HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

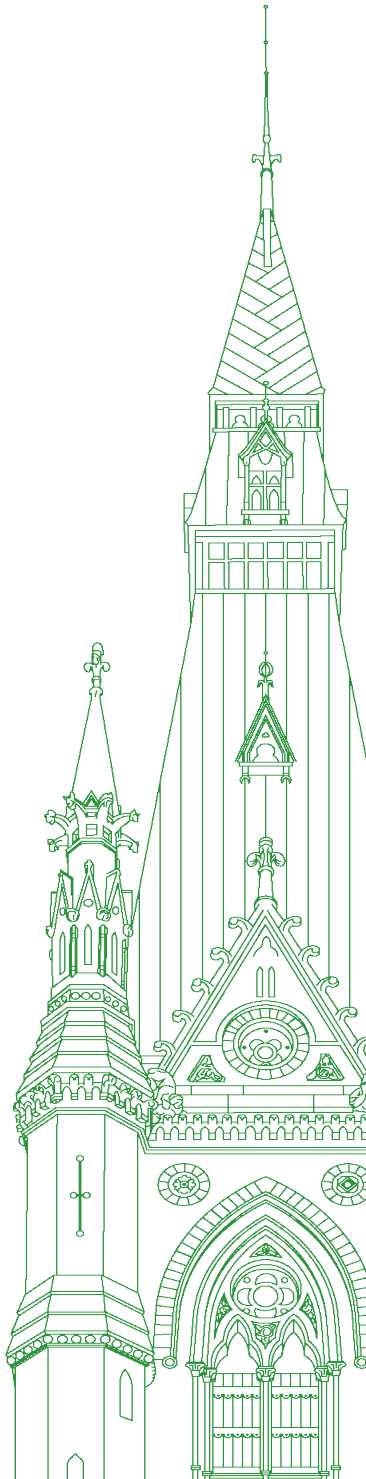
45th PARLIAMENT, 1st SESSION

# Standing Committee on Natural Resources

EVIDENCE

**NUMBER 049**

Monday, October 26, 2026



Chair: Terry Duguid

# Standing Committee on Natural Resources

**Monday, October 26, 2026**

● (1100)

[*English*]

**The Chair (Hon. Terry Duguid (Winnipeg South, Lib.)):** I call this meeting to order.

I'll start by acknowledging, as we always do, that we're meeting on the unceded territory of the Algonquin Anishinabe nation.

Welcome to meeting number 49 of the House of Commons Standing Committee on Natural Resources.

Today's meeting is taking place in a hybrid format, pursuant to the Standing Orders. Members are attending in person in the room and remotely using the Zoom application.

I'd like to remind everyone to please wait until I recognize you by name before speaking. For those participating by video conference, click on the microphone icon to activate your mic, and please mute yourself when you are not speaking.

For those on Zoom, at the bottom of your screen, you can select the appropriate channel for interpretation: floor, English or French. For those in the room, you can use the earpiece and select the desired channel.

This is a reminder that all comments should be addressed through the chair.

For members in the room, if you wish to speak, please raise your hand. For members on Zoom—we have a few today—please use the “raise hand” function. The clerk and I will manage the speaking order as best we can. We appreciate your patience and understanding in this regard.

Pursuant to Standing Order 108(2) and the motion adopted by the committee on Wednesday, October 7, 2026, the committee shall commence its study of Canada's nuclear future.

I would like to welcome our witnesses.

[*Translation*]

We have Mr. Pierre-Olivier Pineau, professor and fellow of the chair in energy sector management at HEC Montréal. He will be testifying as an individual.

[*English*]

From the Canadian Nuclear Association, we have George Christidis, president and chief executive officer. I believe you have some colleagues with you, whom you can introduce shortly.

From Canadian Nuclear Laboratories, we have Eric McGoey, vice-president of corporate affairs, and Colin Judge, deputy vice-president of science and technology.

All virtual witnesses have conducted the mandatory witness onboarding test.

I would like to make a few comments for the benefit of the witnesses. You will each have five minutes for your opening remarks, after which we will open the floor to questions.

[*Translation*]

You have the floor, Mr. Pineau.

**Pierre-Olivier Pineau (Professor, Chair in Energy Sector Management, HEC Montréal, As an Individual):** Thank you, Mr. Chair.

It's an honour for me to share some thoughts with this important committee.

First, Canada's nuclear energy sector is significant domestically and internationally, Canada is a significant player in the nuclear energy sector. As you know, Canada is the world's second-largest producer of uranium. We are one of the few countries with a clean nuclear technology: the Canada deuterium uranium reactor, known as CANDU. This technology has been exported to several countries. In Ontario in particular, nuclear energy is very big.

In a world that is fighting climate change—unfortunately, we aren't really in that world yet—nuclear energy is indispensable. There will need to be some, because it will be extremely important to replace coal in many countries.

Now that I've made these very positive points about nuclear energy, which I believe and support, we need to take stock of Canada's situation, which is unique. Canada does not have enough opportunities to speak candidly and present the real figures.

First, nuclear energy in Canada and Ontario is particularly expensive. Ontario Power Generation, or OPG, sells its nuclear power to Ontarians for about $110 a megawatt-hour. A look at Hydro-Québec or hydroelectricity production in other provinces shows that this energy is sold at $40 a megawatt-hour. Thus, nuclear power is very expensive for Ontarians.

We also have an interprovincial trade problem. There has been a lot of talk in the last two years about the need to open up trade between the provinces, but there has never been active talk, to my knowledge, about opening up the electricity trade between the provinces further, removing interprovincial barriers so that Ontarians can benefit from hydroelectricity, which is much cheaper in Quebec, and ensure complementarity between the provinces.

Second, the small modular reactors that are being built in Ontario are very expensive. The investment comes to nearly $21 billion for a 1,200 megawatt capacity. Analysis shows that production will cost at least $150 a megawatt-hour, and that is only the capital cost. That doesn't include operating costs. Canadians and Ontarians need to be aware of this cost to be able to make the right decisions.

However, in several Canadian provinces, there is a very poor understanding of electricity prices. Notably, in Ontario, which is the largest producer and consumer of nuclear energy, the price consumers pay for electricity doesn't reflect the costs to generate it. For example, the Ontario electricity rebate reduces the price consumers pay by 15–20% compared to what it costs to generate electricity in Ontario. Consumers aren't aware of this and don't pay the true price for electricity in Quebec, Ontario or other provinces. They pay a price that is distorted by different policies.

That's a problem, because it doesn't send an energy efficiency signal to consumers. Because consumers pay less and taxpayers pay the difference, in Ontario in particular, energy efficiency is not at the level it should be. This is a fundamental problem, because we, in Canada, overconsume electricity and energy in general. We are a country that consumes a lot of energy. When we talk about producing more electricity or energy, as an energy economist or as someone who is interested in energy saving, I always have an issue with that, because we are overconsumers. Before talking about producing more energy, we should do our homework on energy consumption.

I'll close with a final point that relates to what I said about pricing. We have very problematic economic foundations in the electricity sector in Canada. The rates are too aligned with the average cost. In Quebec and in the majority of provinces, the marginal cost of production isn't known. Ontario has a market, so we should be able to know the production cost and market price, but the overall adjustment completely distorts the understanding of prices. Ontario's electricity rebate once again distorts consumers' understanding of pricing.

● (1105)

Furthermore, there's a lack of interprovincial trade and integration between the provinces. If we want to add nuclear energy to Ontario and Canada, we need a far more coherent economic foundation, so as not to invest billions of dollars in a shaky economic foundation, as is the case today.

**The Chair:** Thank you, Mr. Pineau.

[*English*]

We move on now to Mr. Christidis.

You have the floor for five minutes.

**George Christidis (President and Chief Executive Officer, Canadian Nuclear Association):** Thank you, Mr. Chair and honourable members of the committee, for the opportunity to contribute to this important study on Canada's nuclear future.

My name is George Christidis, and I'm president and CEO of the Canadian Nuclear Association.

The Canadian Nuclear Association represents approximately 200 companies and organizations across Canada's nuclear value chain and supports more than 89,000 direct and indirect jobs across Canada. We bring together industry. We advise governments on policy, advocate for our sector and advance international opportunities.

Canada stands at a definitive moment in its energy and economic future. Growing electricity demand, industrial expansion, electrification and technologies such as artificial intelligence are reshaping our energy needs. Canada may need to double its electricity supply by 2050 while maintaining affordable, reliable and competitive energy markets and systems.

Nuclear energy must be central to that response. It provides reliable low-carbon electricity, strengthens energy security and supports high-quality employment. Nuclear technology also contributes to creating and supporting the innovation system. For example, it is a key producer of isotope productions. Isotopes are used for cancer treatments in Canada and abroad.

On behalf of the industry, I commend the federal government for releasing Canada's first nuclear energy strategy. This important achievement reflects years of industry advocacy and establishes a national vision for nuclear energy's contribution to Canada's future. The Canadian nuclear industry is a strategic asset for Canada to meet key energy, climate, economic and national security goals. The nuclear energy strategy also recognizes the need to double Canada's nuclear workforce by 2050, creating significant opportunities for Canadians in a very uncertain time.

However, a strategy is only effective as it's implemented. Canada enters this next phase with considerable strengths. We have world-class uranium resources. We have CANDU technology. We have Westinghouse, with global capabilities through Canadian ownership, a skilled supply chain and emerging technologies, including small reactors, microreactors and fusion.

Importantly, nuclear energy is now a strategic priority for several provincial governments across Canada. Ontario is advancing major nuclear expansion. Saskatchewan has ambitious development plans for large and small reactors. New Brunswick is building on its existing nuclear capabilities. Alberta is actively exploring nuclear energy for its future electricity and industrial needs. Together, planned and proposed projects across the provinces represent 22.3 gigawatts of potential new nuclear capacity.

The nuclear industry has demonstrated that it's able to deliver on time and on budget. Ontario's refurbishment program, which has delivered the refurbishment of the Bruce Power plant and OPG and which is key to Ontario's energy security and energy future, provides us with an example of the experience and the confidence for future investments.

However, a competitive advantage cannot be taken for granted. Other countries are moving aggressively to attract nuclear investment and secure supply chains. A domestic nuclear industry is also foundational for Canada's international success.

I would like to highlight four areas that require federal leadership to enable the growth of the nuclear energy sector that will create opportunities across Canada and beyond.

First, mobilize investment and reduce financial risk. We need broader investment tax credit eligibility, including essential infrastructure and early development costs, greater access to long-term financing through the Canada Infrastructure Bank and appropriate risk-sharing mechanisms.

Second, modernize the regulatory process while maintaining rigorous safety standards. Hence, we support the direction of Bill C-39 while identifying specific adjustments that need to be required as we move into the future. We should reduce unnecessary duplication, improve coordination and increase predictability while maintaining safety.

This must include early and meaningful engagement with indigenous communities, respecting indigenous rights and supporting the participation in decision-making affecting nuclear development. Regulatory efficiency and safety and indigenous engagement are complementary objectives.

Third, strengthen Canada's industrial innovation and workforce capacity. We must develop skilled workers, strengthen domestic supply chains, advance indigenous economic participation and support Canadian technologies moving forward for commercial development, including an appropriate regulatory approach for fusion. Our ambition should be not only to build nuclear projects in Canada but to maximize Canadian participation and delivery.

● (1110)

Fourth, position nuclear energy as a strategic instrument of Canada's international economic policy. Nuclear energy is increasingly connected to energy security, trade diversification and geopolitics. It is an industry that creates long-term geopolitical relationships. It is foundational and essential to working through the relationship with the United States, as well as creating market opportunities in Europe, Asia and beyond. We encourage a team Canada approach supported by timely export authorization, nuclear co-operation agreements and international agreements, as well as clear international financing models that would help Canadian companies compete globally.

Honourable members, Canada's nuclear future is about more than electricity generation. It is a competitive national asset that can help Canada move forward.

Thank you.

**The Chair:** Thank you, Mr. Christidis.

Now we go to Mr. McGoey and Mr. Judge.

You have the floor for five minutes.

**Eric McGoey (Vice-President, Corporate Affairs, Canadian Nuclear Laboratories):** Thank you very much, Mr. Chair, for the opportunity to appear before the Standing Committee on Natural Resources.

Good morning. My name is Eric McGoey. I am the vice-president of corporate affairs at Canada's national nuclear laboratories. Joining me today is my colleague, Dr. Colin Judge, CNL's deputy vice-president of science and technology mission delivery. I'll be splitting my time with him. We appreciate the opportunity to contribute to the committee's study on Canada's nuclear future.

Canadian Nuclear Laboratories operates Canada's national nuclear labs on behalf of Atomic Energy of Canada Limited and under a government-owned, contractor-operated model. Our responsibilities include the Chalk River Laboratories, Canada's largest nuclear science and technology campus, as well as research, decommissioning and the environmental remediation of sites across the country, such as the Port Hope area initiative in Ontario and the Whiteshell laboratories restoration project in Manitoba.

● (1115)

[*Translation*]

As the committee considers Canada's nuclear future, Canadian Nuclear Laboratories welcomes Canada's Nuclear Energy Strategy, which sets a clear vision for the role that nuclear energy will play in supporting Canada's economic, energy and climate objectives.

Canadian Nuclear Laboratories is uniquely positioned to advance the science, technology and innovation needed to help realize that vision, from CANDU reactors and small modular reactors to advanced fuels, fusion technologies or other clean energy applications such as hydrogen production.

[*English*]

I will now invite my colleague Colin to discuss Canada's many opportunities in nuclear energy and the role CNL will play in supporting that future.

**Dr. Colin Judge (Deputy Vice-President, Science and Technology, Canadian Nuclear Laboratories):** Thank you, Eric.

Good morning, members of the committee.

For more than 75 years, Canadian Nuclear Laboratories has helped build and sustain Canada's nuclear sector. As the birthplace of CANDU technology, our federal lab has supported the development, operation, refurbishment and advancement of Canada's nuclear fleet through world-class science, research infrastructure and technical expertise. With the release of Canada's ambitious nuclear energy strategy, success will depend on not only deploying reactors but also maintaining the research infrastructure and expertise that support them today and into the future. CNL provides that foundation.

Chalk River Laboratories has played a central role in Canada's nuclear success story. More than seven decades of research, innovation and operational support have helped build the expertise and supply chain capacity that continue to support CANDU deployment and solidify Canada's position as a leader in global nuclear markets.

Today one of Canada's greatest strengths is the diversity of nuclear technologies being advanced across this country. Large-scale CANDUs can provide reliable baseload electricity for major grids. Small modular reactors, such as those being deployed at Darlington, and microreactors designed for remote and off-grid applications provide the flexibility needed across Canada's diverse geography, regional economies and energy requirements. CNL continues to support this broad technology spectrum through our science, testing and expertise that are needed to reduce technological risk and accelerate their deployment.

Looking ahead, CNL is also helping to lay the groundwork for fusion energy. Building on decades of experience in tritium sciences and deuterium management from the use of our CANDU reactors, the laboratory is continuing to advance fusion-enabled technologies required for future fusion energy systems. These capabilities represent an area where Canada can build on the strengths of our past for new innovations of the future.

Meeting Canada's long-term nuclear ambitions will also require investment in the next generation of research infrastructure. A pan-Canadian multi-purpose research reactor would serve as a cornerstone national asset, supporting advanced reactor development, fuel and materials testing, isotope and radiopharmaceutical development and production, and a broad range of scientific research. Beyond strengthening innovation and intellectual property development, it would help secure and ensure that critical capabilities remain in Canada, supporting a team Canada approach and reinforcing Canada's scientific and technological sovereignty.

More broadly, achieving Canada's nuclear energy strategy will require sustained investment in national infrastructure and expertise that underpin the entire nuclear ecosystem. As Canada's national nuclear laboratory, CNL brings together industry, governments, academia, indigenous partners and international collaborators to develop talent, reduce risk and accelerate innovation. Strong domestic capabilities are essential to maintaining Canada's expertise, supporting our supply chains and ensuring that Canada can independently deliver on its long-term objectives.

Since its inception, CNL has supported Canada through nuclear science and technology. We remain ready to develop and deliver potential technologies—the potential to provide clean and reliable energies to remote locations, the potential to strengthen industrial competitiveness through reducing emissions, the potential to support economic growth and power the digital economy, and the potential to leave future generations with an energy system that is more resilient, more sustainable and more secure than the one we all inherited.

● (1120)

**The Chair:** Thank you. I'll ask you to wrap up, please.

**Dr. Colin Judge:** That was my last thing.

Thank you.

**The Chair:** That was great timing. I also gave you a little extra time, Mr. Judge.

Colleagues, we're ready for questions and comments.

We'll start with Ms. Anstey for six minutes.

**Carol Anstey (Long Range Mountains, CPC):** Thank you, Chair.

Thank you to the witnesses.

Mr. Christidis, I would like to start with you, as you represent industry.

In budget 2024 the Liberal government acknowledged that duplication existed between the CNSC and the IAAC. Here we are more than two years later. I think it would be important for you to articulate for us what that continued regulatory duplication cost has been on industry. More specifically, could you speak to what that has meant in terms of investment, jobs and project delays?

**George Christidis:** It is very true that the Canadian nuclear industry has been calling for a single regulator for quite a while. In Bill C-39, it has been acknowledged. We certainly support the government's recognition within Bill C-39 to basically reaffirm the Canadian Nuclear Safety Commission's role in being our regulator and incorporating the impact assessment through that process.

The discussions with regard to what that nuclear regulatory regime looks like for future projects as our projects are moving ahead was very much about the economic concern, the time concern and concerns about the indigenous consultation process, in terms of making sure that the scoping was done appropriately and the mechanisms were in place. All these factors pointed to uncertainty. There was uncertainty in terms of the regulatory environment and the potential impact for economic decisions. That is why right now with Bill C-39 we feel the government has tabled legislation that is definitely pointing to the right way.

There are still some questions. I can certainly follow up with the committee about our more detailed submission on Bill C-39. It's very much around how that is implemented, that is, how you implement the one single regulator.

**Carol Anstey:** I appreciate that.

In your opinion, since 2024 when there was an acknowledgement of that duplication, would you articulate that we would be further ahead in terms of nuclear capacity if the government had streamlined that process back when it had originally acknowledged it?

**George Christidis:** On the nature of our projects that take longer-term planning, I can't point to a specific deferred project. The project planning continued. There was definitely a recognition that the regulatory environment needed to be much more streamlined and certain.

However, projects such as those at Darlington, which were on a licensed site, the SMRs proceeded, for example, and then other projects that are being contemplated in Ontario, Saskatchewan, etc., haven't required a regulatory approval. They're just going down that track.

In many cases, I can't point to a specific deferral, if that's what you're asking.

**Carol Anstey:** I want to drill down into it a little bit further. You have pointed to specific examples of duplication that I'd like to flesh out a little bit more.

You cited that in Canada's nuclear sector, regulatory requirements had increased by more than 80% over a 15-year period. In June 2025, you also raised concerns about increasing regulatory requirements and declining efficiency. There was also a reference to increased documentation, which I found quite alarming. For a renewal application—this is for people already operating in the industry—it had doubled from 154 pages to 320 pages, basically showing that this regulatory burden applied not only to new projects but to existing operators.

Can you give us specific examples of requirements that have increased costs or delays without corresponding improvements in nuclear safety? I think it's important for the purposes of this committee that we have the industry's understanding of that. Can you give some good examples of that?

● (1125)

**George Christidis:** Absolutely. An area that we are flagging as a concern in Bill C-39 is this notion of the regulatory burden question as it relates to reg docs, the Canadian Nuclear Safety Commission's regulatory document requirements, where it looks at issues and issues these reg docs for discussion. It does not take a cost-benefit analysis.

That's exactly the example we've used. Over the last 13 years, there's been a significant increase in these regulatory document requirements or reviews that does represent significant resources to companies. I can certainly get more specific examples to the committee as a follow-up, but overall, those regulatory requirements do not have a safety component.

Our message generally across the board is that for non-safety regulatory requirements, there has been a significant increase. That is certainly one of the things we're calling for within the Bill C-39 legislative process, but also the review of the Canadian nuclear safety act, which we understand is going to be the next stage.

**Carol Anstey:** What does that regulatory burden mean in terms of investment when a company is deciding whether to invest in a nuclear project in Canada or in another country?

**George Christidis:** I would argue it's a little more about the domestic, existing nuclear operations and operators where those reg docs do represent a cost, a fee and process. Again, it's not much of a cost-benefit analysis in terms of why those regulatory requirements are being asked. It's much more about the existing operators that have those concerns.

Obviously, with the longer-term lens on nuclear projects, as we're looking at large nuclear and small nuclear projects, there is this opportunity to get the regulatory system in place, which then would avoid some of those problems.

**The Chair:** Thank you, both.

We're moving on to Mr. St-Pierre for six minutes.

[*Translation*]

**Eric St-Pierre (Honoré-Mercier, Lib.):** Thank you.

I'd like to take this opportunity to thank you, Mr. Pineau, for joining us today.

For my English-speaking colleagues from other parts of Canada, including Ontario, British Columbia and Alberta, I would like to remind you that Mr. Pineau is one of Quebec's leading energy experts.

It's therefore a pleasure to have you here today, Mr. Pineau.

Can you comment on the role of nuclear energy in our government's new electrification strategy, which aims to double the supply of electricity by 2050? Do you think nuclear energy can play a significant or less significant role?

I'm interested in getting your perspective on our electrification strategy.

**Pierre-Olivier Pineau:** Thank you, Mr. St-Pierre.

Obviously, nuclear power is significant, especially in Ontario. As I said in my opening remarks, doubling electricity production in Canada is a justifiable goal from certain perspectives, but I'm personally concerned about it, given our overall energy overconsumption, the potential for energy efficiency and the economic foundations of Canada's electricity system, which is very fragmented. Canada has 10 different provinces and 10 different electricity systems. If we want to plan on a solid foundation, we would need a better integrated electricity system across Canada.

A better integrated electricity system in Canada would provide a clear picture of the best sites for future nuclear reactors in the country. Today, plans are being made in Ontario, Quebec, New Brunswick and Nova Scotia. New Brunswick and Saskatchewan are talking about building small nuclear reactors or acquiring new nuclear reactors, but they haven't considered how their electricity system could grow if it were better interconnected with those of their neighbouring provinces. As for the four Atlantic provinces, they are doing their planning completely independently.

It's essential to plan things in a more integrated way. This would provide more opportunities for nuclear energy and interconnections for wind and solar energy. It would provide a better understanding of the true role of nuclear, wind, solar, hydroelectricity and interconnections. This is very difficult at the moment, because we don't have an overview of the Canadian context. We have 10 small fragmented views of the 10 Canadian provinces. That's bad for everyone and for nuclear energy.

Nuclear energy can indeed play a role, but the real role, the one that will be the most economically significant for Canadians and in the strategy, is the affordability of electrical energy. What really surprises me about the nuclear discourse is that very little is said about costs, which are higher compared to most other sources of electricity.

● (1130)

**Eric St-Pierre:** I would be interested to hear more about that from you.

Can you comment on the cost of nuclear energy in Canada, historically, and compare that to global trends?

**Pierre-Olivier Pineau:** Historically, nuclear energy in Canada has been more expensive than other sources of energy. Of course, hydroelectric power is much cheaper, even in Ontario, but there is an issue with its potential. Hydroelectric potential cannot be further developed at the historical cost we have known.

Hydroelectric power is much cheaper than nuclear energy in Ontario, Quebec, Manitoba and British Columbia. Ontario decided to independently build its nuclear capacity without looking to its neighbours, Manitoba and Quebec, to see if there were more cost-effective sourcing opportunities than building nuclear reactors. Manitoba and Quebec also didn't seek to better understand Ontario's interest in their exports. However, Quebec signed two export contracts with the State of New York and the State of Massachusetts at prices below the cost of building nuclear facilities in Ontario.

When we wonder if we should pay less for electricity, it's hard to understand the decisions that were made, especially by Ontario, which didn't consider importing electricity from Quebec and left Quebec to export electricity to the United States at a lower price than the cost of building nuclear facilities.

That's why it's important to have a pan-Canadian vision, something that the current government is seeking to develop, but which should be done on a slightly larger scale. Wind power costs have fallen significantly around the world. Nuclear has its advantages, but it is generally more expensive.

**The Chair:** Thank you.

Mr. Simard, you have the floor for six minutes.

**Mario Simard (Jonquière—Hébertville—Pays-des-Bleuets, BQ):** Thank you very much, Mr. Chair.

Mr. Pineau, I echo the praise my colleague Mr. St-Pierre showered on you in his introduction. Indeed, you are a valuable resource for anyone looking to gain a better understanding of the issues facing the energy sector in Quebec. I am convinced that the same is true across Canada.

You concluded your opening remarks by speaking to the need to fully grasp the economic foundations of our energy development to avoid mistakes in the future. It strikes me as especially relevant to the report we will have to prepare. Specifically, you provided some figures on the cost of electricity per megawatt-hour. For small nuclear reactors, you mentioned a cost of $150 per megawatt-hour, excluding operating costs, and a cost of $110 per megawatt-hour when discussing Ontario. These costs are extremely high.

If you could table a document with the committee comparing these different costs, that would be appreciated, because this specific issue of the choices we have to make needs to be reflected in our study. Resources are not unlimited.

Earlier, you discussed the federal government's strategy, which extends to 2050, with my colleague. In the current context, is it wise to invest a considerable portion of government resources to develop the nuclear sector?

Should other sources of electricity generation which, ultimately, are less costly, be prioritized?

● (1135)

**Pierre-Olivier Pineau:** Thank you, Mr. Simard.

Obviously, a comparison of the various options is worthwhile. That said, while not downplaying the costs I mentioned, we must also recognize the value that different technologies bring to the grid. It's certainly true that nuclear technologies, which provide stable generation 24 hours a day, offer different value to the grid compared to wind or solar farms, which provide intermittent generation.

Therefore, energy costs must not simply be measured in dollars per megawatt-hour. The value to the grid and the need for balancing must also be taken into account. In this respect, nuclear power has enormous advantages. However, once again, in Canada, as some provinces have large reservoirs and an electricity transmission network which, if sufficient transmission lines were built, would balance intermittent generation in different regions, and everyone could benefit from these reservoirs at a lower cost than it would cost to build many new nuclear power stations.

Second, you spoke of the advisability or merit for the government to invest in a particular technology, in this case nuclear power. Nuclear energy and research in this field are fundamental for various reasons, particularly in health care and in the fight against climate change. However, in Canada, we must be mindful of our current budgetary situation. We are running a deficit, we consume enormous amounts of electricity and energy in general, and it's widely recognized that developing energy efficiency in the long term costs less than adding extra capacity.

That is what is so unfortunate about the current energy debate: We constantly overlook the fact that Canadians are the world's biggest energy and electricity consumers, and that there are opportunities for energy efficiency that would make us stronger, more efficient and more resilient in the face of future climate change. It's extremely problematic to invest further in tax credits to subsidize new construction instead of putting more focus on energy efficiency.

Therefore, until we have sound economic foundations, I would be wary of subsidizing new construction. Research ought to be subsidized, yes, but new construction should not be subsidized as part of new projects until sound economic foundations that enable consumers to be aware of the true costs and to pay the true price for their energy consumption are in place.

**Mario Simard:** Briefly, what I take from your comments is that, if there were one thing to prioritize, it would be to focus on energy efficiency. If you have any documents to submit in relation to this to assist the analysts in their work, that would be appreciated.

There is one other thing. I understand that you are saying people should not get caught up in a race to offer ever-higher tax credits to build new infrastructure, but there are bound to be some opportunities that are more promising than others. I see storage technologies becoming increasingly efficient, which can certainly help to harness intermittent energy sources. I also see new technologies for advanced management, particularly in Quebec, where this is a key issue.

Wouldn't it be better to focus the government's efforts on this type of technology, rather than relying on nuclear energy, which, in the long term, will still prove very costly?

**Pierre-Olivier Pineau:** We need to do several things simultaneously.

There are significant gains to be made by giving consumers greater flexibility in their energy use. Before storing energy, we need to be able to shift certain uses. Electric vehicles will be very useful in this regard, shifting energy use and storing energy. However, there are ways of shifting demand—I'm thinking of water heaters and household appliances, for example—to better reflect intermittent generation and makes better use of what intermittent energy sources can offer at a lower cost.

[*English*]

**The Chair:** Colleagues, we'll move on to our second round. We're going to start with Mr. Patzer.

You have five minutes.

**Jeremy Patzer (Swift Current—Grasslands—Kindersley, CPC):** Thank you very much, Mr. Chair.

Thank you to the witnesses for being here.

I would like to expand on some of the questions that have already been asked.

I will direct this question to the Canadian Nuclear Association.

You brought up the issue of needing to de-risk projects. What is the biggest risk that these projects need to be de-risked from?

● (1140)

**George Christidis:** When we talk about de-risking, we're talking about having certainty in the investment environment. We're also looking at certainty in the context of the federal government's role in that process. We're looking at investment tax credits, for example, and making sure they're extended to meet the timelines of the nuclear industry's build-out, which are plans driven by provincial governments. We're looking at the inclusion of unions, because unions are partners in Bruce Power's ownership structure, as well as first nations consultation and the like.

In terms of federal programs, you would identify the portion of the risk to the private sector, the investment community, the utilities and the government. These come together to de-risk critical infrastructure projects—the story goes beyond just nuclear—in order to enable this investment to occur in Canada.

Our concern is about how these different groups and programs come together to support and de-risk our projects as they proceed.

**Jeremy Patzer:** There's a lot of government in there. That's what I'm hearing.

What is the number one regulatory risk that you see that needs to be changed or eliminated today?

**George Christidis:** As per your colleague's questions earlier, the regulatory environment is about implementing the direction of Bill C-39. We feel it's trending in the right way, but we want to make sure there are certain components, such as one regulator, one project, and certain implementation questions in terms of ensuring that efficiency.

It's about reducing duplication, recognizing provincial and other departmental information and the regulatory process, looking at brownfield industrial processes, for example, and accepting some of the information there. That is an example where we could reduce any duplication or inefficiency. It's really about reducing inefficiency.

**Jeremy Patzer:** You could jump through all the hoops and spend millions and millions of dollars. Then, at the end of the day, the minister could just say no.

Are you concerned about that?

**George Christidis:** From the perspective of national projects, we feel the government right now has made a determination that the country needs to have some sort of mechanism by which cabinet can determine whether a project is on a national basis.

I can't speak to the political conversation in that space, but given where Canada is—

**Jeremy Patzer:** It's not a political problem.

**George Christidis:** —I think there's a need for accelerated economic activity and for energy and economic sovereignty.

These are questions that you, as members, and the government will have to discuss.

**Jeremy Patzer:** Sure. However, the point I'm trying to make is that a company can spend tens of millions of dollars on this. I've even heard of companies walking away from over $1 billion spent on projects because a minister either wasn't going to give their approval or was delaying on purpose. Like you said, Bill C-39 is going to try to address some of that, but it doesn't change the fact that a minister could still play that game with a project and not provide that certainty.

Is that a concern?

**George Christidis:** Right now, seeing the direction of the national projects list, nuclear is included, so I don't have concerns I could table here today.

**Jeremy Patzer:** Okay. That's interesting.

An issue was brought up in one of your opening remarks. I'm sorry, but I forget which group said this. You were talking about provincial interties. This committee did a report back in 2017 specifically addressing the need for provincial interties. In the last parliament, we talked about interties, and we had witnesses come in and say that nothing's been done.

My province of Saskatchewan has a lot of uranium. That will probably be the next major nuclear project built in Saskatchewan. What are we going to do with it? Where are we going to send this power, and how are we going to send this power? What's the end objective here?

Could somebody address that?

**George Christidis:** Well, being from Saskatchewan, you would know that the Government of Saskatchewan has made a series of announcements of the upgrading of the intertie system. They're taking a regional lens in terms of their energy strategy, including nuclear large and small. That speaks to the regional nature of our country. Having a national grid is not feasible. Having strong interconnections regionally is what is most practical.

In terms of Saskatchewan, for example, the connections between Saskatchewan, Manitoba, Northwest Territories, Alberta and the northern states are where the Saskatchewan government is looking at enhancing its system. Nuclear there—small reactors, but large reactors as well—is being contemplated to shore up the process to be able to export and achieve their goals as well.

**The Chair:** That's your time, gents. Thanks to both of you.

Mr. Hogan, you have five minutes.

**Corey Hogan (Calgary Confederation, Lib.):** Thanks, Chair.

Thanks to our witnesses.

This is an important study at an important moment. We are trying to hit that three-legged stool of affordability, reliability and low emitting. I think that where Canada is generally is not bad. We're at about 15% nuclear generation, and that mix is serving us well. We have some of the lowest electricity prices in the OECD, but there are many challenges that need to be tackled and many opportunities that need to be seized. We need to think about that whole system and the federal government's role in fostering and facilitating electricity generation, but also economic opportunity. That's where I want to put my questions in this round.

We can't ignore the economic opportunity that being an energy leader has provided. We can think of the billions of dollars and the tens of thousands of jobs exporting nuclear technology has given Canada.

Mr. Christidis, you talked about creating opportunities in Europe, Asia and beyond. I want to piggyback on that to ask a broader question about how we quantify the value of a robust nuclear industry. Tell us more about the jobs and economic opportunities that nuclear creates.

● (1145)

**George Christidis:** Thank you for that.

Yes, the nuclear industry is a significant employer right now. In the energy sector, we are a significant labour-intensive industry in everything from skilled labour such as plumbers and welders to the steel industry, for example, along with the nuclear experts and nuclear engineers and the like.

We really speak to a growth of the labour side of our industry. That is also why the key groups, including unions and other organizations, support the growth of the nuclear industry. That is a fundamental benefit to investing in nuclear. It's not only the electricity generation. It's not only the low emissions to reduce emissions. It's also the creation of significant jobs.

Now, I do need to table one thing from a perspective of the cost question, just to address that fully. The cost question is quite clear that you need all technologies on the table for each provincial government to identify what's best for its own needs. Unless folks in Quebec are advocating for a national grid—I'm not familiar with that—it's very important that each province and each region has the ability to look at all technologies—renewable, hydro, nuclear, gas and whatever it might be—to assemble the best economic portfolio to generate electricity, particularly at this time. On our side, we create a lot of jobs and benefits in innovation, universities, polytechnics, research labs and the like, which we see as fundamentally a core of Canada moving forward.

**Corey Hogan:** Thank you.

Obviously, these are long-lived assets, so some of those capital costs up front can create maybe a shadow that's not going to be there in the long term. You've opened up other markets and opportunities in them, other than Ontario and existing nuclear provinces, I should say.

I want to ask you about Alberta and the energy-only market that exists in Alberta. What do we need to be thinking about as a federal government as we start thinking about how we foster nuclear sectors in provinces that have not historically been nuclear provinces and, in particular, in ones that might have very different systems, like Alberta?

**George Christidis:** It goes back to the fact that each province will make the decision that's right for them, quite frankly.

Alberta is a free market and it needs to take a look at what is the price of reliability of that market, and that's to say sustainable, reliable power that can't go down. We are seeing a conversation in Alberta, whether it's a large reactor project or a potential small reactor project, where Albertans are raising the question: Do they have the right system in place that would generate reliable power and that would complement their economic and energy needs?

Really, it's for Albertans to have this conversation, but the question becomes how the Canadian government can enable Alberta and others to consider this technology to meet national goals of reducing emissions, creating jobs and enhancing energy security. That entails, again, the proper regulatory environment; the nuclear financial models that could help Alberta and other provinces consider how this technology fits their needs; and workforce development. Again, our sector creates significant jobs, and developing a workforce, for example, will take a federal-provincial lens, along with the industry.

Those are the kinds of questions that need to be discussed by Albertans in Alberta.

**Corey Hogan:** What are the opportunities that might exist with interties to pair with hydro or other assets?

**George Christidis:** I can't speak to the intertie question directly because we're not in that space. However, it is very true that, on a regional basis, many of the nuclear projects are part of provincial and regional interconnection systems. For example, Ontario and Quebec do exchange electricity. What I understand, in Ontario, is that Quebec will have less available power in the future and needs to consider its future needs. I understand that Quebec tabled an energy strategy of its own that identified that it needs to consider other sources in the future, but I can't speak to that.

It's very true that our country has regional interconnections that will enable each province to consider how nuclear, hydro, renewables and natural gas come together.

I would also like to suggest, if there's interest in exploring how politicized decisions could impact decisions on energy, I would encourage you to take a look at the European Union and Germany specifically.

● (1150)

**The Chair:** Thank you, both.

[*Translation*]

Mr. Simard, you have the floor for two and a half minutes.

**Mario Simard:** Thank you, Mr. Chair.

Mr. Pineau, I'd like to follow on from what Mr. Christidis has just said. In your remarks, you spoke of 10 different electricity systems in Canada and the possible need to further develop the integration of these electricity systems. I can't recall whether I've already had this discussion with you, but it seems to me that areas where it would be easier to integrate systems, such as Quebec, Ontario or the Maritimes, had already been identified. I can't remember, so I would like you to talk about the areas that should be prioritized.

I'll first ask you another quick question, after which I'll give you the floor.

I fully understand the principle you're advocating regarding energy efficiency, but to electrify heavy industrial processes, wouldn't that still require new sources of power generation? I don't think that energy efficiency alone will enable us to electrify many heavy industrial processes that are highly energy-intensive.

I'd like to hear your views on these two points.

**Pierre-Olivier Pineau:** It's clear that I'm not advocating a single pan-Canadian electricity system and that more work is needed to align different sub-regions, with the Atlantic provinces being a priority. The federal government has been working hard on this for the past 20 years or so, with little success, unfortunately.

In my view, Quebec, Ontario and the Atlantic provinces should also collaborate more closely to better identify the best projects for everyone. However, this doesn't prevent Alberta, British Columbia, Saskatchewan and Manitoba from also collaborating and trying to further align their electricity systems. Some work therefore needs to be done at the regional level. This would increase transparency, efficiency and the visibility of fair prices.

Now, as for your second question, there is enormous potential for progress in the area of energy efficiency, but we must be realistic: Canadians are extremely reluctant to make an effort in this regard. I think they'll do more, but they won't go to extremes. As such, we will indeed need new energy sources, and this is where nuclear energy can offer major advantages, because it generates heat and electricity without emitting greenhouse gases. In some cases, it may be worthwhile to make use of the heat and electricity that nuclear power can provide. In that case, we really need to take an integrated view of both aspects—

[*English*]

**The Chair:** Thank you so much.

Next is Ms. Kronis followed by Mr. Saini.

**Tamara Kronis (Nanaimo—Ladysmith, CPC):** Thank you so much.

Professor Pineau, I want to ask you a few questions.

You've laid out some pretty powerful challenges in terms of workforce staffing, interprovincial trade barriers and some financing concerns around the de-risking side.

On the federal government's strategy, the target for 2035 is to have at least one deployment outside of Ontario operational or under construction. How realistic do you think that is?

**Pierre-Olivier Pineau:** Having it for 2035 is pretty quick. That's in nine years. I don't think it is entirely realistic to have a new nuclear power plant somewhere. We've failed at reaching many goals along our history in terms of the deployment of environmental and energy goals, so I don't think failing at that goal would be particularly problematic.

It is quick. I would not like to rush a new nuclear power plant unless a strong economic case is made that it would be cost-competitive against alternatives based on a regional analysis, where we compare different options and what's best in terms of reliability for everyone and costs. This is key for taxpayers. We all say taxpayers should be considered. I'm calling for us to consider taxpayers and realize that there's a cost.

Nuclear is providing some benefits, but we have to study these benefits against alternatives. We need to see these studies.

● (1155)

**Tamara Kronis:** In addition to calling for at least one deployment outside of Ontario to be operational or under construction by 2035, there's an additional target of two large nuclear reactors under construction by 2035.

If one is difficult, how realistic do you think it's going to be to have three?

**Pierre-Olivier Pineau:** It's definitely going to be very difficult, especially since we haven't made the case that they are absolutely needed and they haven't been assessed compared to alternatives. We need to assess these alternatives. We need to look at what's best for the country.

I value the nuclear industry and Canadian knowledge in nuclear energy. I think we should be careful about growing our knowledge and our capacity. It should not be done at any cost. We should establish and analyze these different costs, and we shouldn't set targets on these terms.

**Tamara Kronis:** You brought up the costs. The language that's been used here.... A lot of people have talked about de-risking. De-risking usually involves providing investment certainty to the large corporations and the large entities that are involved.

In the context of projects that, in your words, feel a bit rushed, what do you think the risks are to the Canadian taxpayer of cost overruns if this is rushed forward in an unrealistic way?

**Pierre-Olivier Pineau:** They might be significant. We have had some successes in the past, but if we look at New Brunswick, the Point Lepreau power plant was not on cost or on target when it was refurbished.

There are risks, and we should be careful. These risks exist in any kind of energy project. Some hydro projects in Newfoundland and Labrador went over cost, so we should be careful. That's why I agree that we should not rush. We should look at energy efficiency so we make sure that we don't overbuild, because we can consume less. We should be concerned about that.

In the nuclear sector, costs are significant, so we should be extremely cautious about trying to invest too quickly.

**Tamara Kronis:** We've talked about some of the challenges of building the actual reactors. There's an additional supply chain component in needing to build the transmission lines out of them to deliver the energy.

Can you comment on the difficulties we're going to have there with these timelines?

**The Chair:** You have 20 seconds, Mr. Pineau.

**Pierre-Olivier Pineau:** There are new technologies for transmission lines that can increase the capacity of existing lines without having to build new corridors. It's not easy to build transmission lines, but they can be built. There are not many risks. They are projects to be accepted by the population, but they are not very risky in terms of technology.

**The Chair:** Thank you, both.

Mr. Saini, you have five minutes.

**Gurbux Saini (Fleetwood—Port Kells, Lib.):** Thank you, Mr. Chair.

Thank you to the witnesses.

My question is for George.

While nuclear energy is an important non-emitting energy source in Canada, there are environmental considerations surrounding the management of the nuclear waste released into water sources and the decommissioning of sites.

What is Canada's track record regarding the production of nuclear energy and environmental protection? Outside of the emissions and land footprint, has there been any assessment of the cumulative environmental impact of nuclear energy production in Canada?

**George Christidis:** From a Canadian nuclear perspective and how we're seen in the world, Canada is seen as a leader in nuclear energy, including in how nuclear waste is managed. That includes the near surface projects, which my colleagues here could speak to, but also the deep geologic repository that is proceeding in Ignace, which has local support and has been a world-acknowledged process for consultation and discussion with communities and first nations. Therefore, Canada is a leader across the way from its nuclear technologies and its supply chain to the way nuclear waste is managed, as well as the regulatory process itself.

Having said that, there are always going to be opportunities for improvement for any technology. The nuclear industry very much looks at these projects as moving forward and really reinforcing Canada's leadership in that space.

In terms of the environmental footprint, the amount of nuclear waste that's generated by the industry in comparison to other energy sources is very small. The example often referred to is that the amount of energy that's created for the lifetime of an individual by the nuclear industry would fit in a soda can. That's nuclear's contribution to that energy use.

The impact of nuclear energy on the environment is very managed and regulated. I'd offer up that our industry is the most thoroughly regulated, not only domestically but also internationally, as well. From the perspective of the environment, we are a contributor to a clean and sustainable environment.

● (1200)

**Gurbux Saini:** Mr. Judge, Canada is internationally recognized in the nuclear field for domestically developing CANDU technology. There are 17 CANDU reactors operating in Canada and nine operating outside of the country.

What is the level of awareness among the public of Canada's homegrown CANDU technology?

What feedback do your members hear from countries around the world regarding the potential purchase of the Canadian nuclear technology known as CANDU?

**Dr. Colin Judge:** We are working very hard to increase the level of awareness through our STEM programs and education programs. The CNL is a part of and very closely connected with many university networks, but it's also working very closely with a lot of high school students, as well, to build awareness of what nuclear technology is and what we've done in Canada with CANDU.

I believe CANDU is a recognized household name, especially within the markets where they exist. In Ontario, those in and around Toronto and that region very much know where their power is coming from and the connectedness to CANDUs.

How the technology works is still slightly unknown. It's something we can very much improve upon through our STEM programs.

Internationally, those countries that have CANDUs.... When I travel around and go to conferences and people hear that I'm Canadian, they bring forward the name CANDU to me, rather than the other way around. I think it has a proven track record internationally....

**The Chair:** Do you have brain freeze?

**Dr. Colin Judge:** It was contemplation.

**The Chair:** Mr. Saini, you have the chance for a quick question.

**Gurbux Saini:** I'm going back to George.

As you know, in Pinawa, Manitoba, the reactor is being decommissioned. Given the need for nuclear power, do you see a future for it now?

**George Christidis:** I may actually defer to colleagues who run the lab in Manitoba, where the facility is being decommissioned.

From our perspective, we certainly see nuclear power being reconsidered by a number of key provinces, including Manitoba. Could that provide an opportunity to consider how small reactors are developed and/or included in Manitoba? That's an open question. It has been discussed at a certain level.

Particularly on that site, I would defer to CNL to maybe—

**The Chair:** Even though I'm from Manitoba, give a quick answer, please.

**Eric McGoey:** The Whiteshell nuclear laboratories site is one of the sites that CNL operates. We are decommissioning that reactor, and I think it's an amazing site. It's a really impressive resource that we have for Canadians.

When you look at the size of the hot cells there and you look at the potential economic future of that site, there are a lot of possibilities for the site for the benefit of Canadians. Fundamental to realizing those opportunities is that we have to clean it up. We have to do the the decommissioning and the restoration to prepare that site for a new future use, and that's what we're focused on.

**The Chair:** Thank you so much. I really appreciated that.

Colleagues, we usually don't do a third round, but I see we have some suggested speakers.

Mr. Bélanger, I'll give you three minutes, if that's okay, and then we'll give equal time to the other side. We'll then take a break to set up for our new witnesses. We have only two witnesses, so we'll make up a little time in the next round.

Please go ahead.

● (1205)

**Jim Bélanger (Sudbury East—Manitoulin—Nickel Belt, CPC):** Thank you, Mr. Chair.

I'm going to address my question to Mr. Judge.

In your commentary, I found something very interesting. You were talking about nuclear energy that is mostly done with fission and the opportunity to go to fusion. That really interests me. I'd like to know why. I guess it creates a lot more energy.

Tell me why it's so much better, what the current risks are and why it's more difficult to use that process.

**Dr. Colin Judge:** Fusion is unlike fission. Fission is more about splitting the atom and creating energy. However, as with people, it's usually better when you can bring it together. It creates that much more power. Fusion is the fusion of atoms. The fuels being used for fusion are tritium and deuterium, rather than uranium, plutonium and actinides that will split.

The biggest challenge associated with fusion is containing that power. It is the power of the sun. It goes up to extreme temperatures, and you have to have confinement. That's usually done with magnetic confinement and plasma. A lot of the technologies that exist are worried about that process and how to contain the power of the sun. Because it's so hot, you get much more thermal output and electricity for every piece of fuel being used. It's incredibly powerful once you can sustain it and have it harnessed.

Here in Canada, we're focused a lot on how we fuel the individual reactor. At CNL, we're leaning into the strengths of the fuels that would be used in fusion, which are tritium and deuterium. Because of our CANDU experience, we have a lot of experience in those two areas. We can almost be technology agnostic to what the reactor would look like, but we can create an ecosystem within Canada to enable anyone around the world in that space.

**Jim Bélanger:** In the future, if we develop the technology to do fusion rather than fission, could the current sites be converted for that process?

**Dr. Colin Judge:** Our colleague George mentioned the regulatory space associated with fusion as well, I believe. It's something that needs to be looked at. Different nations take different approaches to going about doing that.

It might not require the same level of of rigour you would have for your fusion devices. If anything, the fission reactors will have a slightly higher regulatory framework associated with them. The hazards are somewhat different, but the landscape and, basically, the framework we have within Canada with the CNSC and our regulators should transfer over with fusion quite nicely.

**The Chair:** Thank you both.

Mr. Hogan, the last word goes to you and then we'll be taking a break to bring on the next panel.

You have three minutes or less.

**Corey Hogan:** Thank you, Mr. Chair.

One of the things we have not had an opportunity to dig into on this panel is strengthening research expertise, manufacturing and intellectual property. Is there anything you didn't have an opportunity to say that you wish you had said?

Maybe we can get quick responses from each of you.

I'll start with you, Mr. Christidis.

**George Christidis:** From our perspective, we see the Canadian nuclear industry as being foundational to Canada's innovation, infrastructure and industrial policies to create economic opportunities, meet climate objectives and, quite frankly, in an uncertain economic environment, create jobs that will be highly paid and highly skilled.

This is an international trend. I need to reiterate that key jurisdictions around the world, regardless of political stripe, have now embedded nuclear as a key component of their energy economic goals. That includes jurisdictions in Europe, the United States and Canada and markets in Asia and the like.

Now is the opportunity for an alignment of the economics, regulation and international relations to all come together to predicate the development of our industry domestically that will then create and reinforce opportunities internationally. This really is an opportunity to implement the nuclear energy strategy as a means to attain those goals.

● (1210)

**Eric McGoey:** Thank you very much.

I'm going to defer most of my time to Dr. Judge, because he was born to answer this question.

I would say, though, that Canada's nuclear energy strategy positions us to build on our strengths. Really, the only things that Canadian Nuclear Laboratories requires to have a bright future are a thriving nuclear sector and a mandate from Atomic Energy of Canada Limited. We have that mandate, and the nuclear energy strategy sets out a path for a thriving nuclear energy sector that we will all benefit from at the labs and in our communities.

If you want to expand on that, Dr. Judge, you can.

**The Chair:** You have 20 seconds.

**Dr. Colin Judge:** One thing I'd say in the time we have right now is that, historically, nuclear in Canada has been very Ontario centred. Yes, we have some in Quebec and New Brunswick.

Right now, we're looking at a fairly large and ambitious expansion across western Canada and northern remote communities. I know that New Brunswick is now looking for opportunities with microreactors. As that expands, it's going to create an ecosystem with jobs and talent that's going to be across all of Canada and not more centrally located. That comes with great opportunity.

**The Chair:** Colleagues, let me thank our witnesses on your behalf.

It was a great exchange on a really interesting topic. Thank you so much for giving us your time.

We welcome briefs and any other information you want to send to the committee. It will be incorporated into the testimony and hopefully the final report.

Colleagues, with that, we are suspended.

● (1210)

_____(Pause)_____

● (1215)

**The Chair:** We'll resume the meeting.

Let me, on members' behalf, welcome the witnesses.

As an individual, we have Karin Stephenson, director of nuclear research and education support, McMaster University.

From Hatch Ltd., we have Mario Pieries, global director, nuclear.

All virtual witnesses have conducted the mandatory onboarding test. I'll make a few comments so the witnesses know our way of operating here.

Please wait until I recognize you by name before speaking. I'll remind you that all comments should be addressed through the chair. You will each have five minutes for your opening remarks, after which we will open the floor to questions.

We're going to start with Ms. Stephenson.

You have the floor for five minutes. Please proceed.

● (1220)

**Dr. Karin Stephenson (Director, Nuclear Research and Education Support, McMaster University, As an Individual):** Thank you, Mr. Chair, and members of the committee. I appreciate the opportunity to contribute to this discussion.

My perspective comes from working across nuclear research, isotope production, commercialization and workforce development. From that vantage point, I see our nuclear future being shaped by a combination of scientific capability, talent development, industrial innovation and our ability to translate research into practical outcomes for the economy, health care system and society more broadly. We start from a position of strength with Canada's nuclear energy strategy, alongside an established nuclear industry, CANDU technology, deep expertise in isotope production, a strong supply chain and world-class researchers working across energy, materials, medicine and manufacturing.

When discussing the future of nuclear, the focus is often understandably on electricity generation and reactor deployment, which is important, but there also exists a broader Canadian nuclear ecosystem. Nuclear technologies extend well beyond electricity production. They contribute to health care, scientific research, materials development, skills training and economic competitiveness. The capabilities that support these activities are often shared—

**The Chair:** Excuse me, Ms. Stephenson. Could you please speak a little more slowly for the sake of our interpreters? I know we'd all appreciate that. We'll give you a little extra time to make sure you can get all your comments in.

**Dr. Karin Stephenson:** I'm naturally fast; I will slow down. Would you like me to start from the beginning?

**The Chair:** No, that's okay.

**Dr. Karin Stephenson:** The capabilities that support these activities are often shared, so the same infrastructure helping researchers understand how materials perform in reactor environments also supports advanced manufacturing, isotope production and the development of new medical treatments and materials.

Investments in nuclear research benefits multiple sectors simultaneously. One area where there may be a significant opportunity is in strengthening a national accessible network of nuclear research infrastructure and capabilities. Internationally, countries with strong nuclear sectors often support national user facilities by sharing infrastructure and enabling universities, industry, hospitals, utilities, government laboratories and entrepreneurs to have access and, importantly, the opportunity to work together. Importantly, nuclear infrastructure carries significant regulatory safety, security and operating requirements. As a result, there are advantages to building critical mass around existing centres of expertise while ensuring broad national access and collaboration.

One capability that deserves particular attention is neutron science. There is neutron scarcity in the world, yet neutrons remain one of the most powerful tools supporting diverse research areas, from energy systems to batteries, aerospace, quantum materials and more. The Canadian Neutron Beam Laboratory at McMaster University represents an important step in rebuilding that capability in Canada. More broadly, the CNBL can be viewed as strategic research infrastructure supporting innovation across multiple sectors.

Alongside neutron science, there are significant opportunities associated with innovation and commercialization. One area where I believe this opportunity is particularly visible is radiopharmaceuticals. We have a long and successful history in medical isotopes. The opportunity, however, is not only in producing isotopes, but also in developing the diagnostic agents and therapies themselves. That is the vision behind the McMaster institute for radiopharmaceutical imaging and therapy, or MIRIT. Through MIRIT, researchers, clinicians, radiochemists, hospitals and industry partners will work together, encompassing the entire radiopharmaceutical pipeline, from isotope production to clinical trials.

**The Chair:** I'm sorry, Ms. Stephenson. Just go a little slower, if you could, so our interpreters can catch up. Thank you so much.

**Dr. Karin Stephenson:** At McMaster, we co-locate the infrastructure needed to develop next-generation treatments as we are home to Canada's highest power research reactor, a cyclotron, more than 15 different hot cells and five GMP-compliant manufacturing clean rooms.

Combined with southern Ontario's manufacturing and life sciences strengths in the McMaster Innovation Park, there is an opportunity to develop Hamilton as a centre for radiopharmaceutical innovation and clinical translation. The goal is not simply scientific discovery. It is also about supporting company formation, attracting investment, retaining intellectual property, creating highly skilled jobs and improving outcomes for patients.

I would also highlight talent development. Meeting the workforce needs of a growing nuclear sector requires diverse expertise. We will need the engineers and scientists, but equally we will need builders, tradespeople, business leaders, regulators, policy-makers and communicators who can guide innovation, build public confidence and translate opportunities into economic growth. At McMaster nuclear, approximately 600 undergraduate and graduate students engage with our facilities each year through research, education and training activities. As we think about our future workforce, there is an opportunity to ensure that it reflects the diversity of the communities it serves. Increasing participation by women and indigenous communities across the nuclear sector remains important, particularly in technical and leadership roles.

At McMaster, we have developed and delivered focused workshops and hands-on experiences to those under-represented in the industry. Building the workforce will require broad participation, diverse perspectives and sustained engagement. This is as important to our long-term success as the research and infrastructure itself.

In closing, I would suggest that when we discuss the future of nuclear, it would be valuable to think not only about the technologies we deploy, but also about the capabilities that support them. Our strengths, from clean electricity generation and reactor technology to advanced research infrastructure and radiopharmaceutical innovation, alongside workforce development and industrial partnerships should not be viewed as separate priorities. They are interconnected elements of a broader nuclear ecosystem that contributes to energy security, health care, economic growth, and scientific leadership.

Thank you, and I would be pleased to answer questions.

● (1225)

**The Chair:** Thank you, Ms. Stephenson.

We're going to Mr. Pieries.

You have the floor for five minutes.

**Mario Pieries (Global Director, Nuclear, Hatch Ltd.):** Mr. Chair and members of the committee, thank you for inviting me.

My name is Mario Pieries and I'm Hatch's global director of nuclear. Hatch is a Canadian-headquartered, employee-owned firm with 11,000 employees across energy, metals and mining, and infrastructure. Our nuclear work spans the entire fuel life cycle. Our teams are supporting new nuclear development and refurbishment across Canada's nuclear fleet. We partner with universities and laboratories, and we are part of the team leading and advancing Canada's deep geological repository for used nuclear fuel. This gives us a practical understanding of moving nuclear projects from planning into operation.

Hatch is technology-agnostic. We begin with the need, assess the options and help our clients deliver the right solution safely, with a clear focus on cost and schedule.

Canada has spent generations building nuclear expertise. We have Canadian technology and IP, a strong uranium sector and an established supply chain. Canada's CANDU fleet and the expertise surrounding it are national assets. We should build on those strengths while assessing each technology against the need it serves. The federal nuclear energy strategy is a positive step. The forthcoming financing framework will also be important, because the cost of capital shapes project viability and affordability.

Canada's main delivery risk comes from several major projects advancing all at once, competing for the same resources and suppliers. Coordinated planning can contain costs, protect schedules and reduce the pressure across the entire sector.

Our first recommendation is to have a national nuclear delivery outlook. This would show which projects may advance, when they may proceed and what workforce and supply chain capacity they will require. This would allow suppliers and employers to prepare before shortages emerge.

Our second recommendation is to standardize and repeat. Unnecessary changes add cost and prevent teams from applying lessons learned. Canada should standardize delivery where practical, and draw on expertise from adjacent industries to build at scale. Safety must remain the first consideration. We should identify what can be repeated safely, then apply it consistently.

Our third recommendation is to build a larger and more mobile nuclear workforce. With appropriate training and supervision, experienced people from other industries could enter many nuclear roles. A common nuclear passport would allow qualified workers to carry recognized training and qualifications between projects while maintaining Canada's rigorous standards. We should also measure what Canadians gain from publicly supported projects. Those investments should build lasting Canadian capacity through qualified suppliers, skilled workers, Canadian IP and meaningful indigenous economic participation.

Canada must also plan for the critical inputs each technology will require. Canada is a leading uranium producer, but some technologies may depend on fuel services that are unavailable here. We should identify those dependencies early, build domestic capacity where it makes sense and work with trusted partners where international supply is required.

Heavy water supply is a separate consideration. New CANDU reactors would require a secure supply of heavy water, which is currently not produced at scale. Hatch is examining a viable approach to help prevent heavy water supply from constraining future CANDU projects.

Canada has built a nuclear advantage. We now need to organize it for the work ahead. If we get it right, Canada's nuclear future can help meet growing electricity demand, strengthen our energy sector and build a Canadian expertise that we can export globally, as a tier one nuclear nation.

Thank you. I look forward to your questions.

● (1230)

**The Chair:** Thank you to both of our witnesses.

We are going to start with Ms. Anstey for six minutes.

**Carol Anstey:** Thank you, Chair.

Mr. Pieries, I'd like to start with you.

You've worked on nuclear projects in both Canada and the U.S. When a company is deciding whether to invest in building a nuclear reactor in Canada or the U.S., how important are regulatory timelines and certainty in determining where the investment goes?

**Mario Pieries:** The regulatory timelines are very important. Having been a project director on both the U.S. side and the Canadian side, I feel we need certainty around when licence-to-construct or licence-to-operate applications are finally approved. For a company choosing to invest in or embark on the nuclear journey, or to enter the nuclear supply chain, it's really important to have certainty around those timelines.

As you probably know, workforce shortages are appearing across the globe. What we're trying to do, from an industry standpoint, is make sure there's certainty for companies that want to enter the nuclear supply chain.

**Carol Anstey:** Would you say that right now we are at a competitive disadvantage when it comes to attracting nuclear investment and jobs?

**Mario Pieries:** I would say there's an improvement that we could make with respect to being more competitive. If you look at some of the other jurisdictions globally, from a timeline perspective, you will see that the regulatory piece plays a part in that. Most of the schedules for large and small nuclear reactor builds, and even adjacent projects inside the nuclear industry, run through the licensing and regulatory phases. That critical path is what is preventing us from building at scale.

**Carol Anstey:** I'll give an example of that. The Dow and X-energy project in Texas submitted its construction permit application in March 2025, and the U.S. regulator established an 18-month review schedule.

In Canada, Ontario Power Generation applied for its Darlington reactor in October 2022 and received its approval approximately 29 months later.

Based on your experience, what does the difference in timelines mean for project costs as well as construction schedules?

**Mario Pieries:** Construction schedules have more certainty with that regulatory timeline being more certain. The faster timeline will also allow for better readiness around the supply chain. The delays that you can see through a project with respect to delayed regulatory approvals can impact suppliers that tend to pivot to other industries. It's really important to have the certainty around those timelines so that the projects can move forward.

**Carol Anstey:** What does that mean in terms of the cost to the developer, and do those costs ultimately get passed on?

**Mario Pieries:** Yes, with any project, if you look at adjacent industries like oil and gas or mining, speed to market is one thing. Now, we can't compromise safety in nuclear, or in any industry, but nuclear is inherently.... We have to make sure that we adhere to those principles.

Costs do go up. It's time and money. The longer you wait.... You can fill that time with more money associated with it, if you get where I'm going with it.

**Carol Anstey:** Yes, thank you for that.

You spoke at McMaster University's Nuclear Renaissance conference in October 2025, and you stated that there is a shortage of nuclear experience and know-how. In Canada, when we face these uncertain approval timelines, what do you think happens to the engineers, technicians and skilled tradespeople those projects need?

● (1235)

**Mario Pieries:** There is a shortage. However, from a Canadian standpoint, I think we have an opportunity in front of us. We have a lot of smart professionals and capable tradespeople whom we can bring into the nuclear sector from adjacent industries. That's something I think we need to look at a lot more closely in order to fill that gap if there are going to be multiple builds of nuclear technology inside Canada.

**Carol Anstey:** Is there a risk, then, of losing these people to the U.S.?

**Mario Pieries:** I didn't get the first part of the question.

**Carol Anstey:** Do we currently have a risk of losing these people to the U.S.?

**Mario Pieries:** There is potentially a risk of losing those people to the U.S., yes.

**Carol Anstey:** Have you seen that over the last number of years?

**Mario Pieries:** I have observed that, yes.

**Carol Anstey:** When nuclear projects are subject to reviews by both the Canadian Nuclear Safety Commission and the Impact Assessment Agency of Canada, are engineering teams required to duplicate technical studies, design work or documentation?

**The Chair:** I just need a 20-second answer to that, Mr. Pieries.

**Mario Pieries:** Yes and no. It's potentially yes because there's not one accountable body. If you have one accountable body that's organizing the regulatory submission, you can streamline a lot of that efficiency associated with additional engineering deliverables.

**The Chair:** Thank you.

We're going to Mr. Danko for six minutes.

**John-Paul Danko (Hamilton West—Ancaster—Dundas, Lib.):** Thank you, Chair.

My first set of questions will be for Dr. Stephenson.

Dr. Stephenson, it's good to see you, as always. I'm a proud McMaster graduate myself.

I'm wondering if you could explain what the McMaster research reactor is, how long it's been in operation and the main areas of research and economic activity that you do there.

**Dr. Karin Stephenson:** That's a great question.

The McMaster nuclear reactor has been operating for over 65 years. We have really three main areas of research. One is medical isotopes and radiopharmaceuticals. We're the largest supplier of iodine-125, which is used to treat various solid tumours. We treat about 80,000 cancer patients each year out of our reactor at McMaster. We also have a significant neutron science and material science program and in the energy sector.

I would say it's not just the reactor at McMaster that makes it special. It's the full suite of nuclear facilities that we have. We have a world-class suite of research facilities, with some very unique things that don't exist on a university campus anywhere else in the world. That includes our post-radiation examination facility, CANS.

**John-Paul Danko:** You've heard of the government's initiative to significantly expand nuclear across Canada. As has been mentioned, it has been Ontario-centric, but the goal is to greatly expand that expertise across the country. Where do you see research and innovation facilities, such as at McMaster and other places across the country, fitting into the broader nuclear strategy?

**Dr. Karin Stephenson:** That's a great question.

I spoke a little bit about this in my comments. I think there's a real opportunity to have national nuclear user facilities where we provide open access to academics, researchers, industry and government to be able to come in and do research in the different areas they would like to. That alone will then allow us to best use all the neutrons we have, as there's a neutron scarcity really in the world, and in Canada we want to be able to use all our tier one nuclear knowledge and excellence in research to accelerate that.

I think it's about building these user networks that allow people to move back and forth. We have some great facilities across the country.

**John-Paul Danko:** Some of your expertise is in commercialization and workforce development. You talked about bringing more women and indigenous leadership into the nuclear sector. We also heard some other discussion about the challenges of keeping the best and the brightest in Canada and providing those opportunities for them here.

I know that you work very closely with some very impressive students and postgrads and whatnot at McMaster. Maybe I'll just give you an opportunity to talk about the youth you work with and the opportunities you would like to see for them in the nuclear sector moving forward.

● (1240)

**Dr. Karin Stephenson:** I really think youth is a huge component to the success of our future nuclear world. They'll be voters. They need to be informed. They need to have a general understanding and demystify this concept of nuclear.

Some of the programs we run are actually quite national. We ran a camp called Indigenous Girls+ where we had 35 girls and their chaperones come from across the country. We had more out-of-province than in-province attendees. We bring them in. They live on a university campus to have that authentic university experience, but we also embed them within the facility. They're making isotopes. They're handling our big robotic arms and all these sorts of things. We really want them to leave feeling comfortable with the concept of nuclear and also being interested in science and engineering so that they will stay in science and have the opportunity to progress.

We're doing that with indigenous youth across the country, but also with women and those who are also underserved in the nuclear sector.

**John-Paul Danko:** On the commercialization side, I often hear from industry that the reason they're located where they are is that they have access to the best and the brightest—not just in Canada, but in the world. Maybe you can elaborate a little bit on that link between commercialization and the talent we have here locally in Canada.

**Dr. Karin Stephenson:** Yes, of course.

I can give a great Hamilton example. One of the reasons that a lot of start-ups in the radiopharmaceutical industry come to the Hamilton area is our expertise. Right now we are hosting a company called AtomVie, but also at our innovation park we have Fusion Pharmaceuticals. That is a spin-out that was started by a McMaster professor. John Valliant started the Centre for Probe Development and Commercialization—I actually worked there for a period of time as the director of discovery—which spun out that branch to Fusion Pharmaceuticals. They were acquired by AstraZeneca for $2.4 billion.

The barrier to entry into nuclear can be high because of the safety components and the regulatory components, but one thing we do really well is help lower that barrier of entry. We help them to be able to come in and work quickly to advance those products into clinical trials.

**John-Paul Danko:** Thank you.

I have only a few seconds left.

My last question is this. What is one thing you're most excited about for the future of nuclear in Canada?

**Dr. Karin Stephenson:** That's a tough question.

I think I'm really excited about radiopharmaceuticals and materials, energy security for everybody and decarbonization. I have teenagers who tell me all the time that they're worried about the future of the world. They're worried about not having soil. They're worried about all these things. I keep talking about all the things we need to do. I think there's a real opportunity here to be excellent at that in Canada.

**The Chair:** Thank you.

[*Translation*]

Mr. Simard, you have the floor for six minutes.

**Mario Simard:** Thank you very much, Mr. Chair.

Mr. Pieries, you have highlighted what I believe to be a very important issue. In your opening remarks, you said that several projects were progressing simultaneously and sharing resources, and this could be problematic. I get the impression that the government's resources for electrification are not inexhaustible. I maintain that nuclear projects are much more expensive than certain other electrification projects.

If we do the math, take into account the complex nature of nuclear projects and the issues surrounding the supply of heavy water, which you mentioned in your opening remarks and put all that together, I get the impression that a more efficient strategy for the government would be not to put all its eggs in one basket. The costs associated with nuclear power may be too high in relation to the benefits it brings. That's the impression I have. You probably don't share it, but I'd like to hear your views on the difficulty of seeing a nuclear project through to completion, given its complexity and the costs involved.

● (1245)

[*English*]

**Mario Pieries:** That is a very good question, indeed.

I'm a personal believer that nuclear plays its part in the energy mix. When you take a look at the life-cycle cost of nuclear, it has a levelized cost of electricity much lower than the cost of some of the other competing technologies. Yes, there is a higher capital investment that is needed for a lot of these projects, but if you boil it down.... We did this back in the 1970s and 1980s, built at-scale nuclear projects. We did it efficiently there, and other jurisdictions as well have done that since those days inside Canada. We are able to deliver projects. In my opinion, it is a project delivery challenge that we need to overcome.

There are aspects associated with nuclear technology that I think we've overcome with respect to the first-of-a-kind issues. Now it becomes a challenge of how to scale and deliver those projects efficiently and effectively. A lot of the nuclear projects are, effectively, infrastructure projects. If you look at the nuclear island, the conventional island and the balance of plant, I would say a small portion is really taking the nuclear piece into perspective, and all the rest has a lot more flavour around a larger project that has a lot of pieces that need to be put together.

[*Translation*]

**Mario Simard:** Thank you very much.

Ms. Stephenson, in your opening remarks, you spoke at length about the possibility of having a national research infrastructure that would enable us to further develop nuclear expertise in Canada.

[*English*]

**Dr. Karin Stephenson:** I'm sorry, but I've stopped hearing the translation. I didn't get the translation.

[*Translation*]

**Mario Simard:** Is the microphone working when I'm addressing you?

[*English*]

**Dr. Karin Stephenson:** Yes.

[*Translation*]

**Mario Simard:** In your opening remarks, you spoke of funding a national research infrastructure that would enable us to further develop our expertise. Shouldn't government strategies distinguish between energy projects and the use of nuclear energy for other purposes, such as in the health sciences, which you also spoke about at length?

Shouldn't a distinction be made between the two, given that energy development strategies are already in place within the government?

This study is looking into nuclear energy, but the desire to further develop energy infrastructure and the need for a better understanding of nuclear energy are two very different things.

Shouldn't we draw a distinction between the two?

[*English*]

**Dr. Karin Stephenson:** That's a great question.

I think there's a lot of overlap and a lot more overlap than maybe we see. Even with our current fleets, we are continually improving. There's continual research going on in different components of the refurb projects. Those things are always happening in parallel.

I would not completely break the two up, but I think that the building component of a new power reactor would be different. You wouldn't be involved in the research in that component. However, as you look at continuous improvement, there's significant overlap with research facilities across the country as we all participate in different components of that.

[*Translation*]

**Mario Simard:** I profess my lack of knowledge. However, I do wonder what a national nuclear energy research infrastructure looks like.

[*English*]

**Dr. Karin Stephenson:** That's a great question.

If you take all of the facilities, TRIUMF, Canadian Light Source, McMaster, our national labs at CNL, there are labs across the country that are really difficult to access for other academic researchers to be able to facilitate and get into those facilities. It would be wonderful to have a network where, if you wanted to do research in a certain area, you would be able to log in to this national nuclear user facility and be able to have access and apply for funding, where it could be based on scientific merit and have a call for proposals.

This is how it is run in the U.K. They have the NNUF, the National Nuclear User Facility. There's a similar one in the U.S. It's the Nuclear Science User Facility, which the Department of Energy runs. That's something we don't have in Canada.

With all of our expertise in nuclear and infrastructure that we do have across the country, providing a forum for academic, government and industry—

● (1250)

**The Chair:** Thank you so much.

We're on to our second round, colleagues. We'll have Mr. Kelly followed by Ms. McKelvie. They will have five minutes each.

**Pat Kelly (Calgary Crowfoot, CPC):** Thank you.

If I may, I will start with Ms. Stephenson.

The committee is tasked with making recommendations. The report will be tabled in Parliament for the government's consideration.

What are your recommendations? In your opening statement, I heard about much of the work that you do, but what are the specific recommendations you have for this committee that this committee could put in its report that will be tabled in Parliament?

**Dr. Karin Stephenson:** I think it would be to consider having a national network of user facilities for nuclear and to be tying them together. I think it would be looking at investing in research infrastructure so that everybody has access to those facilities. That would be a specific recommendation in the workforce development, and look at diversity in our workforce development and focus in on those areas as we need it to represent communities that we are serving.

**Pat Kelly:** Thank you.

I'll go to Mr. Pieries.

Back in 2017, this committee tabled a report in Parliament, which contained a number of recommendations. Most of the recommendations in that report were pretty broad. One of the recommendations, though, was a bit more specific about small modular reactors, recognizing the potential for clean and reliable power through small modular reactors in remote and northern communities.

This report was quite some time ago, and there are no small modular reactors deployed in northern and remote communities. Are you frustrated by the pace of this recommendation from back in 2017?

**Mario Pieries:** Again, there's certainly an opportunity. Small modular nuclear reactors have a certain place, especially given the push on defence and sovereignty for Canada. There will be a place for small modular nuclear reactors in the north for remote communities and applications for that aspect, as well.

I think there are a lot of learnings that the industry has carved out, but if you look at some of the other jurisdictions in the world that have started to put shovels in the ground, yes, it can be a little frustrating. We could move a little faster on deploying those small modular nuclear reactors, for sure.

**Pat Kelly:** Are there any new or additional recommendations on that?

**Mario Pieries:** It goes back to my testimony around change. I think we have to think slow to go fast, if you know that notion. Proper planning is necessary, but once you make a decision on moving forward with something, I think we need to put all our efforts into making sure that dream comes alive.

**Pat Kelly:** I think that's the frustration that some Canadians have or that I have as a parliamentarian when reports are tabled in Parliament, whether it's from committees, the Auditor General or any of a variety of places that the government can take advice from. Recommendations are made and the follow-through doesn't happen.

I think I have a bit of time left. I'd like my colleague, Mr. Bélanger, to have a moment for questions.

**Jim Bélanger:** Thank you.

My question is for Ms. Stephenson.

It's estimated that the nuclear sector in Canada will need 50,000 to 100,000 new workers, with 70% of those being in the skilled trades and 30% being engineers, scientists and other experts. Do you agree with these projected labour requirements?

● (1255)

**Dr. Karin Stephenson:** As much as I can, yes. I think they're difficult to project, but it seems reasonable, yes.

**Jim Bélanger:** Can you tell us how many nuclear graduates Canada produces per year versus the actual need?

**Dr. Karin Stephenson:** I don't think I could do that off the top of my head. I'm sorry.

I would imagine that we're producing hundreds. There's McMaster's nuclear engineering program. There are a couple of other programs. It's in the the hundreds, and we need thousands each year.

**Jim Bélanger:** What can the federal government do to ensure the sector has the workers it needs in the future?

**The Chair:** Give a quick answer, please, Ms. Stephenson.

**Dr. Karin Stephenson:** We have to invest in education in universities and in colleges for the trades programs, and in the transformative programs that occur postgrad. I think there's an opportunity to take engineers from all sides. We need civil engineers and mechanical engineers. We need them all. and we need to train them to want to come into nuclear.

We launched a program at McMaster in a minor that allows them—it's all across campus, actually—to graduate with a nuclear minor. You could finish your civil engineering degree with a minor in nuclear. That makes you much more ready for the nuclear industry.

**The Chair:** Thanks to both of you.

Ms. McKelvie, you have five minutes.

**Jennifer McKelvie (Ajax, Lib.):** Thank you.

My questions are for Dr. Stephenson.

Your facility at McMaster produces isotopes, but it's also used for research. It's a balance between the two. What are the considerations that are made around that time in the reactor? I have been.... I was going to say that it's super cold. Maybe I should say “super hot”. It's a very interesting facility.

How do you balance those two?

**Dr. Karin Stephenson:** It's a true multi-purpose research reactor. While we're doing all of the beam science that's occurring at the pool wall, we're doing isotope production at the same time. We can actually manage to do both at the same time.

I think one of the real challenges we have in the sustainability and longevity of running the reactor is the cost. It is solely run from McMaster. We've had a significant one-time investment to improve our operations to go from 16 hours a day to 24-5, which is what we currently operate at now. To go to 24-7 in the next years, we want to maximize the use of all of these neutrons so that we can do more of everything.

**Jennifer McKelvie:** On the research side, what do you see as the major research gaps in the university sector? What sorts of major investments need to be made on the research side?

**Dr. Karin Stephenson:** In terms of research, I think it would be having access to others. We would like to have more academic researchers having access to doing irradiations in the reactors. That's a difficult thing to do because of the costs of running the research reactors.

I think it's a gap that we are unable to really open our doors. This is the point of having a national nuclear user facility. There are brilliant researchers across the country, and we want all of them to have access to do the type of research to advance and bring new intellectual property, new innovation and new technology to Canada.

**Jennifer McKelvie:** As for isotope production, what is estimated in terms of demand? Even when you're moving to 24-7, when do you see that the demand will outpace what you're able to produce? What sorts of investments do we need to be making in isotope production?

**Dr. Karin Stephenson:** In isotope production, we are perfectly set up as a research reactor. We feed into the CANDU. One of the beautiful things about a CANDU reactor is that it is also multi-purpose, and we can produce medical isotopes at the same time as producing electricity without any impact.

The really beautiful role for the research reactors is that we don't want to put anything into a CANDU that hasn't been fully developed and fully explored. We want to be on the leading edge of that, all the way up to a phase one, phase two clinical trial, and then you would really pass that. You would be looking at going to a commercial production in which you might be, at that time, looking at something like a CANDU to produce isotopes.

As a limitation for us, we haven't outpaced that yet. We're still growing, but there will come a time when we'll be full. The radiopharmaceutical industry is growing rapidly. I think it's going to be $40 billion by 2032, or something like that. As it's growing really rapidly, we want to be thinking about next-generation medical isotopes. We want those new treatments to be coming to Canadians.

It's not just about isotope production. It's a whole suite of things. We need to do preclinical discovery research. We also need to be doing radiopharmaceutical production, which occurs in clean rooms. I mean, we can take it all the way up at McMaster to phase one, phase two, but we want to be able to accelerate that process so that it keeps the intellectual property within Canada and it brings new treatment options to Canadians. Usually, our sickest patients with advanced cancers are involved in these things.

● (1300)

**Jennifer McKelvie:** As we invest in the new next-generation CANDU, it's important that we're thinking about that in advance, the isotopes production, making sure the design is there to incorporate that. It's harder to go retrofit and run around, chasing it afterwards. Is that not right?

**Dr. Karin Stephenson:** I would think so.

One main message I would like to impart is that we not look at just electricity generation in isolation but that we look across all of the other nuclear sectors that are impacted. Nuclear medicine is a big one, and having access and a reliable robust supply of radioisotopes. If we don't have that, then patients don't get the best treatment option that may be there for that particular cancer.

**The Chair:** That is your time. Thank you.

Colleagues, we're going to end with Mr. Simard's questions and comments.

You have two and a half minutes, Mr. Simard.

[*Translation*]

**Mario Simard:** Thank you very much, Mr. Chair.

I have a question for both of you regarding the payback period for nuclear projects.

A previous witness drew a comparison a short while ago. He said that Hydro-Québec sells its electricity at $40 per megawatt-hour, whilst for Ontario Power Generation, or OPG, the figure was around $110 per megawatt-hour. The witness estimated that the cost per megawatt-hour for small nuclear reactors would be around $150, not including operating costs.

Energy storage technologies are developing quite rapidly, and they may improve the efficiency of electricity generated from intermittent sources. Isn't it becoming difficult to justify nuclear projects, given that their cost would be disproportionate compared with other sources of electricity?

I don't know whether you have any data on the payback period and the cost per megawatt-hour of a nuclear project, but this could be useful to the committee.

[*English*]

**Mario Pieries:** I don't have the data at my fingertips. There might be some data I could perhaps pull out, which we've published as part of publicly available papers, that I can share with the committee.

To your comment, and I did listen to our previous colleague's comment around that, we need to understand what the need is first, and then assess those options on a specific case-by-case basis. I think there are different needs among end-users.

We come at it from an agnostic viewpoint. Nuclear is one option. There are other technologies that are out there, but I think there's certainly a benefit to adopting nuclear, from a Canadian standpoint.

**The Chair:** Thank you, Mr. Simard.

Thank you to our witnesses, Ms. Stephenson and Mr. Pieries. It was great testimony, with great questions by colleagues. We really appreciate your time with us.

Colleagues, that brings our meeting to an end. We will be meeting again on Wednesday to continue our nuclear study.

With that, I will adjourn.

**Published under the authority of the Speaker of the House of Commons**

## SPEAKER'S PERMISSION

**The proceedings of the House of Commons and its committees are hereby made available to provide greater public access. The parliamentary privilege of the House of Commons to control the publication and broadcast of the proceedings of the House of Commons and its committees is nonetheless reserved. All copyrights therein are also reserved.**

**Reproduction of the proceedings of the House of Commons and its committees, in whole or in part and in any medium, is hereby permitted provided that the reproduction is accurate and is not presented as official. This permission does not extend to reproduction, distribution or use for commercial purpose of financial gain. Reproduction or use outside this permission or without authorization may be treated as copyright infringement in accordance with the Copyright Act. Authorization may be obtained on written application to the Office of the Speaker of the House of Commons.**

**Reproduction in accordance with this permission does not constitute publication under the authority of the House of Commons. The absolute privilege that applies to the proceedings of the House of Commons does not extend to these permitted reproductions. Where a reproduction includes briefs to a committee of the House of Commons, authorization for reproduction may be required from the authors in accordance with the Copyright Act.**

**Nothing in this permission abrogates or derogates from the privileges, powers, immunities and rights of the House of Commons and its committees. For greater certainty, this permission does not affect the prohibition against impeaching or questioning the proceedings of the House of Commons in courts or otherwise. The House of Commons retains the right and privilege to find users in contempt of Parliament if a reproduction or use is not in accordance with this permission.**

**Also available on the House of Commons website at the following address: https://www.ourcommons.ca**

**Publié en conformité de l'autorité du Président de la Chambre des communes**

## PERMISSION DU PRÉSIDENT

**Les délibérations de la Chambre des communes et de ses comités sont mises à la disposition du public pour mieux le renseigner. La Chambre conserve néanmoins son privilège parlementaire de contrôler la publication et la diffusion des délibérations et elle possède tous les droits d'auteur sur celles-ci.**

**Il est permis de reproduire les délibérations de la Chambre et de ses comités, en tout ou en partie, sur n'importe quel support, pourvu que la reproduction soit exacte et qu'elle ne soit pas présentée comme version officielle. Il n'est toutefois pas permis de reproduire, de distribuer ou d'utiliser les délibérations à des fins commerciales visant la réalisation d'un profit financier. Toute reproduction ou utilisation non permise ou non formellement autorisée peut être considérée comme une violation du droit d'auteur aux termes de la Loi sur le droit d'auteur. Une autorisation formelle peut être obtenue sur présentation d'une demande écrite au Bureau du Président de la Chambre des communes.**

**La reproduction conforme à la présente permission ne constitue pas une publication sous l'autorité de la Chambre. Le privilège absolu qui s'applique aux délibérations de la Chambre ne s'étend pas aux reproductions permises. Lorsqu'une reproduction comprend des mémoires présentés à un comité de la Chambre, il peut être nécessaire d'obtenir de leurs auteurs l'autorisation de les reproduire, conformément à la Loi sur le droit d'auteur.**

**La présente permission ne porte pas atteinte aux privilèges, pouvoirs, immunités et droits de la Chambre et de ses comités. Il est entendu que cette permission ne touche pas l'interdiction de contester ou de mettre en cause les délibérations de la Chambre devant les tribunaux ou autrement. La Chambre conserve le droit et le privilège de déclarer l'utilisateur coupable d'outrage au Parlement lorsque la reproduction ou l'utilisation n'est pas conforme à la présente permission.**

**Aussi disponible sur le site Web de la Chambre des communes à l'adresse suivante : https://www.noscommunes.ca**