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Chair

Mr. Leon Benoit

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● (1540)

[*English*]

The Chair (Mr. Leon Benoit (Vegreville—Wainwright, CPC)): Good afternoon, everyone. We're here today to continue our review of the state of the nuclear industry in Canada and abroad.

We have four groups of witnesses today. I'll start the presentations in the order listed on our agenda.

We'll start immediately with the presentation from AREVA Canada Inc. We have with us today Roger Alexander, president, and Jean-François Béland, vice-president.

Please go ahead with your presentations, for up to 10 minutes.

Welcome.

Mr. Roger Alexander (President, AREVA Canada Inc.): Thank you.

I am pleased to have this opportunity to address the standing committee and exchange some views regarding something that is so vital to our country: the nuclear industry. It produces energy without CO_2 and has a total life-cycle carbon footprint similar to that of wind-generated power.

AREVA is a company that has focused on energy production without CO_2 production. Yes, we are a nuclear company, but we're also a renewables company, with wind, biomass, and solar. We believe in the right mix of energy solutions, and although we believe that nuclear energy is not the only solution, it is part of the solution.

At AREVA we have 75,000 employees worldwide in a vertically integrated company engaged in CO_2-free power generation. We incorporate activities ranging from mining through to the manufacture of reactors, nuclear services, spent fuel reprocessing, and electrical transmission and distribution. Here in Canada we employ over 1,100 people across the country. We have been conducting uranium exploration and mining activities in Saskatchewan for over 40 years.

I'm sure you've heard of the nuclear renaissance around the globe, and yes, it has been slowed by the ongoing global economic and financial crisis. Some potential customers, such as U.S. utilities, have delayed their investment plans, as they have felt the need to clean up their balance sheets before going forward.

In this industry, we're used to thinking in terms of decades, not weeks or months. Whatever the current difficulties, it's a simple truth that in the next few decades a huge investment will be needed to cover the world's energy demand.

In the long term, demand for energy will continue to grow. It's a moral imperative. There's simply no way to reduce poverty in a growing world population without increased energy consumption.

The current generation capacities will age and need replacement. The price of fossil fuels may be low today, but oil and gas reserves are not infinite. These prices will almost certainly escalate when economic growth resumes. In the meantime, the world will keep looking for CO_2-free electricity generation to reduce global warming.

Our estimate is that the demand for new nuclear reactors will reach approximately 300 by 2030. Countries such as China have massive reactor-building plans, and others such as France and the U. S. are looking at steady development and replacement over the next decades. Twenty-five building sites are active as we speak, with 16 in Asia, five in Russia, and four in Europe.

More importantly, perhaps, the industry is still investing. We recently announced a major investment plan to expand the capacity of existing equipment factories in Europe and to build new facilities in the U.S., where we will have reactor orders.

But demand is not enough. We need to adapt and organize to answer that demand. That is what has happened all over the world in the nuclear industry in the past few years.

First of all, we have experienced significant consolidation. Initially this was due to the increased costs of designing and building nuclear plants that are both safer and more economical than the existing fleet, the models known as generation III reactors. It took hundreds of millions of dollars to design generation II reactors, while the bill amounts to several billion for each generation III design.

This means that no one can go it alone anymore. Our industry has had to give up on that quaint, outdated notion of national champions that are able to do everything by themselves.

AREVA was created in 2001 through the merger of French, German, and American companies. In 2007 we partnered with Mitsubishi to create ATMEA, a joint venture for new plant design and the development of new nuclear fuels.

I don't represent a French company at all; I represent a multinational company headquartered in Paris. This company sells global technology, not French technology. This technology evolved out of a U.S. design, thanks to the common work of French and German engineers who, for our next products, will be complemented by Japanese teams, proven out of experience from China and Finland. Of the 102 nuclear plants that AREVA has built or is currently building, only 59 are in France. The rest can be found in 10 different countries over four continents.

This is the only way it can be today. AREVA was not the only company to gain a global industrial foothold in the last decade. All of our major competitors did as well. In 2006 Toshiba purchased Westinghouse and created the third-largest nuclear company in the world, straddling the Pacific. In 2007 GE and Hitachi joined forces in a series of joint ventures. This is the new face of nuclear: large multinational companies that can reach across the continents, bring together R and D teams of thousands, and invest billions of dollars in the development of new designs.

AREVA spent $1.2 billion last year on research and development. That does not include Mitsubishi's share of our new reactor developments. But it's not enough to consolidate existing resources. We must also prepare for the future by hiring the right people and organizing a strong global supply chain. Crisis or no crisis, AREVA needs the best people available to deliver the best products and services.

● (1545)

In 2008, we hired 12,000 new recruits globally, but based on the current economic situation, we have taken a recruitment pause. At the same time, we have invested massively in the supply chain, in some cases through acquisition, while sometimes we have expanded or created new factories. As I have mentioned in other cases, we chose to build long-term strategic partnerships to ensure future deliveries, just as we would like to do more of here in Canada.

Typically these partnerships serve both a global and a local purpose. Globally, they give our partners an opportunity to provide highly specialized components to our new builds around the world. Already this is happening with Canadian companies as well. The plant we're building in Finland has Canadian valves and a Canadian simulator.

Locally, these partnerships allow us to build at a lower cost and with maximum benefits for the local economies. This helps us build local skills in a way that is consistent with our responsibilities as the industry leader.

How does this apply to the Canadian situation? It applies directly. Since AREVA has a strong record of partnering with local companies in our other markets, I do not see why anyone could believe that the situation would be different for us here in Canada. Our corporate track record with uranium-mining joint ventures in Saskatchewan supports this.

Canada has a great nuclear tradition. Even more importantly, this country kept its skills alive when others were letting their own industry decay in times of low demand. AREVA's database includes the resumés of 25,000 Canadian nuclear professionals. That's a very attractive situation for a company such as ours that needs the best skills worldwide.

If AREVA were to win a reactor in Canada, it would be absurd to believe that anybody with nuclear skills in this country could lose their job. The exact opposite is true. We would need not only to preserve the existing skills, but to build even more of them in Canada, as we have done elsewhere.

I want to touch briefly on the current process in Ontario. We are of course disappointed regarding the current suspension of procurement. We believe that a long-term focus is needed to supply energy here. We are proponents who think that the Province of Ontario should start an initiative to build a reactor in Ontario now. Of course, we would like it to be AREVA technology. We are interested in and have offered the federal government the possibility of transferring a licence for proven AREVA technology to Canadian entities, including, possibly, AECL.

A licence transfer to Canada would create new jobs in the nuclear industry here and will guarantee that existing skills remain in Canada. Canada could have access to the light water reactor technology market, which is 90% of the world requirement. This is about diversification, not replacement. Canada will naturally retain its role as a leading heavy water player while gaining expertise in light water technology. AREVA would be proud to accompany the Canadian nuclear industry in this diversification process and to create long-term partnerships.

There's also the U.S. Already, U.S utilities have announced that they will build seven AREVA reactors. Four of these projects are already in front of the U.S. safety authority, while three others have been delayed due to the current economic crisis. When this is over and AREVA finds itself building two reactors or more at the same time in the U.S market alone, we will need all the help we can get. We'll need engineers, valves, electrical equipment, construction capabilities, and uranium, you name it. Canadian industry would be a valuable partner in this venture.

What about the waste? That's always the question I get asked in this business. Well, at AREVA, we believe we have part of the solution. It's an innovative concept: recycling. How does that work? We have the technology to reduce the volume of hazardous waste by approximately 80% to 90%. The plutonium and uranium from spent fuel are recyclable and final waste can be stored or buried after the process of vitrification.

North American jurisdictions have not yet come to grips with this issue, but I personally believe it is one of the key topics that will ensure the sustainability of the nuclear industry going forward. It needs to be taken on here in North America.

The topic of isotopes has received a lot of visibility recently. We think AREVA can help. We have successfully built research reactors in many jurisdictions and we are confident we can do so here in Canada. We think it makes sense to do this in cooperation with a Canadian university engaged in nuclear research.

AREVA has also been concerned with the federal government's non-resident ownership policy related to uranium mining in Canada, having advocated its elimination for a number of years. We were encouraged by the Competition Policy Review Panel recommendation last year and the subsequent commitment of the federal government to implement those recommendations, in particular in the domain of uranium mining.

This policy required non-resident owners to reduce their ownership in a uranium mine below 50%. Obviously, without the elimination of this restriction, AREVA would be discouraged from continuing our 40-year interest in Canada, where our long-term presence both in exploration and in mining operations has been a significant development factor, with billions of dollars invested, resulting in employment and business opportunities that are often focused on northern aboriginal communities.

● (1550)

This policy could hinder several more billions of dollars of potential investment in exploration and development projects in Nunavut and Quebec. We are hopeful that the non-resident ownership policy will be eliminated.

The electricity industry is at the dawn of a new era, an era that promises to deliver steady, reliable, zero-emission energy to meet the growing need in both developed and developing nations. AREVA is proud to be the industry leader and to work with governments in developing a long-term view in this sector. We look forward to helping Canada carve out for itself a significant role in the growing market.

Thank you.

The Chair: Thank you very much, Mr. Alexander.

Mr. Alexander is the president of AREVA Canada.

Just before we go to the next witnesses from the Nuclear Waste Management Organization and then from the University of Saskatchewan, I want to mention that we have as the last witness, by video conference from the University of Greenwich, Professor Stephen Thomas, professor of energy studies.

Professor Thomas, can you hear us?

Professor Stephen Thomas (Professor, Energy Studies, University of Greenwich): Yes, I can.

The Chair: Thank you. I was just checking to make sure you're catching everything.

We will now go to our next presenter. Mr. Kenneth Nash is president and chief executive officer of the Nuclear Waste Management Organization.

Go ahead, please, for up to 10 minutes.

Mr. Kenneth Nash (President and Chief Executive Officer, Nuclear Waste Management Organization): Good afternoon. Thank you for this opportunity to appear before the committee this afternoon.

Used fuel arises as a byproduct of electricity generation. My remarks will focus on Canada's progress on the long-term management of this material.

Work on used fuel disposal in Canada was initiated in the early 1980s when the Governments of Ontario and Canada established the Canadian nuclear fuel waste management program, where AECL was assigned the responsibility for the development of geologic disposal. In 1989, in response to public concern about siting the repository, the concept of geologic disposal was referred to a federal environmental assessment panel, and a moratorium was placed on siting a disposal facility.

The federal panel conducted a comprehensive review of AECL's disposal concept and in its 1998 report said that the technical safety of a geologic repository had been demonstrated at a conceptual level, but public support had not been demonstrated. The panel made recommendations that were largely translated into the 2002 Nuclear Fuel Waste Act, a new framework of responsibility and decision-making.

Canada now has 2 million fuel bundles or 30,000 tonnes of used fuel in safe interim storage, principally in the province of Ontario. Nuclear power plant operators have adequate future capacity for decades to come and, with care and maintenance, the storage structures can safely store used fuel for up to 100 years. However, this material will remain hazardous almost indefinitely and requires sound long-term management.

In accordance with the requirements of the Nuclear Fuel Waste Act, significant progress has been made since 2002. The NWMO was formed by Ontario Power Generation, Hydro-Québec, and New Brunswick Power Corporation with a mission to collaboratively develop and implement a socially acceptable, technically sound, environmentally responsible, and economically feasible plan for Canada's used nuclear fuel. An advisory council was formed by the NWMO and trust funds have been established by the used fuel owners. Accumulated balances in these funds now exceed $5 billion.

NWMO completed a study of alternative methods of storage and disposal and submitted recommendations to the Government of Canada in 2005 in accordance with the Nuclear Fuel Waste Act. During the three-year study, significant efforts were made by the NWMO to address societal aspects of long-term nuclear fuel management.

Some 18,000 Canadians, including 2,500 aboriginal people, were engaged in and contributed to this study, and it received contributions from 500 experts. There were 120 information and discussion sessions held across all provinces and territories. Not surprisingly on a subject like this, there was a wide diversity of views.

However, there was common ground: safety and security is a top priority; this generation must take action now to manage the waste we have created; we must take advantage of best international practice; and the approach must be adaptable to allow for changes in technology and societal priorities.

NWMO's recommendation for adaptive phased management emerged as the approach that would best meet the priorities and values of Canadians. This plan was approved by the Government of Canada in 2007. APM, or adaptive phased management, is both a technical method and management system.

The technical method is isolation in a deep geologic formation where used fuel can be monitored and can be retrieved if necessary. This method is aligned with international best practice, where almost all countries with major nuclear programs have made national decisions for a deep geologic repository.

● (1555)

Equally important is how we get there, and this is specifically tailored to Canadian values and priorities. It requires flexibility in the pace and the manner of implementation and responsiveness to new developments and traditional aboriginal knowledge, and openness, transparency, and staged decision-making, with the involvement of Canadians at every step of the way. It also requires the facility to be located in an informed and willing host community.

NWMO is now responsible for implementing a national infrastructure project that will involve an investment of $16 billion. It will be a high-technology project with skilled employment for hundreds, over many decades, and will operate a centre of expertise for international collaboration. It will involve a long-term partnership between NWMO and the host community and must foster community well-being. It will be highly regulated, with strict scientific and technical criteria to assure safety.

In 2008 NWMO published an implementation plan after two rounds of public consultations. We very much see ourselves as working on behalf of Canadians, and we can succeed only if we maintain a social licence to proceed.

We've established several mechanisms to achieve this in a systematic way: a forum of aboriginal elders from across Canada and projects with several aboriginal groups; a forum of municipal associations; a network of citizens' panels and multi-party dialogues where we bring together interested parties such as industry, aboriginal people, special interest groups, and labour; and ongoing briefings of provincial and federal governments. We use these mechanisms on a frequent basis to seek input to our implementation plans and, more recently, to our plans for site selection.

Probably the most challenging task is the selection of a site for the used-fuel repository. NWMO has held two rounds of public dialogues on siting, using the mechanisms I've just described. Provided we have sufficient consensus, we could start siting selection as early as next year. The draft siting document, which is available on our website, contains a nine-step process for social, safety, and environmental assessment. It embodies the concept that a community chooses to participate and has the right to withdraw. It commits to a partnership approach and provides for the inclusion of surrounding communities and aboriginal people.

Canadians have been very helpful in providing their views on our draft document, including the need for federal and provincial support to the siting process, and the recognition that the eventual host community will be making a major contribution to Canada.

Canada, together with our international partners, has the technology for the safe long-term isolation of used nuclear fuel in a geologic formation.

Canada has the benefit of a strong government policy and legislative framework to support progress.

Trust funds and mechanisms are in place to ensure that financial burdens will not be passed to future generations.

As a result of successive reviews, extensive dialogues, and government decision-making over the past 25 years, NWMO now has a mandate that is consistent with the expectations of Canadians.

Thank you.

● (1600)

The Chair: Thank you very much for your presentation, Mr. Nash.

We'll go now to the next witness, who is from the University of Saskatchewan. Richard Florizone is a policy fellow in the Johnson-Shoyama Graduate School of Public Policy.

Go ahead please for up to 10 minutes.

Dr. Richard Florizone (Vice-President, Finance and Resources, University of Saskatchewan): Thank you, Mr. Chairman and members of the committee, for the opportunity to appear before you today.

As you heard in the introduction, my name is Richard Florizone and I am a policy fellow in the Johnson-Shoyama Graduate School of Public Policy at the University of Saskatchewan. I am also past chair of the Uranium Development Partnership, which I will say more about shortly. I hold a Ph.D. in nuclear physics from MIT and am currently vice-president, finance and resources, at the University of Saskatchewan.

I understand that your mandate is to review the state of the nuclear industry in Canada and abroad, and I am here as an informed individual to provide you with my own perspective on these topics.

The idea of a nuclear renaissance has been broadly discussed in the last several years. Indeed, it was made reference to earlier today. There is indeed a renewed interest in nuclear power around the globe, with nations planning for a total of over 200 new reactors in the next decade. This renewed interest is driven by a number of factors, including increasing energy demands, concerns about energy security and supply, and, probably most importantly, the growing urgency around global warming, and specifically the need to cut carbon emissions.

Canada is uniquely situated in this new environment. We are one of the highest carbon-emitting nations in the world. Many of our provinces, including my own, are heavily reliant on fossil fuels for their electricity production. At the same time, our provinces of Ontario and New Brunswick draw a significant portion of their electricity needs from nuclear power.

In Atomic Energy of Canada Limited, AECL—although its future is the subject of much speculation—we have our own homegrown nuclear technology, the CANDU reactor, which is employed around the world. Finally, we have Saskatchewan, which is currently the world's number one producer of uranium.

Given a potential nuclear renaissance and Saskatchewan's leading existing position as a miner of uranium, there's an important question for our province. What should be Saskatchewan's nuclear strategy? How can we best steward development of our uranium resources to contribute to the world's energy and environmental sustainability as well as to the prosperity and well-being of our own province and our nation?

To answer these questions, the Government of Saskatchewan convened the Uranium Development Partnership, or UDP, in the fall of 2008, with a mandate to "identify, evaluate, and make recommendations on Saskatchewan-based value added opportunities to further develop our uranium industry". I had the honour of chairing the UDP, which consisted of 12 representatives drawn from industry, academe, and affected communities, including environmentalists, first nations, and urban and rural municipalities.

I would now like to comment on some of the findings of the UDP in three key areas: exploration and mining, power generation, and research and development.

Firstly, on exploration and mining, uranium mining has been a good business for Saskatchewan. It contributes approximately 3,000 jobs, 80% of them in the northern regions of the province, and over $200 million annually in royalties and taxes to the provincial and federal governments.

In terms of world demand, the outlook for uranium mining is strong and growing, with forecasted growth of 80% by 2015. That isn't just due to estimates of a nuclear renaissance; this projected growth is also due to the expectations that Russia will stop down-blending its stockpiles of highly enriched weapons-grade uranium by 2013, the so-called megatons to megawatts program, dramatically increasing the demand for primary uranium.

Although Saskatchewan is currently the world's number one producer of uranium, we are likely to lose this leadership position to Kazakhstan in the next year or two. To maintain global competitiveness, the UDP found that Saskatchewan needs to review its royalty framework and evaluate its system of exploration incentives.

The province should also work with Canada's federal government to establish more efficient regulatory approvals and to clarify the parameters and accountabilities for the duty to consult with first nations and Métis communities to enable the development of new mines.

In short, there are a number of steps that can be taken by the provincial and federal governments to support the strong and growing uranium mining business.

Second, let me turn to power generation. Governments around the world are facing increasingly difficult decisions on electricity generation. Concerns over carbon emissions are creating pressures to phase out the use of fossil fuels. However, every electricity-generating technology, including nuclear, presents a different set of advantages and disadvantages. There is no single technology or silver bullet to fill the gap.

Although controversial in some jurisdictions, nuclear power is a safe, low-carbon source of baseload electricity. Assuming capital costs in the range of $4,000 per kilowatt, and carbon pricing estimated in the range of $20 to $30 per tonne, nuclear is also cost competitive with coal and gas.

In short, there is a set of circumstances under which nuclear power can make good environmental and economic sense. The UDP therefore recommended that Saskatchewan consider nuclear power generation as part of its long-term energy mix.

However, we have a number of current challenges for jurisdictions like Saskatchewan in implementing nuclear power. Two of those challenges are public opinion and management of waste, but I'd instead like to comment on four others that are perhaps less broadly recognized, some of which have emerged more in the last year.

The first of those four is capital costs. The halting of Ontario's new reactor build suggests that capital costs may be a challenge. If the industry cannot deliver capital costs in the range of $4,000 per kilowatt, the nuclear renaissance may be short-lived.

● (1605)

The second is uncertainty in carbon pricing. Carbon pricing gives a very significant advantage to nuclear power generation. But without an established carbon pricing regime, the business case for nuclear power is less clear.

The third is the uncertainty around AECL and the extent of federal, political, and economic support for the nuclear industry. Around the world, the costs and risks involved have meant that federal governments have always been involved in some measure in all nuclear new-build projects.

The fourth is the recent drop in natural gas prices. Although this may be only in the short term, gas prices below $5 per gigajoule make gas-fired electricity generation economically attractive.

The long-term solution for Saskatchewan, like most other jurisdictions, will likely include a diverse electricity generation portfolio: expanding hydro where possible; pursuing clean coal and carbon capture; investing in further development of wind and solar potential; and building new nuclear generation capacity where it is feasible and there's public support.

But until the economics of nuclear power, carbon pricing, and the future of AECL become more clear, it will be difficult for Canadian provinces like Saskatchewan to further pursue nuclear power generation.

Third, let me turn to research and development. Canada's critical role in the global medical isotope market has been highlighted during recent shutdowns of the NRU reactor at Chalk River. In addition to isotope production, NRU, which is slated to shut down permanently in 2016, also enables research and development in nuclear power generation and is a source of neutrons for neutron science. Although the focus of the discussion, importantly, has been on medical isotopes, these two other applications of NRU have been talked about a little bit less in public.

Medical isotopes may be produced in other ways, but if Canada wants to maintain this other research and development associated with NRU, the country will likely need one or more new research reactors.

The UDP recommended that Saskatchewan could be an attractive location for a replacement to NRU. This recommendation is supported by a number of facts, but I'll focus on two.

First, Saskatchewan has a history of and an existing capacity in nuclear research and development. In 1951 the use of cobalt-60 in treating cancer was pioneered by a U of S research team in collaboration with AECL.

Second, Saskatchewan has the Canadian Light Source, Canada's only synchrotron and the largest science project in the country in a generation. There are significant operational and research synergies in co-locating a synchrotron and a research reactor or neutron source. Indeed, the U.S., the U.K., France, Switzerland, and now Sweden have recognized the value of these synergies by co-locating their neutron sources next to their synchrotrons.

The Province of Saskatchewan, the University of Saskatchewan, and their collaborators have therefore submitted a proposal to the Government of Canada for a new world-class research facility to meet Canada's medical isotope and nuclear R and D needs: the Canadian Neutron Source.

In summary, although the full extent of a nuclear renaissance is debatable and remains to be seen, nuclear power has a strong future globally. There's an existing base of nearly 400 reactors worldwide that will continue to need fuel, and there are plans around the world for several hundred new reactors.

There are significant economic advantages to nuclear if capital costs can be minimized, and particularly when carbon pricing is implemented. Countries like France and India have continued to put nuclear at the heart of their nuclear strategy, and as I said earlier, nuclear power generation is not a silver bullet, but no existing technology is.

In Saskatchewan the UDP report has provided some recommendations on how our province should position itself in this environment. A key question for the federal government now is, what should be the nuclear strategy for Canada? I hope my comments today will assist you in addressing that question.

Thank you.

● (1610)

The Chair: Thank you, Dr. Florizone, policy fellow in the Johnson-Shoyama Graduate School of Public Policy at the University of Saskatchewan.

We'll go to our final witness today, here by video conference from London, Professor Stephen Thomas, in energy studies at the University of Greenwich.

Please go ahead, Professor Thomas, for up to 10 minutes.

Prof. Stephen Thomas: Thank you for the opportunity to present evidence to this important inquiry.

My presentation is divided into four main parts. In the first part, I will examine the factors that determine the economic competitiveness of nuclear power. In the second part, I will examine what factors will determine whether the widely predicted nuclear renaissance will actually occur. In the third part, I will examine the key markets worldwide for nuclear power. In the final part, I will examine the prospects for sales of CANDU reactors.

Let me start with the economic competitiveness of nuclear power. As a rule of thumb, it is generally assumed that about 70% of the kilowatt-hour cost of electricity from a nuclear plant is accounted for by the fixed costs of building and finance, so I will focus on the determinants of these fixed costs. There are three main elements that make up the fixed cost: the construction cost, the cost of borrowing, and the annual plant output.

Let me look first at the construction cost. Ten years ago, when the new designs that it is hoped will form the basis for the nuclear renaissance were first mooted, the nuclear industry confidently predicted that they could be built for $1,000 U.S. per kilowatt, so that a typical 1,200-megawatt plant like an ACR-1000 would cost about $1.2 billion U.S.

This prediction has proved unrealistic. Cost estimates for proposed new U.S. plants seem to be clustering around the $5,000 U.S. per kilowatt mark, while if press reports of the Ontario bidding contest for nuclear capacity held in the summer of 2009 are correct, the current price is at least $7,000 U.S. per kilowatt.

So cost estimates have gone up by a factor of five to seven in only a decade. These estimates are all in advance of any construction, and historically such cost estimates have almost invariably been an underestimate of actual costs. The one plant of modern design that has had significant construction experience, Olkiluoto, in Finland, was reportedly 75% over budget in the summer of 2009, after four years of construction.

Let me move on to the cost of borrowing. The cost of borrowing is difficult to generalize about, as it depends strongly on the creditworthiness of the customer and the role of competition in the electricity system the plant is going to feed into. In the past, financing nuclear power plants was cheap and easy because consumers took all the risk. Whatever costs were incurred were passed on to consumers, so that the risk to the bank of lending money to a utility was very low because consumers were underwriting the risk.

Now, in most markets in Europe and North America, this assumption of cost pass-through doesn't apply. This makes nuclear investment very risky. For example, there is now a significant risk that the owner of the Olkiluoto plant in Finland will default on the loan and banks will be left holding a very large liability. The cost of borrowing will—if finance is possible at all—be very high for markets where cost pass-through does not apply.

The third element, reliability, I won't say much about. In the past, the reliability of nuclear power plants has been much poorer than predicted by the reactor vendors and utilities. However, performance has improved in the last decade or so. Reliability of new plants should not be assumed, but it seems that the risk of poor reliability is lower than it was.

To conclude on economics, many cost estimates for nuclear electricity are based on unrealistic assumptions on construction costs and on a cost of borrowing that does not reflect the economic risk of nuclear investment. More realistic assumptions could easily increase by a factor of three the generation costs these estimates would produce.

I'll move on now to whether the renaissance will occur. The premise of the renaissance was that there would be new designs of nuclear power plants, the so-called generation III+, evolved from existing designs, but which would be cheaper, quicker to build, safer, and would produce less waste. This would persuade countries in western Europe and North America, which seemed to have abandoned the option of nuclear plants, to restart ordering.

● (1615)

No orders have yet been placed in what you might call renaissance countries. When the U.S. program to relaunch nuclear orders was started in 2001, it was forecast that at least one unit would be in operation by 2010. It now looks likely that construction on new orders in the U.S. will not begin before 2013.

So at best, the renaissance will be very late.

U.S. orders will be placed if the Obama administration is willing to cover 80% or more of the construction cost with federal loan guarantees. If the program of subsidizing three units of each of the five new designs being considered in the United States is granted, this could require guarantees worth about $120 billion U.S. The Congressional Budget Office estimates that the default rate could be about 25%, which would leave a bill to U.S. taxpayers of about $30 billion U.S.

In the U.K., the government is adamant that it will not provide subsidies for new nuclear orders. But utilities, which had previously suggested that orders without subsidies would be possible, are now lobbying for a guaranteed carbon price and a consumer levy to pay the additional costs of nuclear power.

If the U.K. and U.S. governments do not provide subsidies, orders are improbable. And if these two important markets do not materialize, orders elsewhere in the west are much less likely. If subsidized orders are placed in the U.K. and the U.S.A., it might prove no more than that governments can get nuclear plants built if they are willing to provide large enough subsidies.

Let me move on, then, to the key markets for nuclear power. There are four key markets nuclear vendors must open up for the renaissance to happen: the United States, the United Kingdom, China, and India.

The very bad economic experience with nuclear power in the United States and the United Kingdom seems to mean that new orders would not be possible there. To convince these two countries to give nuclear power one more chance would be a considerable coup for the nuclear industry.

China is building 21 of the 55 nuclear power plants worldwide that are under construction or are firmly ordered. Of these 21 units, 15 are being supplied by Chinese companies based on a 1970 design. China has ordered CANDUs in the past, but China's policy seems to be to investigate all nuclear technologies and then supply the options it chooses using indigenous companies.

India's experience is very different. The projections from the Indian government of a huge number of orders for India are implausible and the Indian nuclear industry will fight hard to ensure that a large proportion of any orders placed are for Indian designs and Indian vendors. Orders for CANDUs seem highly unlikely there.

Finally, let me look at the prospects for CANDU sales. Part of the U.K. and the U.S. policies to relaunch nuclear ordering was to give generic safety approval to several generation III+ designs so that utilities could choose from a range of designs. CANDU, in the form of the ACR-1000, was submitted to both processes, but was withdrawn from them at an early stage.

This means that sales of CANDUs in the United States and Europe in the next decade will not happen. The only exception might be if Romania resuscitates a very old order placed 30 years ago for three or four plants and orders a third unit there.

Outside Europe and North America, CANDUs have been sold to Korea, Argentina, and Pakistan, but Korea has developed a U.S. PWR design for its own market and will not be importing units. The Pakistan market is small and will probably be supplied by China, while Argentina has been unable to complete construction on a plant it began building 30 years ago. So it would be unwise to count on Argentina to order large numbers of plants.

Exports of CANDU reactors, apart from one or two of the old design, are only likely to be possible if the new design, ACR-1000, can be demonstrated to be competitive and reliable in Canada. This summer's bid by AECL for a CANDU was reported to be about $10,000 U.S. per kilowatt, a prohibitively high price. This clearly reinforces the message that nuclear power orders are economically highly risky, because the AECL bid factored in some of the construction risk.

● (1620)

The cost to whoever bears this risk will be high and ultimately will be passed on to the public. Whether Canadian taxpayers and electricity consumers are again going to bear this risk is for the Canadian people to decide.

A decision to opt for nuclear orders does have opportunity costs. Nuclear power programs tend to absorb a very high proportion of the available R and D funds and, equally important, they absorb political resources and attention. In short, if a nuclear power program is chosen, renewable and energy-efficient options, which would appear far less risky and probably more cost-effective, are likely to be neglected.

Thank you.

The Chair: Thank you, Professor Thomas, energy studies, University of Greenwich, London.

We very much appreciate all the presentations. Again, thank you for being here.

We'll go now to the questioning, starting with Mr. Regan, from the official opposition, who has up to seven minutes.

Go ahead, please, Mr. Regan.

Hon. Geoff Regan (Halifax West, Lib.): Thank you very much, Mr. Chairman.

Thanks to all of you for being here today.

Mr. Alexander, we just heard Professor Thomas's views on the state of the nuclear industry. Do you find any points of agreement? If not, what would your response be?

Mr. Roger Alexander: I think there are certain aspects of the cost structure of nuclear that are relatively debatable in various jurisdictions. Costs have been put out in the press that I think are probably unsubstantiated in terms of how they were developed, so I think it would be wrong to speculate on the cost of nuclear based on what reportedly appears in the odd article in the press from time to time.

Hon. Geoff Regan: Perhaps it's a little unfair to ask that since you didn't know what his presentation was going to be ahead of time and didn't, perhaps, have a chance to read the presentation as we listened to it.

Tell me, is AREVA interested in buying AECL?

Mr. Roger Alexander: We're certainly following the situation with interest. I think it remains to be seen what the Rothschild recommendations are and how that will be put forward. Obviously, as the world leader in this business, we have to pay attention to changes to this and the environment. We're following it closely until the federal government comes out with exactly what they're interested in doing with AECL. Then we'll evaluate that and determine what our stand will be.

● (1625)

Hon. Geoff Regan: So at this time, have you had any formal or informal discussions with the government or the minister or AECL?

Mr. Roger Alexander: Rothschild has surveyed the individuals who might be interested for their opinions on the situation with AECL and we have commented to them.

Hon. Geoff Regan: Would AREVA be likely to be interested in all AECL's operations or just the CANDU technology or the sales side?

Mr. Roger Alexander: It's too early for us to comment on it in that regard.

Hon. Geoff Regan: We've heard a variety of reports that put the value of AECL at about $300 million. I'm sure you're going to want to comment on that.

Mr. Roger Alexander: As a businessman, I will just point out that AECL is a company that.... Whatever the numbers are, I think we've all seen what they are in the press in terms of the number of subsidies of hundreds of millions of dollars it gets every year.

I think if any of us could imagine buying a business that requires that amount of cash input and that has roughly in the order of $350 million or $400 million in revenue but requires an additional $400 million or $600 million, whatever the number is in subsidy, you have to think carefully about how that would be approached, just in the generic terms of anybody buying a business of that nature, without going into the specifics.

Hon. Geoff Regan: Let me turn to Mr. Florizone.

You talked about the expectation that Chalk River would shut down around 2016. What do you view as the advantages of building a new reactor at the University of Saskatchewan as opposed to building a new reactor in Chalk River?

Dr. Richard Florizone: I think the principal advantage may be, as I said, the synergies with that Canadian Light Source. As I referred to, a number of nations that have built new neutron sources or research reactors have tended to put them next to their synchrotrons. The reason for that is that the science is quite compatible. They both can be used.... I'm talking about something separate from the medical isotope business, but the neutron scattering is quite synergistic with what a synchrotron does, which is essentially to use photons to look at the properties of materials, and you can use neutrons to study the property of materials. It's much of the same scientific community.

You can also potentially see some operational synergies in things like user support, IT, security, or some of the things that have been mentioned when we've talked to other facilities around the world.

Hon. Geoff Regan: Can you give us any details on the proposal submitted in August by the university and the province relating to future isotope production?

Dr. Richard Florizone: Sure. It's not the cheapest proposal out there, I'll say that up front, and that's just to say it's establishing a new reactor. The approach we took involves a couple of things. One, we wanted to build on our existing strengths, and two, we wanted to put together a proposal that minimized technical risk, so our proposal is really modelled after the OPAL reactor in Australia. It recently came on line, so it's proven technology.

There's a sense of what it's capable of and there's a sense, at least in Australia, of what the costs might be, so our proposal is at a high level on costs. The costs are in the range of $500 million to $750 million in capital and then roughly 10% of that in terms of operating. As well, we've been quite clear with the proposal that the isotope business could account for approximately 15% of the operating revenues required to operate the facility. That's a high level view of the economics and some of what we based our proposal on.

Hon. Geoff Regan: To whom was your submission made?

Dr. Richard Florizone: We were one of the 22 proposals submitted to the expert panel established by Natural Resources Canada.

Hon. Geoff Regan: Have you had any follow-up or feedback?

Dr. Richard Florizone: We have not had any formal follow-up yet. We're awaiting the deadline of November 30.

Hon. Geoff Regan: How long would it take to build a 25-megawatt reactor and who would finance it?

Dr. Richard Florizone: That's a good question. In talking to the regulator and in talking through the building program in Australia, our original proposal suggested that the fastest you could see something come online is probably about seven years. The timeline we've talked about is seven to ten years, so potentially it would be coming online shortly after the NRU was shut down, but that would mean moving relatively quickly into some pre-design work—basically immediately.

● (1630)

Hon. Geoff Regan: If your proposal was accepted, would it make any sense to continue to operate a reactor at Chalk River?

Dr. Richard Florizone: That's a good question. I think it ties back into the nation's nuclear strategy and the future of nuclear power R and D in the country. Bluntly speaking, perhaps you can think of the NRU as serving three purposes: medical isotopes, nuclear power R and D, and as a source of neutrons for neutron-scattering science.

Our proposal for the Canadian neutron source focuses on only two of those three: the neutron scattering and the medical isotopes. The issue is that if you want to include the third, if you want to do the power generation R and D, it's a much larger project and a much more significant reactor.

So the answer would be that you could have the medical isotope business and you could have the neutron-scattering science at the facility we've proposed, but right now if you shut down the NRU, you wouldn't have the capability for some of the R and D that's done around power generation.

Hon. Geoff Regan: If the government decided to continue to do R and D at Chalk River with the present or a future reactor, would it then still make sense to produce isotopes at the university?

Dr. Richard Florizone: Again, it would come back to your public policy goals. If you decided that you wanted to just have an isotope supply sufficient for the country, it's likely that you could a build a reactor in Chalk River that could serve that supply. If you wanted to optimize the reactor at Chalk River—again, depending again on your strategy with AECL—and optimize it more toward nuclear power R and D, let's say, it may be that you also might chose a portfolio approach where you have another reactor that's more focused on the isotope business and neutron scattering.

The Chair: Thank you.

Thank you, Mr. Regan.

We'll go now to the Bloc Québécois, with Madame Brunelle, for up to seven minutes.

[*Translation*]

Ms. Paule Brunelle (Trois-Rivières, BQ): Good afternoon, gentlemen and thank you for coming.

Mr. Alexander, your company is, without any doubt, the world leader in power generation from nuclear energy. I would like you to give us some more details. You told us that you are a multinational corporation, but according to my notes, 90% of your shares are held by the French state.

Do you see yourself as a state corporation?

[*English*]

Mr. Roger Alexander: That's correct. Eighty per cent to ninety per cent of the shares held of AREVA worldwide are held by the French state.

[*Translation*]

Ms. Paule Brunelle: Is being a state corporation an advantage or a disadvantage? Here is my point. The federal government wants to restructure AECL and maybe to privatize it; this is understandable. We are told that its present structure does not allow it to benefit from this possible nuclear renaissance.

So, at the end of the day, is it beneficial to be a state corporation, essential to be in this highly competitive market?

[*English*]

Mr. Roger Alexander: Certainly for us, the way AREVA functions worldwide is as a profitable and essentially independent corporation. We have products that are required and that are sold, for which we have orders that we deliver against in the world market. We return significant profits to our shareholders on an annual basis.

So we're able to fund, as I mentioned, $1.2 billion a year in R and D of our own volition because of the profits we generate worldwide from our services and sales businesses, not only in nuclear, but also in the renewables sector. Next year, approximately 1 billion euros of our roughly 12 to 13 billion euros in sales will be from the renewables sector as well.

Again, we're a CO_2-free energy generating company. We are engaged in a number of businesses that return profits. The way it works, despite the fact that we're partially owned by the French state, is that we operate relatively independently to produce those profits and return money to the state.

So I think it has less to do with being a state entity than an independent business that has the right products and services for the market and that returns a profit.

[*Translation*]

Ms. Paule Brunelle: The fact is that your technology is different from the Canadian technology: heavy water versus light water. I understand some of it, however it is highly specialized.

Would you be able to work on CANDU reactors?

● (1635)

[*English*]

Mr. Roger Alexander: When you say “work with them”, we in fact have a services organization here in Canada. We do work at all of the Canadian sites on a services basis on the existing technologies here in Canada with respect to the businesses we have here. As well, of course, we have a significant presence in mining here in Canada, with uranium mining in Saskatchewan, Quebec, and the territories.

[*Translation*]

Ms. Paule Brunelle: Then you might have an interest in buying AECL, maybe at least part of it.

[*English*]

Mr. Roger Alexander: As I said, we're following the situation quite closely and we will be very interested in what the government's recommendations are and what position the government and its advisers take.

[*Translation*]

Ms. Paule Brunelle: You are aware, as we are, of all the problems related to isotope production. In your statement, you tell us that AREVA can help. Could you explain how? Are you referring to the Osiris reactor technology which is producing isotopes in France?

[*English*]

Mr. Roger Alexander: We've been engaged in producing isotope reactors in other jurisdictions. I think Dr. Florizone covered the topic quite nicely in terms of the challenge and financial scope of building a research reactor.

Unfortunately, although everyone would like a short-term solution, that is not a short-term solution. In construction terms, we're talking about at least a five-year period to actually construct a reactor, with design, specifications, and licensing being organized beforehand. So that's just not a short-term solution.

I think the construction of a new isotope reactor is not a question that should concern anyone. It's just a matter of time.

[*Translation*]

Ms. Paule Brunelle: We talked a lot, in this Committee, of the shutdown of MAPLE 1 and MAPLE 2 reactors because of operating problems and some safety standards, supposedly.

Would it be of any interest, for a company like AREVA, to reactivate these MAPLE reactors? Could it save time? Do you consider that technology outdated? What do you say?

[*English*]

Mr. Roger Alexander: We really don't have any detailed knowledge of the MAPLE reactors or the technology there. We would essentially be interested in building a new reactor, not in doing any work on the existing MAPLE reactors other than what might be required from a specific service or assistance standpoint.

[*Translation*]

Ms. Paule Brunelle: You said something that I found very interesting. You have an innovative concept, recycling. It is absolutely wonderful to be able to reduce the volume of waste by 80% to 90%, but at what cost? It must be very costly if it has not been done yet. What is the process exactly?

[*English*]

Mr. Roger Alexander: Yes, we have a facility that's currently operating in La Hague and has been for a number of years. I was there the week before last to tour the facility. I hadn't had the opportunity to see it yet in my new responsibilities. It's reprocessing waste for France as well as for other countries such as Italy and Japan. In fact, we're working with the Japanese. A number of Japanese delegations are at our facility for training to work in their new facility, which is under construction.

The facility reprocesses waste. Of course, international law requires that the waste, after reprocessing, be repatriated to its country of origin. It's quite an impressive facility to see. There's waste coming from Japan to our La Hague reprocessing facility to be completely reprocessed. The eventual vitrified waste is repatriated to the country of origin, but of course in much less volume.

The Chair: *Merci, madame Brunelle.*

We'll go now to Mr. Cullen, from the New Democratic Party, for up to seven minutes.

Go ahead, please, Mr. Cullen.

Mr. Nathan Cullen (Skeena—Bulkley Valley, NDP): Thanks.

Gentlemen, thank you for your testimony today.

This is a question for Mr. Thomas. I want to get into the notion of subsidies being required.

You mentioned the U.K. and the United States in terms of the need for a subsidy of their portion of the so-called global renaissance. Can you explain a little more why it's so important that these subsidies be applied and that these builds happen in those two countries, which then affect other parts of the global chain of nuclear new builds?

● (1640)

Prof. Stephen Thomas: Experience in the United States suggests that the key subsidy is a loan guarantee, because that makes the finance available. Essentially it means that the bank is lending money to the federal government. That's a very safe loan; it means that the cost of borrowing can be very low. For example, the Finnish plant had loan guarantees from the French government and the Swedish government, and that meant it could borrow money at what I think was a rate of 2.6%.

Without those loan guarantees and with exposure to the risk of cost escalation, the banks would impose a very high interest rate, which would make the economics of nuclear power completely untenable.

Mr. Nathan Cullen: Can I ask about something you mentioned tangentially in regard to the Ontario bid that has been halted by the Ontario government right now? You mentioned that the scope of risk was larger or was entirely included within the new bid, but perhaps it wasn't you who mentioned this.

Prof. Stephen Thomas: Yes. I said a little bit more in my written evidence, but I cut it out in the verbal evidence.

There were two bids, apparently, according to the reports I have seen in the newspapers. One from AREVA was for about $7,000 U. S. per kilowatt, but that wasn't compliant with the terms of the contract, because AREVA was not willing to take any of the construction risk. The bid from AECL was compliant because it did take some of the construction risk; it wasn't specified how that construction risk was taken, whether it was an entirely fixed price contract or what.

I think the relevance, though, is to the Olkiluoto order, which was a fixed price contract for 3 billion euros—or what appeared to be a fixed price contract. Now that's in dispute. AREVA is suing the customer and the customer is suing AREVA for the cost overruns, so it's a very messy situation.

But it does illustrate the point that asking a vendor to take the risk of cost overrun is going to add to the cost of the bid. That's probably one of the reasons why AECL's bid was so high.

Mr. Nathan Cullen: Thank you for that. That's something we're trying to understand: what the actual bids mean.

Mr. Alexander, I know you'll want to say something about that. Are you familiar with the role of Moody's Investors Service in assessing the global risk of companies?

Mr. Roger Alexander: Yes.

Mr. Nathan Cullen: Are they seen as a credible risk assessment agency? Are they extreme to one end or the other or are they sort of held up in the industry as reputable?

Mr. Roger Alexander: I couldn't comment on that. I don't have specific knowledge of how they rank in the industry.

Mr. Nathan Cullen: So you have no comment as to whether Moody's is any good at what they do?

Mr. Roger Alexander: My comment is just that I don't know.

Mr. Nathan Cullen: Okay.

At the beginning of the summer, Moody's came out with a report that I'm sure you're familiar with. I'll quote from the report concerning utilities that have nuclear power in their mix: “History gives us reason to be concerned about possible...balance-sheet challenges, the lack of tangible efforts today to defend the existing ratings, and the substantial execution risk involved in building new nuclear power facilities”.

It's noted that some utilities have lost as many as four points on their risk viability. Moody's is considered one of the more conservative credit rating systems in the world. Why would they knock down a utility's risk portfolio if they have nuclear energy as part of their portfolio?

Mr. Roger Alexander: Well, I think Dr. Florizone touched on it. Obviously these large projects require some form of government support. You don't build a $10 billion development—or whatever it might cost—of two nuclear plants without some level of government support. Unfortunately, the average size of the balance sheet of a U. S. utility is, I think, $10 billion, so when you look at the size of a major project like this in relation to the balance sheet of the utility, it's such a big project with respect to the size of the utility that other things are required to support its financing.

● (1645)

Mr. Nathan Cullen: The minister was with us a couple of days ago and talked about the AECL product as a niche product for the market. The viability of AECL is what we're trying to understand, as well as the viability of the nuclear industry right now in Canada. There are 130-plus new builds going on around the world. AECL has the contracts for exactly none of them. Why is that?

Mr. Roger Alexander: Part of it, I think, relates to the light water versus heavy water topic that has been discussed here. The predominant technology in the world is light water technology; that's what the licensors are standardizing on and what countries are standardizing on.

In my remarks, I talked about the obvious consolidation in the industry over the last five or six years and about how multinational companies have formed joint ventures, just as AREVA was formed, to create a substantive size to be able to...in typical business terms, this is a huge barrier to entry. It requires huge amounts of development money. As I mentioned, it requires billions of dollars to develop new reactor technology. Only the biggest can survive, as is the case in many industries in the world now.

Mr. Nathan Cullen: So in a sense the reason AECL doesn't have any of the contracts for new builds is that they're too small. That's one argument that can be made.

Mr. Roger Alexander: That would be one argument.

Mr. Nathan Cullen: Also, they're using a heavy water system that is not favoured by those wanting to build new nuclear reactors.

Mr. Roger Alexander: That would be another one.

The Chair: Thank you, Mr. Cullen. Your time is up.

We'll go now to the government side and Mr. Trost for up to seven minutes.

Go ahead, please, Mr. Trost.

Mr. Brad Trost (Saskatoon—Humboldt, CPC): Thank you, Mr. Chair.

Maybe both AREVA and the Nuclear Waste Management Organization can help me out on this one. I'm wondering what the potential would be for the Canadian waste site to be used as a depository or as a place to attract material for future reprocessing. Because frequently when we talk about nuclear waste, other people talk about it as a potential for reprocessing as fuel.

I was hoping the two organizations could both comment on what the potential development could be and how the two could be integrated together, and also, what the potential market is internationally and domestically if such an enterprise were feasible.

Take it away.

Mr. Kenneth Nash: Thank you.

There's no doubt that when we do our dialogues with Canadians and we talk about long-term nuclear waste management they are looking for what is essentially the blue-box solution: can we recycle this? That's in the Canadian psyche, actually.

What our assessments told us at the time we did the study—and quite frankly, nothing's changed there—was that reprocessing with the current technology that exists for this does not materially improve long-term waste management prospects. We see this decision to reprocess as more of an economic security of supply issue that has certain proliferation issues around it.

One of the objectives we identified in the implementation plan that we published was to keep a watching brief on emerging technologies. The report we published last year on this subject really did identify that, in the medium term, reprocessing is not likely to become a worldwide trend unless the price of uranium goes up a lot, and this really is a decision that would have to be taken by governments and by the nuclear power generators, etc. The other observation we have is that CANDU fuel is not really a good candidate for reprocessing.

Nevertheless, the repository we're targeting to build would have the ability to retrieve the fuel if and when reprocessing did become viable and it could retrieve and utilize the energy that's there.

Mr. Brad Trost: Does AREVA want to comment?

Mr. Roger Alexander: Just to reiterate my previous comments, we at AREVA are doing fuel reprocessing. We think it's economically viable. We think it works in the jurisdictions we work in.

Just my personal opinion as a Canadian is that if we asked the existing populace right now whether they want it or not, that's may not be the right approach. Maybe we need some leadership here to say that recycling is the right thing to do.

● (1650)

Mr. Brad Trost: Let's say hypothetically that the waste management organization chose Saskatchewan as a location to do it. I'm not asking for a definitive commitment, but would there be a possibility that an AREVA or a similar company, one of your competitors, etc., could find it economical to take things there and reprocess them?

Mr. Roger Alexander: Yes, definitely.

Mr. Brad Trost: So it's a possibility. It just depends on the numbers.

Mr. Roger Alexander: It's definitely possible, and yes, typically there is a significant number of jobs. I think we have 5,000 people working at our La Hague facility.

Mr. Brad Trost: I need to speed up my questions here.

Turning to regulatory reform, the duty to consult is very important for mining companies. While we're not interested in taking away anything from safety or anything, does anyone have any comments on how we could streamline regulation in the industry without having any safety implications?

Dr. Richard Florizone: I can offer one overall thought and it's something out of the UDP report. It's quite general, so I don't know if it's specifically what you're looking for, Mr. Trost.

One of the things that's clear, and one of the things that was an interesting lesson for me as I went through the Uranium Development Partnership process, is that in the global nuclear industry, the people I spoke to were very supportive of a strong and independent regulatory framework. One of the reasons that was quoted to me by the people in the industry was that they rely on public trust, and public trust is rooted in a strong and effective regulator that is at arm's length from government. So the industry is quite committed to strong and efficient regulation. That was a lot of what I heard.

At the same time, with regard to mining, we did hear concerns about how people wanted regulation to be strong and effective, but also efficient. There was a sense that in some mine openings people felt that there were very many ministries that were involved when it came to regulatory issues in the nuclear environment, so you'd have multiple ministries.

Mr. Brad Trost: So there could be various consolidations, particularly in the mining sector.

Dr. Richard Florizone: That was the one recommendation—

Mr. Brad Trost: I'm seeing agreement from AREVA, so we'll put that in the transcripts.

Dr. Richard Florizone: Again, that was one that was public in the UDP report, asking for more coordination—

Mr. Brad Trost: I'm sorry, Richard. I don't want to cut you off, but I have just one last quick question about the NRO. AREVA's not the only company that's been stymied in investing in Canada. I was looking at something from JCU, Japan-Canada Uranium, and there are Korean firms and so forth.

Do you have any idea how much investment has been blocked from Canada, or how much more there could be if we repealed the NRO and went to more of a free trade, open...treated it the same as we would copper, gold, or anything of that nature?

Mr. Roger Alexander: It's clear that we have developments slated in future years in Nunavut and Quebec that are in the multi-billions of dollars. These are on the books. We've costed the developments for future development activities over the next 15 to 20 years and it's also clear that unless we retain ownership of those developments, we won't do them.

Mr. Brad Trost: You forgot to mention Saskatchewan. Do you have any properties in Saskatchewan?

Mr. Roger Alexander: Yes, of course. I'm sorry.

The Chair: Thank you, Mr. Trost.

We'll go now to the second round, a five-minute round, starting with the official opposition.

Mr. Tonks, go ahead, please.

Mr. Alan Tonks (York South—Weston, Lib.): Thank you, Mr. Chairman.

Thanks to the witnesses for their testimony.

Dr. Florizone, with respect to the future of the medical isotope part of the nuclear sector, Mr. Alexander captured my sense of the presence of medical isotopes when he said that the isotope is just a matter of time.... I can't read my own writing—

Voices: Oh, oh!

Mr. Alan Tonks: —but in any case, the future of medical isotopes is just a matter of time. Now, the Dutch and the Americans are investing highly in second-generation medical isotope production and so on.

Also, I understand that the University of Saskatchewan, where you're from, has a reactor that is capable of producing isotopes. How do those decisions affect the business plan with respect to the university's reactor?

Dr. Richard Florizone: Is the question about the different technologies?

Mr. Alan Tonks: No. It's just about the market and whether this affects the continuation of that.

Dr. Richard Florizone: So it's whether the market affects the picture.

● (1655)

Mr. Alan Tonks: Yes.

Dr. Richard Florizone: That's an excellent question.

Again, I want to be clear and we've been clear with our proposal up front. The way the global isotope market works right now, the establishment of these types of facilities is not a money-making proposition. The way the medical isotope business has evolved is that there's a series of research reactors around the globe, basically government-sponsored, that provide the raw material to the industry. The revenue that's realized from those doesn't fully occupy the cost.

So what our business case was predicated on was producing approximately four times the Canadian market: so producing enough for the Canadian domestic market and producing for export. With that, we believed it would cover about 15% of our operating cost of the facility. In other words, the facility, even with that plan, would still require 85% of its funding to come from the public purse.

So on your question, then, if you have these other sources and they impact share, then it would reduce that 15% accordingly. Again, I think that it would come back somewhat to public policy objectives, and I think this is a valid question for that expert panel to include: does Canada want to purchase its medical isotopes on the open market, rely on others, and see that science go outside the country? Does Canada just want to basically procure that in the market? I think that's an important public policy question.

Mr. Alan Tonks: Okay. I appreciate that and I'd like to follow up, but I think the committee should give Mr. Nash an opportunity to respond.

With respect to the recycling and to what has been referred to by Mr. Alexander as the process, the committee is attempting to come to grips with the overall sector and the whole issue of storage. You indicated that there are several football fields full of storage at this particular time.

There must be an ultimate solution,and Mr. Alexander seems to be very positive, but from your perspective, what is the policy tangent that perhaps the committee could be appraised of?

Mr. Kenneth Nash: Thank you.

In Canada's policy on long-term used fuel management, the end point is to store that used fuel in an unreprocessed form in a deep geologic repository where it could be retrieved if necessary.

The majority of other countries with nuclear power plants are not reprocessing. Historically they were. For instance, Sweden, Germany, Spain, and the United Kingdom all utilized reprocessing. Since then, they've pulled out of that, mainly because the cost is prohibitive.

However, France is still reprocessing, for a number of reasons. Some would say they are economic, while others would say they're for security of supply reasons. Nevertheless, they are reprocessing. They require a deep geologic repository. It's in their national policy to (a) reprocess and (b) store the vitrified high-level waste, which is one of the products of reprocessing, in a deep geologic repository.

I have to reiterate my remark that in using existing technology on reprocessing there is no significant—in our viewpoint—waste management benefit alone from reprocessing. It really is an economic security of supply issue that has proliferation issues connected to it with existing technology.

Mr. Alan Tonks: I see.

Thank you.

The Chair: Thank you, Mr. Tonks. Your time is up.

Mr. Allen.

Mr. Mike Allen (Tobique—Mactaquac, CPC): Thank you, Chair.

My thanks to our witnesses for being here today.

Mr. Alexander, I wanted to ask you about the typical model for construction risk. If it would take five to seven years to put in an isotope-producing reactor, I would assume that for a power reactor over 1,000 megawatts we'd be talking about seven to ten years, what with siting, environmental permits, and everything else.

What is the typical model these days for completion and financial risk? Are these units being turned over to the customer, or are you doing it on a build, own, and maintain basis?

Mr. Roger Alexander: It depends on the jurisdiction. In some cases, we work very closely with a utility. For example, the week before last I visited our facility in Flamanville, France, where we're working closely in partnership with EDF. That facility will be turned on in 2012 and, based on their on-schedule and on-cost performance so far, I was very impressed, in terms of a personal sort of confidence in looking at it, that it will be on time for delivery there.

It varies by jurisdiction. For example, in Olkiluoto, Finland, where we had a less mature nuclear jurisdiction and a variety of local subcontractors that were first of a kind in the nuclear business, there were different issues associated with that. That tends to take on a little longer perspective.

It entirely depends. There is the merchant plant model, whereby a utility will go in and produce a plant in a non-regulated market and sell the power into a regulated market on a different sort of basis. There are all sorts of different models that exist, depending on where you are in the world.

Currently, there are projects being discussed in the UAE. These would be constructed on a merchant model basis, with a consortium of utilities and manufacturers going in and providing the complete package to the end user.

● (1700)

Mr. Mike Allen: Did I hear you correctly? I just want to confirm for the record that the $1.2 billion you spent on R and D last year was all from internally generated cashflow and that none of it came from the Government of France.

Mr. Roger Alexander: Yes, that's my understanding.

Mr. Mike Allen: If you could confirm that, it would be great.

Mr. Roger Alexander: Sure.

Mr. Mike Allen: Being from New Brunswick, I'm more familiar with heavy water reactors and CANDU technology. How does the safety record of the AREVA reactors compare with that of the CANDU reactors? Has the safety record been good? What do you see as the major safety issues with your technology? I'm thinking of this from a liability and insurance point of view.

Mr. Roger Alexander: Safety and security is the key area that differentiates the generation III+ reactors from the generation II reactors. So technology base aside, I think there's been a lot of progress.

I sometimes like to use the analogy of being in a DC-3 aircraft designed and built many decades ago versus going into a modern aircraft that has all of the electronic suite in it. This is kind of a good analogy for thinking about how the new design of nuclear plants is being handled. I mean, you can go into a new aircraft and the thing practically flies itself. There are many time-redundant safety systems involved.

To me that's the major difference in safety between these generation III+ reactors and the older ones. I thin the nuclear industry generally has a very good track record for safety. Whether it's CANDU or any of the AREVA reactors, I don't think there's a difference in the safety record. In terms of crash resistance, generation III+ reactors, our new reactors, can withstand a crash of any known aircraft that exists today, with no radiation release into the atmosphere.

Mr. Mike Allen: I'm interested in your reprocessing facility, because this also has implications with respect to Bill C-20, on the liability insurance. As is proposed in this bill, if I understand it correctly, in Canada the owner-operator would have that liability.

What are the transportation issues? You're talking about fuel coming from Japan to this facility. Who bears the liability and who bears the insurance on the nuclear fuel being transported?

Mr. Roger Alexander: I don't have the answer to that question. I know that transporting it is a significant part of the planning that they do there.

Ken, I don't know if you understand the liability issues between countries, but I know that certainly the country of origin generally has to take back the vitrified waste and the constituents of the recycling process. They have to patriate that back to the original country, so I know that it's being shipped back to Japan, for example. I would presume that the host country takes the risk associated with such shipments, but I'm not sure.

The Chair: Thank you, Mr. Allen. Your time is up.

We'll go to the Bloc Québécois now, with Monsieur André, for up to five minutes.

Go ahead, please, Monsieur André.

[*Translation*]

Mr. Guy André (Berthier—Maskinongé, BQ): Good morning.

I am not a regular member of the Committee, but I represent the Berthier—Maskinongé riding, which includes part of the Trois-Rivières area. We are looking into the refurbishment of Gentilly. It is a source of concern for the population in my riding as well as that of Ms. Brunelle. I shall mention some of those concerns.

On the one hand, people say that the CANDU system is outdated, obsolete, not adapted to future requirements and that it should be replaced by a better nuclear reactor. On the other hand, there is the whole issue of nuclear waste management which has been raised publicly. The Quebec National Assembly, for instance, has passed a resolution stating that the province of Quebec will not accept the nuclear waste of other provinces. We shall manage our own which represents about 5.44% of the waste we are producing now. This is a source of concern.

On a third level, that of public health, substances like nitrium are infiltrating the water table causing health problems such as cancer in young children and so on.

There are also some concerns related to the cost of nuclear energy. As you are aware, we produce mainly hydroelectric energy. The Gentilly system would only supply about 3% of our electricity. Alternatively, other people suggest that we should keep our expertise in the nuclear field.

Mr. Nash, you are saying that each province will have something to say about nuclear management and that each will have to agree with the federal government on the issue of nuclear waste management. What do you think of the Quebec National Assembly's decision of refusing to take part in nuclear waste management, in the burial of nuclear waste? Will it cause you to automatically exclude the province of Quebec from your nuclear waste management plan?

● (1705)

[*English*]

Mr. Kenneth Nash: Thank you very much.

Perhaps I will make two points up front and try to get to a detailed answer there.

First, the Nuclear Waste Management Organization is absolutely committed to locating a deep geologic repository in an informed and willing community, and that includes the region. We will not move ahead unless that is in place.

Secondly, there are very strict safety criteria around this. A repository would not be constructed until we were absolutely sure it would be safe and the fuel would be located in a place that could not release radioactivity into potable groundwater. That will not happen.

With regard to provincial governments, when this investment is made it will be a long-term partnership between the NWMO and the community, and the wider community. There will be billions of dollars invested. I can't imagine a set of circumstances where such a project would move ahead without the consent or willingness of the provincial government involved.

Having said that, we have conducted dialogues, and we continue to do so in all the provinces that have nuclear fuel, because we believe that in Quebec, like anywhere else, people should be heard on how we should move ahead with this. I'm not sure if that sufficiently answers your question, but I'm fully prepared to deal with any follow-up questions.

[*Translation*]

Mr. Guy André: There is a concern among the population about some substances derived from nuclear energy production such as nitrium which would be present in water and would cause cancer. Have you studied this matter further?

I see that Mr. Alexander's corporation has developed new technologies. Do you have concerns here? Has research been done on those issues?

● (1710)

[*English*]

The Chair: Who is your question directed to, Monsieur André?

Mr. Alexander, a short answer, please.

Mr. Roger Alexander: I think the safety of the existing nuclear facilities in Canada is well monitored and controlled on an existing basis. I don't think there's any danger of contamination to groundwater. I think agencies of the respective organizations such as Hydro-Québec would be in a better position to address any specific concerns you might have with respect to studies that have been made in the local area. I know that significant monitoring happens on a regular basis.

[*Translation*]

Mr. Guy André: How do you explain people's worries? Do you think that it is due to a lack of information? People are worried. Some studies have shown that nitrium is produced and could cause illnesses such as cancer in children. These stories are circulating among the public and have been documented. Is it due to a lack of information? What do you think, Mr. Florizone?

[*English*]

Dr. Richard Florizone: It's a very good and complex question.

You're absolutely right about the local support that's required. We could talk about the example in Yucca Mountain in the U.S. versus, say, the repository in Finland, and how local support is incredibly important to success in these.

On the safety question, there is different data out there, but it's very important to note that some of the more positive data gets talked about less. Maybe I'll just come to a couple of studies that have been done, that is, when you compare the overall safety record of the nuclear industry—including Chernobyl, which was a very drastic accident—and when you look at the total fatalities per unit of energy produced, nuclear is shown to have at least 10 times fewer deaths versus gas, coal, or any of the fossil fuel alternatives.

So there are these examples, and the perceptions of risk are very high, but in aggregate I think people remember Chernobyl but forget that there are 400 reactors that have been operating quite safely around the world. That's not to minimize these people's concerns. Concerns are very, very important. How you deal with them, I'm not quite sure, and there I'd turn more to the industry members for advice. It's a very difficult set of questions.

The Chair: Thank you, Mr. Florizone.

We'll go finally to Madam Gallant for maybe five minutes. We'll see how much time there is before the bells start.

Mrs. Cheryl Gallant (Renfrew—Nipissing—Pembroke, CPC): Thank you, Mr. Chairman.

Through you to Mr. Nash, when you refer to nuclear fuel waste management, are you referring to spent fuel rods?

Mr. Kenneth Nash: Yes, that's correct.

Mrs. Cheryl Gallant: As you know, raw natural uranium is used with CANDU technology. During the cycle of a fuel rod in a power reactor, just 1% of the potential energy from CANDU fuel rods is used, and the natural uranium aspect is one of the reasons why CANDU technology enjoys the superior level of proliferation resistance.

Given that only 1% is used, which means that 99% of the natural uranium in a rod is not utilized, why is deep geological storage preferable to the above ground storage, which is now in place in some areas? Because in the future when the price of uranium is significantly higher, it may be cost effective to retrieve the spent fuel rods and use some of that 99% of potential energy that's untapped. Do you not see any benefit in perhaps looking at above ground storage and also in being able to monitor more closely the decay of the radioactivity?

Mr. Kenneth Nash: Thank you for the question.

This very question was significantly dealt with during the three-year study we conducted between 2002 and 2005. In that study, we were required by our federal mandate to look at the options you describe there.

But when we consulted with Canadians and with experts, we felt that the plan we put forward for the adaptive phased management best met the values and expectations of Canadians for, number one, long-term safety and security. A deep geological repository would best meet that. Even in a scenario where recycling takes place and some economic decision is made in the future to retrieve that and reprocess, you would still be left with high-level waste.

Secondly, the idea that we leave this material here in the hope that in some future time there will be a technology that somehow deals with this in a more elegant way was not something Canadians were willing to wait for. They believe that we have an obligation to take action now, but the plan we have is such that if that technology came along, we would be able to adapt to that technology. So this is a take action now approach, with the ability to adapt as and when such technologies did become economically viable or environmentally preferable.

● (1715)

Mrs. Cheryl Gallant: With respect to security, are requirements such that it would be preferable to situate long-term storage near a military base?

Mr. Kenneth Nash: The question of security of this material is obviously a question that needs very careful thought, and we need to be very careful about what we say about it. I can assure you that all the precautions taken to safeguard that material right now in Canada and elsewhere result in a very high level of security, and in a deep geological depository, they would also do so. I don't think, from what I understand of it, that the security threat is materially changed by the location in the vicinity of a military base.

Mrs. Cheryl Gallant: Thank you.

Mr. Alexander, AREVA's new build in Finland has nearly doubled in the estimated cost and is significantly behind schedule. To what do you attribute these escalating costs and the delays?

Mr. Roger Alexander: I think I alluded to some of the factors earlier. This is a jurisdiction that's somewhat immature with respect to nuclear. This is a new process for the licensing authority and there were some significant issues around that. Also, the localization of the nuclear level construction activities required significant work on behalf of the local constructors to develop it. Also, of course, this is the first of a kind for generation III+ technology for any manufacturer in the world. I think those are factors that have certainly affected the activities there.

As I mentioned, I think, our second plant in Flamanville, which I visited the week before last, is reported to be on time and on schedule.

Mrs. Cheryl Gallant: So then—

The Chair: Thank you very much, Ms. Gallant. We're actually out of time. We do have a very important vote soon.

I'd like to thank all the witnesses for being here today.

By video conference, we heard from Professor Thomas, from the University of Greenwich, London.

Thank you very much, Professor Thomas.

Thank you to the gentlemen here in the room: from AREVA Canada, Mr. Alexander, president, and Jean-François Béland, vice-president; from the Nuclear Waste Management Organization, Kenneth Nash, president and chief executive officer; and from the University of Saskatchewan, Richard Florizone, policy fellow at the Johnson-Shoyama Graduate School of Public Policy.

Thank you all very much. This has been very helpful indeed.

The meeting is adjourned.

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