is the relative prices of these commodities. You make the choice based on the relative price in its simplest form on the relative price of these commodities. When uranium is really expensive and separative work is very cheap, you would choose to use more separative work and less uranium to produce the same 100 kg of what we call the enriched uranium. When uranium is very cheap, (and we have seen this over the last twenty years) and separative work is very expensive, then you use a lot more uranium and a lot less enrichment to produce that same 100 kg of enriched uranium. We have a few examples and combinations here showing how you can achieve that same 100 kg of enriched with some different recipes.

There are significant synergies to be realized and domestically with the nine-hundred million pounds of resources, significant synergy is being optimized within this country based on the type of recipe that you want to choose to minimize cost.

Last plug for getting enrichment into Canada - The size of the opportunity for us, (if we're looking at reasonably assured resource) that's a seventy billion dollar opportunity and that's something that we obviously have. Refining – about one billion dollars. (That's our Blind River facility which will run a lot of uranium through). Conversion- a couple of billion dollars, but enriching (someone is going to do this) enriching that material, another thirty-five billion dollar opportunity. Again, very large opportunity. Again, new enrichment is being deployed in North America as we speak….why not here?

No shortage of opportunities within the nuclear fuel cycle, both as commercial entities, but also as a country.

Moving on to the Global Nuclear Energy Partnership and open with some of these four challenges that the nuclear renaissance, the nuclear industry has – the ones that were mentioned yesterday (capital safety), but non-proliferation and reducing the waste burn that comes from our industry.

Those are really the two big principals out of GNEP. Of course again, it is a U.S led multi-lateral initiative with the two main goals of reducing proliferation risk and minimizing the waste burden from nuclear energy.

There are twenty-one signatories at the moment, two that have joined this partnership. Canada is one, United Kingdom being the most recent. All of it is aimed at expanding nuclear power around the planet in a very environmentally sustainable way and it's a friendly source of power.

Just a few words on what GNEP is and what they are looking at… They are looking at deploying new technologies, new technologies in the form of recycling uranium, new technologies reactors that burn up more of the fuel and more of the less-pleasant portions of the fuel. Thereby minimizing or reducing the waste burden that comes out of more closed nuclear fuel cycles, so a very, "Cradle to grave" type initiative, also looking at non-proliferation from reliable fuel services and services program. There is no shortage of multi-lateral fuel cycle initiatives that have been proposed or announced around the world. Maybe somewhere around fourteen or fifteen at the moment; the Japanese proposed one, Germany has proposed one, and the Russians. Really with the aim of reducing proliferation risk by providing all of the fuel cycle services to (as GNEP puts it) rogue states who want to develop a domestic nuclear energy program but who the rest of the world doesn't want to have things like enrichment technology. A reliable fuel services program all with the goal of eliminating proliferation risk and minimizing nuclear waste.

Canada has signed up to the Global Nuclear Energy Partnership (GNEP). Why would we do that, what are the opportunities for Canada? Well, certainly we get to participate in developing new nuclear technologies. That is a big driver for GNEP and much of the funding that they have earmarked will be going toward research and development. These are again, nuclear technologists when it comes to nuclear reactors, when it comes to recycled fuel, when it comes to the fuel cycle and of course Canada has a lot of expertise and experience in that regard.

We get to participate in recycling technologies and increase the usable energy content of our uranium and decrease the amount of waste that comes from it. We ensure that our uranium and nuclear industries are not left out of some of these international opportunities. Even this G8 moratorium is a fairly good example of that, where we have a seat at the international table when it comes to nuclear fuel. Within GNEP we will continue to play a large role.

Beyond that, if GNEP or some of the other multi-lateral fuel cycle initiative are looking at supplying uranium to other nations, Canada can participate in some of these fuel supply arrangements. I think as we just saw, we have lots to offer.

We have an interest as a country, and certainly as an industry in non-proliferation and safeguards and recycling technologies. I think whether you're pro-nuclear or against nuclear, one thing we can all agree on is reducing non-proliferation risk, and decreasing the waste burden are good things, and some things we should go after. These are good things for our industry and as a country, we can increase nuclear exports.

In terms of the nuclear renaissance, yes, it's under way and yes, (from a Cameco perspective) it has its challenges. Are we going to be able to supply fuel to the nuclear renaissance - in the near to medium term there is going to be some volatility and that's fair to say as we see some new production some on stream and as we see, some hiccups associated with that new production coming in. I don't think you'd be able to find uranium produced that hasn't had those hiccups. That will lead to some uncertainty in the near to medium term, but certainly there's no shortage of resources out there to fuel the nuclear fuel cycle. In terms of opportunities for Canada within that nuclear renaissance, by all means we are already enjoying some value added in this country and we could continue to push for more. We have joined the Global Nuclear Energy Partnership; we will continue to be a strong voice. I think within that partnership and around the world, as we have always applied our safeguards and lived up to our commitments within the MPT. Canada as a country will, with that partnership, continue to enjoy some benefits as well.

Thank you again for the opportunity to come and share some Cameco perspectives.

Question and Answers

Ken Seitz – Vice President, Corporate Development & Power Generation
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Guest: "The early version of GNEP required that the signatories renounce enrichment and reprocessing and so forth, is that so? Explicitly, what are really the conditions as a signatory of GNEP? Are we allowed to proceed with reprocessing or enrichment, or not?"

Ken Seitz: "Many of the underlying execution strategies for what GNEP hopes to do are up for debate. So, "cradle to grave" type fuel supply arrangements, where you supply fuel and take the waste back. These are all very controversial and really up for debate - so the debate hasn't taken place. In terms of a Canadian perspective as to whether we'd be as a signatory to GNEP be prohibited from deploying recycling technologies are enrichment in this country, no. In fact with the G8 Moratorium, I think that there's a strong Canadian voice at the moment, to see that end for the reasons I talked about earlier. There is more debate to come there, as GNEP develops their principles. As of today, no."

Guest: "It's still unclear then, what have we actually signed on to?"

Ken Seitz: "We've signed on to a couple principles of reducing waste burden through development of technology and reducing non-proliferation risk. I think that someone said it yesterday; you sort of make the jump with the expectation that things are going to change. Again, there are fourteen of these fuel cycle initiatives that have exactly those principles. It's a starting point."

Guest: "One reason I ask is that I was at an international meeting just last fall and people from IAEA and also senior people from the U.S, were really pushing the argument that signatories would not pursue these things - that they would have to take the services from those countries that already have it. It's almost like an MPT type of thing. I could not understand why Canada would even think of buying into it because as you said, we have been purer than purer in the international ______."

Ken Seitz: "No, and we haven't. Pushing for criteria based approach to deploying enrichment in countries that don't already have it. So yes, you can have enrichment technology and deploy it in your country, but you're going to need to meet certain criteria. That is what Canada is after right now. I think we'll get there within the G8 and I think we'll get there within GNEP. I just go back to, okay, throw any criteria our way, and we'll be able to meet them as a country."

Guest: "Just a question of scale. You mentioned that you had plenty of fuel for seven hundred units approximately, over the next thirty to forty years. I had done some other little calculations and if these units were totally dedicated on a one-to-one basis in replacing the gasoline consumption daily in North America, those seven hundred units would be totally committed to that job of producing one-for-one energy, compared with gasoline production today in North

America. So, scale…I would say how would the supply look if the demand for units was increased by a factor of ten? I think that's a modest increase myself, I think we need more than those. Increasing the demand for nuclear units to seven thousand to 2050, instead of seven hundred it changes the picture. I agree with you completely, there is plenty of uranium even for the seven thousand if we do it right. Would you agree?"

Ken Seitz: "Yes. When we talk about IAEA type reasonably assured inferred resources (that's of course the uranium that we know about, or that we have fairly good feeling is there). There's lots of the world and lots of the earth's crust that has yet to be explored and find additional uranium. There's always going to be a question of cost and so to answer your question; can we fuel our view of the nuclear renaissance and a renaissance that is ten times our view? I'd probably have to go back and do a little bit of math, but we think there's a lot of uranium out there."

Guest: "I don't want to rain on your parade, but the GNEP program in the U.S is losing support domestically, particularly in the Congress, as you probably know and it may not actually survive the Democrat administration. If I were Canada, I wouldn't put too many eggs in that basket.

The question I wanted to task you about, is the question of Canada getting into the enrichment business. Australia did a report on whether Australia too, should get into the business and they concluded that the barriers to entry were very high, particularly on the economic side of it. You would simply need too much by way of investment to get into that. But the bigger proliferation question is if Canada goes for national enrichment, it sends another signal to the development countries that they themselves should not get into this business, they should buy only from developed countries. There's a huge political problem there. Now I'm wondering whether Canada should not seriously consider the idea of a multi-lateral arrangement, where Canada could contribute its expertise, its materials, but within an international regional framework that would get away from this side of discriminating against the developing world and the idea that somehow, they should always buy from the West and not develop their own facilities."

Ken Seitz: "Point taken about GNEP – understood. In terms of developing domestic enrichment for this country, I think it's a question about how you go about doing it. Enrichment technology is incredibly sensitive and is very difficult to do and very expensive to develop. I think that our American friends who are developing the American ___________just announced the other day their one and a half billion dollar cost to their program. Do we want to develop domestic enrichment technology? Maybe, maybe not. It's expensive just as the Australians concluded but there is new enrichment being deployed in North America and it's not domestic U.S technology, this is European technology that's being deployed into the U.S. So I just ask the question, why not here? What better place to deploy it than Canada? We have the natural resource here. It's our uranium; why not enjoy some of that economic benefit that comes from that thirty-five billion dollar opportunity?

Point taken, it's expensive to develop domestic enrichment technology, but there's a technology that exists that's being deployed all over the world.

Your second question about the debate that would rage were we to deploy enrichment in this country. I agree, and I have my own beliefs on the multi-lateral fuel initiatives; like the conversations that take place in the absence of developing countries, those are all issues. As a start, we should have the right to deploy enrichment in this country. Perhaps like other developing countries who might meet criteria based approach would be able to do. Let's start with the right, let's have the debate around non-proliferation and what that would mean to have domestic enrichment here, but let's start with the right to deploy."

Guest: "I am puzzled. It's a different world out there. You go in the tar sands and they're investing ten to twenty billion dollars, all kinds of energy projects. Somehow we have this narrow-minded perspective that nuclear, when we're talking a few billion dollars is a huge amount of money. It doesn't seem to be proportionate, yet the amount of energy that will produce clean energy should surely shift the social acceptance opinion - that these are worthwhile affordable investments. Yet, we seem to have two different perspectives on whether it is tar sands, or whether it's nuclear. I guess we have a big task in social acceptance of our vision to bring people along to what we're thinking. We've got some neat ideas, but we seem to be talking in an atmosphere that's away from the public and they don't seem to understand what we're saying.

Getting back to the first point you brought out which is the amount of uranium there. I think you just scratched the surface in how much is there. There's an enormous amount in the oceans and if we look onward to a breeder technology and we start doing energy on the scale that needs to be done, if we're going to deal with the issues that we're concerned about like green house gases, we're going to be looking at taking uranium out of the oceans. This uranium is being brought in every year continually by the flow of the rivers and so there's an enormous amount of fuel there that is waiting. (That we will be taking and I don't know whether it's fifty to one hundred years from now). It's something that people should be aware of, there's no limit to the amount of uranium and that is before we even talk about thorium. We shouldn't be thinking about the limits, as this is a renewable sustainable resource that's out there and we shouldn't be just boxing it in as a small piece of the energy puzzle."

Ken Seitz: "I guess I apologize if that is the message that I conveyed here today, that we think there's going to be some massive uranium shortage or that it's going to be a small piece of the puzzle…not at all. We think that there's a lot of uranium around. It is a natural resource that is going to come with some ups and downs, but yes, I agree."

Guest: "My question is about the economics of recycling spent fuel. I was wondering if there was enough information available today to do a comparable analysis with the costs associated with recycling spent fuel, compared to new mine production going through the existing fuel cycle."

Ken Seitz: "Yes, by all means, of course the French and the British are recycling uranium, so they have very good experience with that. It is very expensive. Certainly not competitive when we look at the costs of new mine production, however there are other drivers that lead you to recycling. I think we'll see more recycling technology under the hospices of things like GNEP, which economics will play a role, but there are other drivers, and this goes along the lines of non-proliferation and reducing the waste burden"

Guest: "Do you have a quantum of comparative costs?"

Ken Seitz: "No I don't. I don't want to quote recycling cost because we don't recycle uranium but there is no shortage of publicly available information on the costs of quantum of recycling uranium and certainly the cost of developing uranium mines."