The Chair (Mr. James Maloney (Etobicoke—Lakeshore, Lib.)):

Good morning, everybody. Welcome back. I hope everybody had a good constituency week.

We're starting a new session today on the nuclear sector, although in the second segment today we're taking a step back into mining. Then we'll have a brief in camera session at the end, because I understand that we have some votes this morning, which will cut into our time as well.

To our two groups of witnesses, welcome. I thank you on behalf of the committee for joining us today.

From the Department of Natural Resources, we have Niall O'Dea, Dave McCauley, and Sharonne Katz. Thank you for joining us.

From the Canadian Nuclear Society, we have Peter Easton and Colin Hunt. You are launching us on this new segment we're embarking on, so we're very grateful to you for being here.

I'm going to turn the floor over to each group for up to 10 minutes, and then we'll open the floor to questions. I'm anticipating that some of the questions will be posed to you in French, and we have translation services available.

With no further ado, why don't you start us off, Niall? You look like you're ready to go. Thanks.

Mr. Niall O'Dea (Director General, Electricity Resources Branch, Energy Sector, Department of Natural Resources):

Thank you, Mr. Chair, and good morning.

My name is Niall O'Dea. I'm director general of electricity resources for Natural Resources Canada. It's a pleasure to be here with you today to launch you on this component of your study and to provide testimony on Canada's nuclear industry, its contributions to the economy, the challenges it faces, and the opportunities to advance nuclear innovation in support of the economy and the environment.

I am pleased to introduce Dave McCauley, director or the Uranium and Radioactive Waste Division, and Sharonne Katz, acting director of the Nuclear Energy Division. They will support me in the discussion.

Turning to slide 3 of the deck that we presented in advance, regarding roles and responsibilities in the nuclear sector, unlike other forms of energy, the federal government regulates nuclear energy and materials in Canada through our independent regulator, the Canadian Nuclear Safety Commission. The government also maintains research and development capabilities to fulfill its regulatory roles, amongst other things, through Atomic Energy of Canada Limited.

An important consideration, however, is that provinces, as always, are ultimately responsible for choosing their electricity generation technologies. The federal government has a significant role,

but the role of the provinces in choosing the technologies they use to generate their electricity remains.

Let's move on to slides 4 and 5.

Canada has a mature nuclear industry that continues to have a major impact on the lives of Canadians, on our economy and on our international influence.

Canada is one of seven countries with its own nuclear reactor: CANDU. Canadians rely on nuclear energy to meet 16% of their electricity needs. This accounts for over 50% in Ontario and 30% in New Brunswick.

Now, Canada's nuclear industry contributes upwards of $6 billion to the domestic economy every year. It also employs 30,000 Canadians directly and 30,000 Canadians indirectly. This industry is also one of the largest employers of northern and indigenous communities.

Canada is the world's second largest uranium producer and has one of the world's richest uranium ores in Saskatchewan. Canada's CANDU reactors rely on uranium mined in northern Saskatchewan and processed in Ontario. Ninety-five per cent of Saskatchewan's uranium is exported to other countries to support their nuclear energy production, which allows those countries to reduce their fossil fuel energy production.

There is a network of state-of-the-art research facilities across the country that supports the Canadian nuclear industry. The Chalk River Laboratories, which are among the most remarkable and are home to ongoing innovation, have received a Nobel Prize in research. Nuclear technology contributes to other sectors of our economy, including health care, food and agriculture.

As shown on slide 6, nuclear energy is a non-emitting technology that provides reliable baseload clean electricity, complementing other clean and renewable energy sources. Last year, the G7 leaders recognized in their statement the contributions of nuclear energy to reducing emissions, critical for climate change mitigation. Many of Canada's partner countries, including China and India, are increasingly turning to nuclear to address increasing energy demand, reduce pollution, and mitigate climate change.

Although our nuclear sector sees opportunities in light of clean energy focus, the sector continues to face certain challenges. As we can see on slide 7, nuclear energy projects face high up-front capital costs, despite being cost-competitive on a long-term basis. In addition, nuclear projects face public confidence challenges, including persistent concerns over the safety and security of nuclear facilities, and long-term management of radioactive waste. For these and other reasons, no new reactors have been built in Canada since the 1990s.

As shown on slide 8, in recent years the government's approach has focused on improving the foundation for Canada's nuclear sector to succeed through the restructuring of AECL, first in 2011 with the sale of AECL's CANDU reactor division to benefit from the flexibility, innovation, and efficiencies that came with private sector ownership, and then just last year with the implementation of a new business model at Canada's nuclear laboratories. The government-owned contractor-operated model is intended to introduce private sector rigour and efficiencies

to better position the laboratories to support our nuclear industry and to create conditions for the sector to succeed and seize new opportunities in the medium to long term.

Beyond this, we have also made improvements to our legislation, have made progress on federal radioactive waste management challenges, and have signed international nuclear co-operation agreements and MOUs with key countries, including China, India, the United States, and the United Kingdom.

Industry is looking to capitalize on new opportunities for nuclear. As shown on slide 9, a good example is Candu Energy Inc.'s agreement in principle with partners in China to develop and market the advanced fuel CANDU reactor. This innovative reactor is based on existing CANDU technology and engineered so it can be powered by recycling spent fuel from other reactors, which increases fuel efficiency and reduces the ultimate resulting waste. Candu Energy is also engaged in talks to build new CANDU reactors in Argentina and Romania.

Domestically, our industry is focused on projects to extend the lifespan of 10 reactors in Ontario by up to 30 years. These investments will total $25 billion and could create 14,000 jobs over the next 10-year refurbishment period.

Our industry is developing innovations, including small modular reactors, advanced generation IV reactors, fusion and non-reactor based technologies for producing medical isotopes.

The government is also doing its part. Last year, the government committed $800 million over five years to revitalize the Chalk River Labs. Last month, our minister inaugurated the Harriet Brooks Building, a major new facility at the Chalk River Labs that is an exceptional group of facilities for testing a variety of materials and processes.

Canada recently joined seven other countries and included nuclear power in its commitment to double government investments for research and development in clean energy as part of Mission Innovation.

As shown on slide 11, we have a national approach to the long-term management of fuel waste from nuclear power and research reactors. Initiatives are also under way to implement long-term solutions for radioactive waste, remediate sites contaminated by past practices, and decommission outdated facilities, all critical to nuclear-operating countries.

The Nuclear Waste Management Organization, or NWMO, is implementing a voluntary siting process to identify a willing and informed community to host a deep geological repository for the long-term management of Canada's nuclear fuel waste. At present, nine Ontario communities are actively engaged in this process.

Ontario Power Generation's separate proposal to construct a deep geological repository at the Bruce site is also well advanced. A joint review panel has recommended that the project proceed, and OPG has committed to submit additional information to the federal government by the end of the year to support its decision-making.

Canadian Nuclear Laboratories also plans to decommission outdated federal nuclear facilities. As part of that plan, CNL is seeking to secure the necessary approvals and construct a near surface

disposal facility at Chalk River Laboratories for operation by 2020. CNL is also remediating sites with historic radioactive contamination, particularly in the Port Hope, Ontario, area.

In sum, Canada's nuclear sector has unique capabilities, markets, and mechanisms to demonstrate new nuclear technologies and compete internationally. The nuclear sector continues to innovate, to address challenges, and to unlock new opportunities. We are doing our part to facilitate a positive environment for the industry to succeed.

This concludes my opening remarks. We will be pleased to answer your questions.

Thank you.

The Chair:

Thank you, Mr. O'Dea.

Mr. Hunt.

Mr. Colin Hunt (Secretary, Canadian Nuclear Society):

Good morning, Mr. Chair and ladies and gentlemen of the committee.

My name is Colin Hunt. I'm the secretary of the Canadian Nuclear Society.

The Canadian Nuclear Society is a national, not-for-profit, learned society across Canada whose members are interested in nuclear science and applied technology in Canada. The CNS has branches of local operations across the country.

The committee posed a number of questions to the Canadian Nuclear Society. My opening remarks this morning will provide short answers to each of those questions.

With respect to the future opportunities for Canadian nuclear science and technology, we believe it lies in the following areas.

The first, immediately, is the various refurbishment projects of 10 Ontario nuclear power reactors, four at Darlington, six at Bruce, in a $25-billion program stretching out over the next 10 to 12 years. It should be noted that much of this investment is private sector capital, specifically at the Bruce plant. This means that the private sector is willing to invest its capital in domestic nuclear power projects where there exists stable government policy. This ensures that nuclear power will remain the dominant source of electricity for Canada's principal industrial province well past the mid-point of this century.

The CNS also notes that the implementation of nuclear generation lies within the jurisdiction of the provinces, as noted by our friends at NRCan just a moment ago, and it is thus up to the provinces to determine their means of electricity production. It should also be observed that

because of the previous restart of six nuclear reactors in Ontario—four at Bruce, two at Pickering—that province is now nearly free of gaseous emissions from its electricity sector.

The second area is the immediate prospects before us of new CANDU reactors in Romania, Argentina, and China.

The third area, over the longer term, is expansion into more regions of Canada of nuclear power generation via small reactor technology for both grid applications and remote locations across northern Canada. SMR technology is also applicable to site-specific industrial applications.

The fourth area is the strong prospects of export of fuel and services to large new markets, and I'm specifically referring here to India.

The committee also asked us about the state of Canada's technology domestically and internationally. The view of the Canadian Nuclear Society is that the state of Canada's CANDU technology domestically and internationally is strong. Domestically, Canada's nuclear reactor fleet is among the best performing in the world in terms of both safety and efficiency. This performance is attributable in part to the expertise of Canada's nuclear plant operators and in part to the thoroughness and effectiveness of its regulator, the Canadian Nuclear Safety Commission.

Internationally, aside from the new construction prospects noted above, one of the most promising developments is the agreement between SNC-Lavalin and two large companies in China to build a new CANDU project in China to demonstrate advanced fuel cycles, and again, our friends at NRCan have made reference to this impending project. Unlike most of the other nuclear power reactors around the world, CANDU reactors can use a variety of different fuels without significant modification of the reactor.

With respect to the question the committee asked about benefiting other economic sectors within Canada, one of the principal ways it can benefit Canada's other resource sectors is by providing a cost-effective energy supply free of gaseous emissions to support primary industry.

The use of small modular reactors, for example, can reduce significantly the need of Canada's oil industry to use large amounts of natural gas for oil sands or for shale oil projects. Small reactors can avoid the need to rely on diesel fuel for energy supply in Canada's Arctic regions. This would lower costs and greatly reduce the risk of shortages. Providing reliable energy supplies would in turn encourage greater economic development of these regions in the interests of local populations.

(0905)

A third point here would be that expanding reliable supplies of electricity to remote communities will greatly assist in improving health and water treatment in the local communities. At this time, existing energy supplies to these communities, primarily diesel fuel, can be highly unreliable.

With respect to research and development, Canada has a strong nuclear R and D structure, and this should not be surprising given that Canada is an innovator nuclear nation. It is active in all

areas of nuclear science and technology, and it was, in fact, the second nation in the world to demonstrate controlled nuclear fission.

Canada's R and D structure is not confined strictly to Canadian Nuclear Laboratories, though I'm in no way understating the importance of that facility. Canada's nuclear R and D structure is distributed through a host of other institutions, universities, and corporations. Canada has a large number of research reactors and particle accelerators across the country, many of which are engaged in various research activities.

But all nuclear innovator nations—and this specifically includes Canada—need high-flux neutrons for large parts of nuclear research. Thus far, the only large source for this has been the NRU at Chalk River. Its impending shutdown does not mean that all such research in Canada will cease. What it means is that such research in Canada will have to go outside Canada for irradiation of targets. Unless the supply of high-flux neutrons is addressed by the Government of Canada, over the long term there is a risk that nuclear expertise in Canada must diminish.

With respect to R and D and nuclear medicine, this is a question I would more happily defer to other associations and societies more expert in the science and application of nuclear isotopes for medical purposes. The CRPA comes to mind in that regard.

The committee asked us about isotope supply, and, again, we would prefer to defer that to other organizations. We can provide the committee with a list of those who we believe are appropriate organizations to deal with that matter specifically.

The committee asked us a series of questions regarding waste management decommissioning. I would prefer to make a general statement here. All radioactive wastes in Canada are comprehensively managed by the owners of the waste. It should further be noted that, over the past decade, the Government of Canada has taken steps to manage comprehensively the legacy waste from the early years of nuclear science and research in Canada.

With respect to existing waste management, it's the view of the CNS that Canada's record is as effective as that of any other nation in terms of public safety. For the longer term, Canada has a long-term plan for management of all of Canada's nuclear waste in a program administered by the Nuclear Waste Management Organization. The CNS is in fundamental agreement with the approach taken by the NWMO.

Those constitute the bulk of my introductory remarks.

Peter, do you have anything you would like to add?

Mr. Peter Easton (Director of Communications, Canadian Nuclear Society):

No, not specifically, although I would make a couple of points with regard to the nuclear waste.

There are, of course, two types: the high-level waste that comes out of power reactors, and the low- and medium-level waste, some of which is from medical purposes in labs, hospitals, and so

forth. There are two different processes for storing these, which my former colleagues at NRCAN referred to.

The one point to be made about these is that the waste from nuclear reactors in particular is very small in relation. It's a controlled volume, and it's completely under the control of the plant operator. They are in swimming pools at plants, so it is not as if the waste is untracked along large areas of the country, and similarly for the low and medium waste. As I said, a lot of this comes from hospitals, medical facilities, and so forth. They are easy to identify and easy to control, and, of course, the Canadian Nuclear Safety Commission places restrictions on facilities that produce these wastes. There are regulations on how they are to treat waste of that nature.

The Chair:

Thank you very much.

I'll open the floor to questions.

Mr. Lemieux, I believe you're first up.

Mr. Denis Lemieux (Chicoutimi—Le Fjord, Lib.):

Thank you, Mr. Chair.

I would like to thank the two groups of witnesses for their presentations.

As has already been said, nuclear energy accounts for over 50% of electricity production in Ontario. I would like to hear the opinion of the two groups of witnesses. Why do you think using nuclear energy isn't as popular elsewhere in the country? What could the Government of Canada do to change this trend?

Mr. Niall O'Dea:

I will be pleased to be the first to answer the question. You would probably need to ask the provinces, which make those kinds of decisions.

As for Canada's nuclear situation, we saw real growth and development in the construction of reactors from the 1970s to the 1990s. That was when CANDU technology was developed because of a great energy need in some provinces.

Since then, other forms of energy have been developed, including natural gas and renewable energies, such as hydroelectricity. Building these kinds of facility is less costly than building nuclear power plants.

For nuclear energy to be competitive in countries like Canada, we need to have a long-term vision and specific energy strategies, since we need to make profitable the significant initial investment required for nuclear energy.

Over time, this becomes increasingly competitive because the facilities can last for over 60 years. In the case of wind or solar energy, the initial costs are much lower, but replacement must take place much sooner.

Taking a longer-term view of electricity sources gives nuclear power a chance in Canada. A longer-term vision gives greater scope to nuclear energy. If we focus on reducing greenhouse gases, and if we want clean energy that does not generate GHGs, nuclear energy becomes increasingly competitive in comparison to fossil fuels.

Before I turn the floor over to my colleagues, I want to point out that the real opportunities for Canadian industry are mostly overseas. Energy sources are very remote in many countries. Access to electricity is therefore more difficult than in Canada. Countries such as India and China have the goal of building a much wider system of nuclear power plants, providing opportunities for a country like Canada.

Finally, the ultimate goal is energy security. Some countries, such as Romania and Poland, want to be more independent when it comes to generating electricity, and they see nuclear power as a way to do that. They are in talks with Canadian industry to see if Canada can take advantage of this opportunity and export Canadian technologies to those countries.

I will now turn it over to my colleague.

Mr. Colin Hunt:

Monsieur Lemieux, that's a very interesting couple of questions that you've asked. I want to deal with them separately, but head-on.

The origin of nuclear power specifically in Ontario was driven by a series of both historical and geographic factors that emerged at the end of the Second World War, and those factors have not changed one iota in the previous half-century. That's a very long discussion, and I'd be happy to address it at some future date with you or the members of this committee.

With respect to the appearance of the lack of support for nuclear power, this is something of a myth. I spent nearly two decades at the Canadian Nuclear Association prior to my role here at the Canadian Nuclear Society, and we made it our business every year to sample what Canadians thought about nuclear power, both in general and in specific provinces across Canada.

Nuclear is not unpopular. That is something of a myth generated in the media. What we found year after year—and this goes back to the early 1990s—is that, in general, citizens in Ontario are divided into three groups. There is a very small and vocal group opposed to nuclear power. There's a somewhat larger group—but again, very much a minority—of those vigorously in support of nuclear power. Then there's the vast majority of citizens in the middle who are mildly

supportive, who don't know much about it, and who aren't much interested unless something hits the headlines and causes a big sensation.

As we look at the development of nuclear power in Ontario, I'm going to refer specifically to the nuclear refurbishment projects that are going on right now. These have been fairly extensively surveyed in terms of "does the public support them or don't they?" The public is rather lukewarm about the whole business of building new reactors. This arose about 10 years ago when Ontario was considering this. Mostly, it was not because of fear of nuclear power or its consequences. Mostly it was concerns about how much it would cost. However, with refurbishment, it's a very different thing. Year after year, survey results have consistently shown that support for refurbishment of Ontario's existing nuclear power plants runs well above 80%.

Mr. Denis Lemieux:

Thank you.

The Chair:

Thank you.

Mr. Barlow.

Mr. John Barlow (Foothills, CPC):

Thank you very much, Mr. Chair.

Thank you very much to our witnesses for being here.

This is going to be an interesting process. Certainly, as a member from Alberta, I'll say that this is something fairly new to us, as we don't have nuclear power in Alberta. It's been a topic of discussion for many years, but for the reasons you've just touched on, it has not come to Alberta.

You've talked about that opposition to nuclear power. In Alberta, we feel much the same in terms of the oil-and-gas side. We have that misperception of the dangers of oil and gas when we know that the safety record is much different in reality, so I certainly feel your pain in trying to promote the nuclear industry.

There are some numbers I found really interesting as I was going through some of the research. We keep talking about opportunities to find more environmentally friendly energy supplies, and nuclear is one that is not very often raised, which I find surprising. We always talk about solar and wind and these kinds of opportunities. In Ontario, you have that great app on your phone, Gridwatch, and I wish we had one for Alberta, but we don't. It's really interesting to look at. Today I clicked on it, and for Ontario, solar is at 0%, wind is at 2.4%, and nuclear is at 60%.

When you look at the cost of those energy supplies, you see that nuclear is at about 5.6¢ per kilowatt hour, whereas solar is at 50¢ per kilowatt hour, and wind is at 13.5¢. That shows you the substantial cost difference in these power supplies. Why are we not talking more about nuclear? I think we all know why, but I would like to ask the witnesses this: how do we change the public perception of nuclear?

You talked about a very vocal minority. We face much the same on the oil-and-gas side. I fear that if we start to talk about opportunities with nuclear, those same people who are opposing pipeline construction are going to be the ones opposing additional nuclear power supplies, even when it makes the most sense. It's economical. I know that the CANDU technology is safer than any other technology in the world when it comes to the safety precautions in there.

How do we change that mindset? Or can we? Is there an opportunity to do this or are we going to be facing the same battles we're having with regard to the oil-and-gas sector? Will we have a government that is going to be more supportive of nuclear than they have been with oil and gas? Do we have an opportunity here? Or is this an uphill battle? Mr. O'Dea is talking about exporting our technology to Romania and China, when we could probably be using it right here at home.

Mr. Peter Easton:

Well, if I may, I could make some points. If you look at what we call in statistics a "normal curve" of opinions about things, you will see that there is going to be a small percentage of people who you will never convince. For whatever reasons, ideological or others, they're opposed to pipelines, they're opposed to nuclear power, and they're opposed to anything except what they particularly propose.

As my colleague pointed out, when they were doing surveys of attitudes towards nuclear in Ontario, there was a percentage that was highly supportive. Most were in the middle. Then, of course, there were the ones who were completely opposed to it. There are a number of reasons for this, I think, aside from the ideologues who you just won't convince, and to my way of thinking, there's no point in even thinking you can do that.

In the case of the strong supporters, in part it is because, without this, the communities in Darlington and Tiverton would never have had access to the employment that a nuclear plant provides. The Bruce Power plant has roughly 3,600 employees, while Darlington has slightly less, at slightly over 3,000. These jobs are extraordinarily well paid, and otherwise, without them, you would have rural communities that would not have access to those 3,000-plus jobs with salaries of $100,000 or $80,000 per year, so it's not surprising that the support is so high.

As for the bulk of the population, a very large part of the issue is that as a species we're extraordinarily poor at assessing relative risk. Opponents of nuclear power will get up and say that it's risky. Opponents of pipelines will get up and say they are risky. Of course it's risky, because everything is risky. You can't have zero risk; the laws of physics don't allow it.

The question is, what is risky relative to something else? I'm getting off the point of nuclear, but in terms of pipelines, we know, because we've had an event, that shipping oil by rail will kill people. It killed 47. I have not heard of a pipeline spill, ugly though the spill might be, that has actually ever harmed a human—ducks, perhaps, but humans, no.

Similarly, with nuclear power, if you take the Fukushima incident as the most recent episode, you will find that more people died from the evacuation, from the stress of leaving their homes and not knowing when they would be allowed to go back, than would have been damaged by the radiation in those homes, because in actual fact there was not that much radiation released. It was released into the water supplies, but not so much into the air.

Again, with nuclear power—and it's an educational process—there are isotopes, particularly Iodine-131, that are long-lived enough or concentrated enough in the human body to be of concern, but like all highly radioactive substances, these also have relatively short half-lives. You can prevent this by taking iodine tablets in the event of an accident, because it gets concentrated in the thyroid, which is where iodine would normally concentrate, so it never gets concentrated in your body and just gets flushed out.

Over the longer term, these are isotopes that are relatively heavy and will plate out of the atmosphere in relatively short distances from the site of the accident. The rest of it is low-level radioactivity that in fact the human body can well tolerate. There was a documentary some years ago showing the site of Chernobyl, where people are still not allowed to live, although some have snuck back. It's a wildlife refuge. The numbers of bison, boar, and whatever are far in excess of what would have been around had the plant been operating, simply because nobody is hunting them. There are no people there.

How to educate the population is a difficult thing to do, particularly in this age of Twitter and Facebook and everything else, where a negative review will blast out and find hundreds of thousands of supporters simply because it sounds true. There is an unfortunate aspect of current society—

The Chair:

Mr. Easton, I'm going to have to—

Mr. Peter Easton:

—that someone has described as “truthism”, where something is not true in the scientific sense but feels true. How you combat that, I really don't know, to be perfectly honest. If I had the answer to that, I might well win some kind of journalistic prize.

Anyway, that would be my comment on that.

The Chair:

Thank you, Mr. Easton. I'm going to have to stop you there.

Mr. Cannings.

Mr. Richard Cannings (South Okanagan—West Kootenay, NDP):

Thank you, Mr. Chair.

Thanks to all of you for being here this morning.

I want to start with Mr. O'Dea and talk about one of the main concerns people have, as has been mentioned here, which is the big upfront cost. You've mentioned that these plants are built to last 60 years, yet we're already seeing Pickering undergoing a fairly large refurbishment, and I think it's only 45 years old.

Mr. Barlow brought up the relative costs of the energy. I assume those costs are calculated and amortized over some period. I wanted to know what that period was. Also in terms of nuclear at 5¢, you show solar at 50¢, whereas in the world market, all the new data I have on solar is that it's around 5¢ as well. I'm wondering about those costs and how long those costs are amortized for.

Also, how can the public be assured about these costs that you talk about? There was talk of $25 billion for all 10 plants in Ontario. The province announced $13 billion for Darlington earlier this year, and the *Financial Post* is suggesting that the actual costs of that refurbishment might be as high as $22 billion. That's 3% of the province's GDP, so I think the public has good reason to be wary of those big upfront costs and how long these plants will be in operation and not require major fixing.

Could you comment on all of that?

Mr. Niall O'Dea:

Sure. Thank you for the questions.

I see two questions, one about the relative costs of energy from nuclear and other sources, and the second about cost management in the context of the nuclear sector itself and refurbishments and things of that kind.

To answer in terms of the first element, yes, the cost of nuclear energy would be amortized over the full lifetime of the facility in question. The low cost of electricity from nuclear in Ontario, for instance, is actually a benefit of that kind of long-standing nature of the plants that exist.

I think Ontario would have to speak for itself in terms of the planning it did in deciding to proceed with the refurbishments, but I think when it looked at that, it said that a big upfront

capital investment was made in these projects, and that upfront capital investment is largely amortized at this point, so a refurbishment allows us to continue to extend the life of those plants and yield a continued benefit in terms of low-cost power for Ontarians from these existing facilities. That's part of what drives the lower cost.

Around the question of why refurbs are happening at this particular time, when you look at the total lifetime operation of a nuclear facility, there is a point in which a refurb is required, and that's considered in the overall life-cycle costs of that project. A 25-year time frame to a refurbishment is one that's reasonable and in fact is something that would be required to ensure the facility continues to perform efficiently and safely over the long term.

In terms of the cost of other forms of electricity generation, I think it's important that, as you note, the costs of various forms of renewable electricity have actually been declining rapidly in recent years, and they are, to some degree, location dependent. In Ontario, for solar, the cost of 50¢ is based on existing power purchase arrangements and feed-in tariff programs. If you were to do an auction for new solar now, it would likely come in at a significantly lower cost. On that basis, and I think globally when we look at numbers that come from the International Energy Agency, IEA, and the Nuclear Energy Agency working together, the life-cycle costs of nuclear remain competitive on a global basis with those costs of renewable energy looked at on a long-term basis.

The choices will be quite location specific. If you live in an area that receives a high degree of solar input, then solar may well be a cheaper option for you in combination with other forms of electricity. In other areas, nuclear may well be the best prospect. It really depends on looking at the specific context of the type of electricity you're looking to generate and the resources you have to draw from, and making a decision on that basis as to which is the best option to proceed with.

In respect specifically to the cost of nuclear, I think it is true that nuclear projects in recent years—or at least in the past decade or so—have faced significant cost overruns in various places, and that's been a challenge to public confidence in the nuclear sector. Interestingly, in respect of the Canadian technology, if we look at more recent new build projects done internationally with Canadian technology, both Qinshan reactors in China were built on time and on budget in the mid-2000s, as was the facility in Romania. There is the capacity to effectively manage these projects and to manage them on time and on budget.

In terms of both the refurbishments in Ontario and the management of the nuclear waste exercise in Canada at large, getting those projects done on time and on budget will be very important to future confidence in the nuclear sector. In order to preserve that confidence, I think organizations like OPG are very conscious of the need to actively manage those costs and to manage within the budgets that have been allocated.

The Chair:

Thank you, Mr. Cannings.

Mr. Tan, the floor is yours.

Mr. Geng Tan (Don Valley North, Lib.):

Thanks, Chair.

Thanks to all of you for coming today.

My first question goes to NRCan. The nuclear industry is an industry, of course, but it's a very unique industry because of the severe consequences of any potential accident. Nuclear safety plays a key role, and I would say probably the most critical role, in shaping our current nuclear industry.

Nuclear labs such as the Chalk River labs have played a major role in Canadian nuclear R and D and in ensuring the safety of nuclear operations for probably more than six decades already. Following the independent review process in 2011, a new organization, known as Canadian Nuclear Laboratories, was created to manage the AECL's nuclear labs under a government-owned, contractor-operated model. What was the rationale behind the move to this new model? Was it financially motivated?

I checked your slides. They say you introduced this model to "reduce costs". Can you tell us what is your projection for the difference between these two models? Also, what is the reduced risk to the taxpayer? I am not very convinced, because it is still government-owned, so any risk will still go to Canadians through the government.

Under the government model, nuclear safety, reliability, and security were the key, but what about the current model? What are the criteria the government uses to evaluate the performance of those contractors? Do you have any idea or policy you want to compare in terms of those two models?

Also, what role can the government play to ensure that safety remains the most important or primary concern and the top priority for Canadians?

Mr. Niall O'Dea:

Thank you for the question, Mr. Tan.

To start, I think I would say that the government clearly places the absolute highest priority on public safety and security and environmental protection in all its nuclear activities. That is a key motivating force for us in how we approach the management of the sector, supported both by the nuclear laboratories in their research activities, as well as by our independent regulator, the Canadian Nuclear Safety Commission.

Specifically in respect of the restructuring of AECL, I can take you through the logic of that. The decision to restructure AECL was taken following a review undertaken by the federal government and completed in 2009. That review concluded that AECL should be restructured to allow Canada

to fully compete in a global nuclear market and so the Chalk River Laboratories could benefit from an alternative management model that was offered by the government-owned, contractor-operated system. That was following the models that have been applied successfully in the U.S., particularly in its Department of Energy labs, as well as in the U.K.

AECL was restructured in two phases to address that challenge.

First, the reactor division was sold to Candu Energy Inc., a subsidiary of SNC-Lavalin. The idea here was to control costs to government related to the activities of that reactor division—so it allowed the private sector to manage those risks—while also maximizing the return on the government's investments in nuclear energy through the royalty structure that is in place.

The second phase focused on implementing a government-owned, contractor-operated model at the nuclear lab itself. There, what was done was to launch a procurement exercise that selected a private sector contractor to take responsibility for the management and operation of those laboratories. Again, the idea there was to develop and implement a highly incentivized contractor that would drive performance of the nuclear laboratories across its missions: to improve and revitalize its scientific mission to provide more focus on the needs of the industry and have a more outward look at what was required to advance the sector at an international level on a long-term basis, and also to manage the significant historic and legacy waste liabilities that are owned by the Government of Canada and ensure that those liabilities were being tackled effectively and efficiently.

We have an ongoing relationship with the government-owned, contractor-operated model at the labs. That is achieved through Atomic Energy of Canada Limited itself, which is now restructured as a small crown corporation of roughly 50 people. You'll be talking to them later this week, I think, and can ask more questions there. Effectively, AECL's role is to be the smart buyer for Canada of the services of the contractor at the labs. The intent there is that they provide oversight to that contract and ensure that work both in respect of S and T and in respect of waste management is being undertaken effectively and that the targets set out in the contract are effectively met by the contractors.

There's a very active management of that work to ensure that we continue to have a sound and renewed R and D enterprise for nuclear in Canada and that our long-term waste liabilities are managed effectively and reduced.

Mr. Geng Tan:

Okay.

I think my question actually focuses on the nuclear safety, not on the cost reductions or any competitiveness in the global market. Also, the situation of Chalk River is somehow different from most other U.S. national labs, because in the U.S., most of the national labs are managed by universities, and they don't need the money. The government doesn't evaluate their performance by money or by cost reductions.

I don't know what the situation is in Chalk River. Part of my question is about how the government evaluates the performance of the contractors. What are the criteria? Are they based on money, on safety, on long-term development, or on our competitiveness in the global market? What are those things? Probably we can discuss it offline.

The Chair:

I think you're going to have to because we're—

Mr. Geng Tan:

How many more minutes do I have? One?

The Chair:

None. Sorry.

Mr. Strahl, we'll go over to you for five minutes.

Mr. Mark Strahl (Chilliwack—Hope, CPC):

Thank you, Mr. Chair.

My question is for the department. Since last summer, there have been allegations—from what Mr. Barlow talked about and what we've heard—of concerns about nuclear safety that I think have come up as a result of allegations against the Canadian Nuclear Safety Commission that have called into question some of the programs in place. There was an anonymous letter claiming that information on non-compliance was withheld from commissioners. That was followed by a report by the commissioner of the environment and sustainable development, which found that CNSC was not inspecting reactors often enough or thoroughly enough.

Can you perhaps explain your relationship between the department and the CNSC? Also, what measures have been taken by the department as a result of that commissioner's report and as a result of concerns that have been raised about the CNSC?

Mr. Niall O'Dea:

Thank you for the question.

First, I think it's important to note that CNSC is an independent regulator that reports to Parliament through the Minister of Natural Resources and, in that respect, has independence from our department. I think the key for us in our support of the minister is ensuring that he's well supported with information as to the CNSC's activities.

I can certainly comment specifically on the two elements in question that you raise, both the anonymous letter and the recent CNSC audit. As you'll be aware, the CNSC did conduct an internal review of the claims raised in the anonymous letter and found that the claims were unfounded. The CNSC released that report for review and held a public meeting to review those findings. CNSC commissioners have confirmed that they're satisfied with the results of that review.

The CESD reviewed the CNSC as well and did find that it had improved upon its record-keeping and documentation practices with respect to site inspections. The CNSC has accepted those recommendations and is taking corrective action to address this. That includes ensuring that criteria for certain types of inspections are formalized and integrated into its management systems and improving staff awareness of procedures for site inspections and administration.

Three of the five concerns that the CESD raised have already been addressed. As evidenced before, the government does place the highest priority on safety and security in nuclear activities. The CNSC is recognized as among the best regulators in the world. It's subject to regular international peer review of its practices and has been found to be one of the best.

I will conclude by saying that the minister has clearly expressed publicly his confidence in the CNSC as an independent regulator, and I think that is the starting point we work from.

Mr. Mark Strahl:

Thank you.

In the limited time I have left, I want to talk about the small modular reactors. We heard about that in our mining study as well, and it was brought up today. In spite of the polling data that's been shared here that people are perhaps generally supportive of nuclear power, I think that's until you talk about moving it into their backyard or somewhere they might be affected. I'm not saying that's right or wrong. I just think it's a reality that when it's in your backyard it has a different connotation.

Is the department working on providing support to the nuclear industry in scaling these projects or commercializing them? What is the department's take on the small modular reactors?

Mr. Niall O'Dea:

Thank you for the question, Mr. Strahl.

The federal government does support work on innovation in nuclear technology and research through Canadian Nuclear Laboratories and AECL's federal nuclear S and T program, so there is work going on to support nuclear innovations through that program.

It should also be noted that Sustainable Development Technology Canada funded two innovative nuclear reactor projects. One is Terrestrial Energy's, which is an SMR-related project. They provided $5.7 million to that project in 2016. There is also the General Fusion project, which is for a fusion-related reactor technology being developed in British Columbia. That technology has received two rounds of funding from SDTC, one for $12.7 million in 2016, and an earlier funding of $13.9 million back in 2009.

As a department, Natural Resources is reaching out to its stakeholders to better understand how innovative technologies, including SMRs, could play a role in the government's commitments to supporting clean technologies. We have partnered with Ontario in a study of the feasibility of different SMR technologies. We also funded a study by the Fedoruk Centre on aboriginal attitudes toward nuclear energy to better understand what the possibilities could be for the application of those types of technologies in remote contexts. It is an area that is promising in terms of innovative technology development.

Canada has unique advantages in respect of the potential development of SMR technologies, particularly in having a performance-based regulator able to incorporate different types of technologies in its reviews, as well as conditions that include a lot of remote communities in need of reducing their reliance on diesel and also remote mining operations requiring alternative energy sources, where I think international and domestic companies see potential applications for the SMR technology. We're continuing to work to support the exploration of those opportunities.

The Chair:

Thank you very much, Mr. O'Dea and Mr. Strahl.

Unfortunately, that's all the time we have for this portion of the meeting. Again, thank you to all of our witnesses for attending today. It's been a great start to this nuclear study that we've just embarked on. I appreciate your attendance.

We'll suspend for two minutes and then start again.