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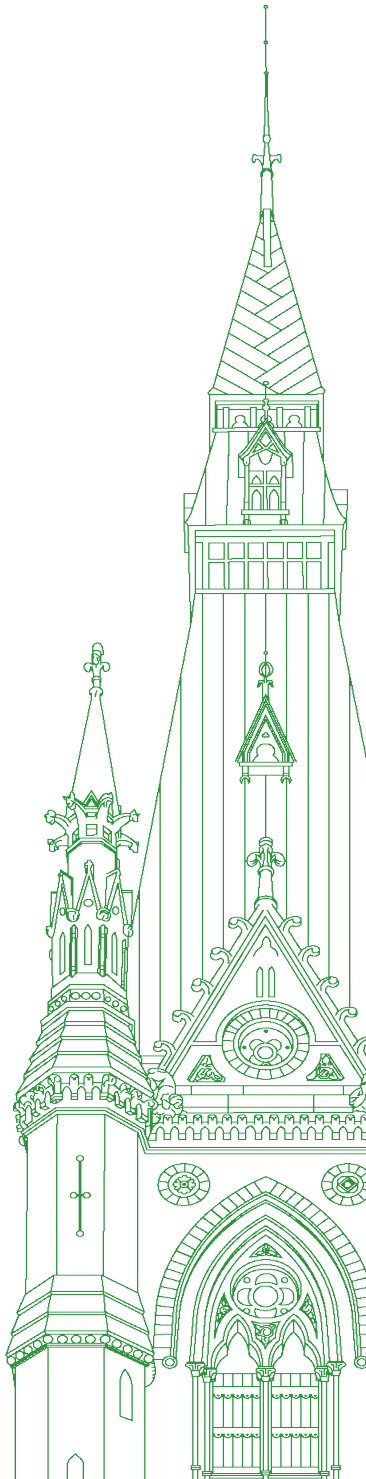
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Chair: Terry Duguid

Standing Committee on Natural Resources

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● (1105)

[*English*]

The Chair (Hon. Terry Duguid (Winnipeg South, Lib.)): Colleagues, let me call this meeting to order.

I acknowledge that we are on the unceded territory of the Algonquin Anishinabe nation.

Welcome to meeting 51 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 by using the Zoom application.

I would like to remind participants of the following points.

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.

Monsieur Simard will always ask, “Is your interpretation working?”, so we look forward to that, Mario.

I remind you that all comments should be addressed through the chair. To members in the room, if you wish to speak, please raise your hand. To members on Zoom, 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.

Pursuant to Standing Order 102 and the motion adopted by the committee on Wednesday, October 7, 2026, the committee is resuming its study of Canada's nuclear future.

Because I won't be here, I think I might deal with that item now. Colleagues, I have to leave a little early. I apologize, but I will give you a heads-up on something, because I won't be in the chair.

In our next meeting, colleagues, we will be in camera as we consider the energy export study. I invite members to consider the possibility of committee travel as part of our study on Canada's nuclear future. Members interested in pursuing this option are asked to come prepared for the Wednesday, November 4, meeting. I think we are open to ideas.

This travel would take place within Canada, so it will be affordable, and the Liaison Committee perhaps will say yes, as they have in the past for this committee. I think that deals with that item.

Think about the cities and destinations the committee wishes to visit, the proposed travel dates and the number of members who would be travelling, as well as a brief explanation of the rationale for the proposed travel, including how it would contribute to and benefit the committee's study. Come prepared to talk about potential travel and how it might benefit our study. It's obviously not mandatory, but I think it would give us a better feel for the topic we are all trying to wrap our heads around.

With that, I would like to welcome our witnesses. Thank you for your patience.

From the Canadian Union of Skilled Workers, we have Cody Quan, director of education and training, and Shawn Campbell, central growth and opportunities representative.

We have Christopher Keefer, from Canadians for Nuclear Energy. Welcome.

Folks, we have Women in Nuclear Canada lined up, but we've had trouble connecting with Priya Malik, the president. If we are able to connect with her, we will be able to hear her testimony. We need to suspend to test her devices.

● (1105)

_____(Pause)_____

● (1110)

The Chair: Colleagues, we're back in session. I was just finishing welcoming our witness from Women in Nuclear Canada, Priya Malik.

I'm glad you were able to work through some of the challenges there, Ms. Malik.

All virtual witnesses have conducted a mandatory witness onboarding test. You will each have five minutes for your opening remarks, after which we will open the floor to questions.

Mr. Quan and Mr. Campbell, you have the floor for five minutes. Please begin.

Shawn Campbell (Central Growth and Opportunities Representative, Canadian Union of Skilled Workers): Thank you, Chair and members of the committee. My name is Shawn Campbell, and further down the line is Cody Quan. We represent the Canadian Union of Skilled Workers.

CUSW is an independent Canadian-led union. We represent more than 4,000 skilled tradespeople across Canada who build and maintain our country's electricity infrastructure. At Bruce Power, Ontario Power Generation and Hydro One, our members are the electrical construction workers and technicians who keep nuclear generating stations running reliably and who bring them back to life during major component refurbishments.

Our message to the committee today is simple: Canada's nuclear future will be built by Canadians.

The technology, the sites and the investment are coming together, but whether these multi-billion-dollar clean energy projects land on time and on budget will depend on whether we have the skilled, qualified workforce ready to build them.

Earlier this year, OPG completed Darlington's unit three refurbishment, four months ahead of schedule and $150 million under budget. At Bruce Power, construction on the unit three major component replacement also finished on budget and ahead of schedule. That is what an experienced Canadian workforce delivers.

Canada has a proven advantage: our long history in domestic nuclear generation. CANDU reactors, with their unique design, fuel independence and operational advantages, offer a truly Canadian solution.

Beyond baseload power, Canada has become an isotope superpower. Bruce Power, OPG and Canadian Nuclear Laboratories produce life-saving medical isotopes. Bruce Power's $250-million isotope expansion, in partnership with the Saugeen Ojibway Nation, demonstrates how skilled trades deliver both reconciliation and world-class health care.

However, here is the challenge: It takes five years to train a licensed electrician, and additional training is required to qualify for work on a nuclear site. The workers Canada needs must begin training now.

I know first-hand what happens when government, industry and unions build genuine pathways together, because I am a product of that system. My father was a radiation safety technician, and for our family, nuclear was a generational opportunity.

In grade 11, I applied to the Ontario youth apprenticeship program, which gave me an early launch into the trades. Right after high school, I joined CUSW, and my first job was at the Bruce Power site. Having that head start allowed me to earn my certificate of qualification at age 23, becoming a nuclear-certified worker and ultimately serving on CUSW's national executive board. Today I stand before you as proof of the life-changing opportunity that nuclear provides when pathways are planned and accessible.

CUSW is building those pathways today. A couple of examples include partnering with Bruce Power and Georgian College on pre-apprenticeship programs that lead directly into the workplace, as well as collaborating with Build a Dream to recruit women into electrical and nuclear trades and with Skills for Change to bring newcomers into the sector.

Crucially, we are also removing interprovincial trade barriers. Our agreement with Quebec's FIPOE allows licensed electricians and power line technicians to work seamlessly across provincial lines, ensuring that Canadian talent can move wherever major outages or construction peaks demand.

To ensure that Canada can deliver on the clean energy build-out, we recommend turning the advice of the Energy and Electricity Workforce Alliance into action.

Second, fund partnerships and pathways for Canadians, from pre-apprenticeship to completion and on to long-lasting careers. It is essential to include employers, unions and post-secondary education, resulting in real workplace opportunities.

Above all, it's about the continuation of education, investing in Canadians through their apprenticeships, mentoring them as they master their craft, encouraging them as they become supervisors and leaders and walking alongside them as they maintain the life of these systems until the day they retire.

When we look after our people with care, with optimism and in genuine partnership, we don't just secure the next project or outage; we build an industry that our children and our communities will be proud to inherit. Let's keep learning together, let's keep opening doors and let's keep working people at the centre of Canada's clean energy story.

Thank you.

● (1115)

The Chair: Thank you.

We'll move on to Mr. Keefer now for five minutes.

Dr. Christopher Keefer (President, Canadians for Nuclear Energy): Thank you, Chair and members of the committee.

I'm Dr. Chris Keefer, president of Canadians for Nuclear Energy, an industry-independent advocacy organization that helped drive the federal government's transformation from nuclear skepticism to enthusiastic support for nuclear energy.

Canada is one of only six countries in the world that can call themselves tier one nuclear nations, capable of designing, building and exporting their own reactor technology. My argument today is that we need to decide whether to build on that advantage or, increasingly, become a supplier within other countries' nuclear industries. In practical terms, will we invest in our own CANDU technology or build American reactors here and compete for peripheral involvement in U.S.-brokered global exports of the Westinghouse AP1000?

Last week, Cameco CEO Tim Gitzel urged this committee to give Westinghouse and CANDU equal standing in federal nuclear policy. Cameco is an iconic Canadian company, the descendant of federal and provincial Crown corporations. Buying a minority stake in Westinghouse, an equally iconic American company, may prove an excellent commercial decision for Cameco, but creating a false equivalency between AP1000 and CANDU based on a private sector investment is misleading.

Consider what true equivalence with CANDU would entail for Westinghouse. It would require a complete transfer of AP1000 technology and IP rights sufficient for Canada to independently develop, license and export the reactor, as well as overcoming longstanding American export controls and binding national security standards designed to protect strategic nuclear technology and restrict foreign owners' access and influence. It would require headquarters and design authority to move from Pittsburgh to Canada, as well as the construction of a multi-billion-dollar enrichment and AP1000 fuel fabrication facility here in Canada. A satellite Westinghouse engineering office and equity stake fall well short of that standard.

Recall that CANDU's underlying IP belongs to Canadians through AECL and Ontario Power Generation. Domestic and export CANDU builds sustain decades of Canadian engineering, equipment sales, research, and services, generating skilled jobs, revenues and a strong Canadian tax base.

These relationships are anchored by Candu Energy's headquarters in Mississauga, CANDU research at Canadian Nuclear Laboratories and Toronto-based Conexus—formerly CANDU Owners Group—which coordinate best practices across a global fleet. In addition, CANDU reactors provide energy security, as they are fuelled by Saskatchewan natural uranium, avoiding foreign enrichment, with fuel bundles fully manufactured in Canada.

American officials are clear-eyed about how they see Westinghouse. In 2026, U.S. energy secretary Chris Wright said, “I would call Westinghouse an American company.... It has a Canadian partner in Cameco, but it's an American company.” How is Washington asserting its influence over Westinghouse? Under its 2025 strategic partnership with Cameco and Brookfield, Washington is arranging financing and approvals for at least $80 billion in domestic AP1000 reactor projects in return for conditional rights to an equity position in Westinghouse itself.

Korean reporting, in the context of a 10% proposed ownership stake in Westinghouse's confidentially filed IPO and citing a ministry submission to its national assembly, also warned of a proposed American “golden share” under negotiation that would give Washington veto rights over key corporate decisions.

My concerns about Canada ceding influence over its nuclear future precede Washington's trade war. We now face 50% steel and aluminum tariffs, 25% auto tariffs and threats to decertify Bombardier aircraft. Even the Canadian-financed Gordie Howe bridge was held hostage by the Trump administration to secure half of its net revenues before Canada recovers its investment, in violation of prior agreements.

American protectionism will ebb and flow, but over the past decade, even under Biden, each retreat has left more barriers in place, and a change of administration offers no guarantee against its eventual return. We must sustain our economic relationship with the United States through thick and thin, but we have learned that it is essential to avoid critical dependencies that leave Canada exposed to American political leverage. Luckily, we are insulated from such a dependency by our indigenous CANDU reactor technology.

Our recommendation is, therefore, that while reactor choices are ultimately provincial, the federal government should reserve financing and loan guarantees for the reactor that Canadians have spent decades developing and whose IP it owns. In addition, Ottawa should accelerate domestic CANDU deployment and invest in supporting infrastructure, such as heavy water production.

● (1120)

I'm out of time, so I'll leave it there.

Thank you.

The Chair: Thank you for staying on time, Mr. Keefer.

Now we'll hear from Women in Nuclear Canada.

Priya Malik, please go ahead.

Priya Malik (President, Women in Nuclear Canada): Thank you, Mr. Chair and members of the committee, for inviting WiN Canada to contribute to this study on Canada's nuclear future.

My name is Priya Malik, and I'm pleased to be here as the president of Women in Nuclear Canada.

Since 2004, WiN Canada has worked to support and advance women across Canada's nuclear sector. Today, our network includes approximately 6,500 members across the country, connecting women at different stages of their careers across organizations and disciplines. Through mentorship, professional development, leadership programming and industry engagement, we help women enter, remain in and advance in the nuclear sector.

Canada has significant nuclear ambitions ahead, from expanding generation and developing new technologies to competing in international markets. Delivering on those ambitions will require a skilled and growing workforce.

WiN Canada welcomes the government's commitment through its nuclear energy strategy to doubling Canada's nuclear workforce by 2050, but building that workforce will take time. Many of the specialized skills our sector needs require years to develop, which means workforce development needs to happen alongside Canada's nuclear investment and project planning, not after it.

Achieving the 2050 ambition will also require Canada to make better use of its full talent pool. Women are already contributing across Canada's nuclear sector, from engineering and skilled trades to operations, project delivery, research, policy and leadership. As Canada grows its nuclear workforce, attracting more women and creating opportunities for them to remain and advance must be part of the strategy. This is not simply an equity issue; it is a workforce and economic imperative.

From WiN Canada's perspective, we see three areas where focused action can make a meaningful difference.

First, we need to strengthen awareness of the nuclear sector and the pathways into it. For many young people, nuclear may simply not be on their radar when they are considering their education and careers. For women, that challenge can be compounded by fewer visible role models in technical fields and limited exposure to the breadth of careers available in the nuclear sector. Stronger connections between education and employment, as well as mentorship, work-integrated learning and early career opportunities, can help bridge that gap.

Second, Canada needs to make better use of skills developed outside of the nuclear sector. Qualified people working in adjacent industries already have transferable engineering, technical, manufacturing and project-delivery experience. We should make it easier for them to transition into nuclear and develop the nuclear-specific knowledge and experience they need to succeed. This will require closer collaboration with employers, training providers and industry organizations to identify transferable skills, address gaps and create more accessible pathways into the sector.

Third, attracting women to nuclear is not enough if they cannot build lasting careers. Building a sustainable workforce requires mentorship, professional development, leadership opportunities and supportive workplace practices that help women remain and advance—

The Chair: Ms. Malik, could I just stop you there? If you could slow the pace a bit for our interpreters and our colleagues, it would be greatly appreciated. We'll give you the time.

Priya Malik: Building a sustainable workforce requires mentorship, professional development, leadership opportunities and supportive workplace practices that help women remain and advance in the sector.

Across the industry, there are opportunities to do more to identify and address barriers to women's participation and advancement. Women in Nuclear Canada's "Gender Balance Roadmap", for example, provides organizations with a framework to assess their progress, establish goals and take measurable steps towards improving gender balance. Initiatives like this demonstrate how employers and industry partners can translate workforce objectives into practical organizational change.

This leads to an important point that I would like to leave with the committee. Canada does not need to start from scratch. The government's nuclear energy strategy will be best positioned to hit the ground running by building on the expertise, networks and delivery capacity that already exist across Canada's nuclear industry. Industry associations, employers and educational institutions are already working to attract talent, develop skills, support career transitions and address barriers to participation across the sector. A coordinated approach that brings these partners together, builds on established programs and aligns efforts with sector-evolving workforce needs will help translate the strategy's ambition into action more quickly and effectively.

As the government advances the workforce development commitments in Canada's nuclear energy strategy, WiN Canada proposes that we start now. Building the specialized workforce that Canada will need to meet the 2050 target will take time. Draw on the full talent pool. Attract more women into nuclear, and ensure they have the opportunities to remain and advance. Mobilize existing capacity. Bring together industry, employers, educational institutions and established workforce development organizations to build on existing expertise programs to accelerate implementation.

Canada has an extraordinary opportunity in nuclear, but our ability to realize this opportunity will ultimately depend on having the people and skills to deliver it. Meeting our nuclear ambitions will require sustained collaboration across industry, employers, government and organizations already working to strengthen the workforce. WiN Canada is proud to be part of that ecosystem, and we look forward to working with partners across the sector to develop a skilled, diverse and sustainable nuclear workforce for the future.

Thank you. I look forward to the questions.

● (1125)

The Chair: Thank you, Ms. Malik, and thank you to all of our witnesses.

We'll start our rounds of questions now.

We're going to start with Mr. Patzer for six minutes.

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

Thank you, witnesses, for being here.

Mr. Keefer, how does nuclear compare to other sources of alternative energy, especially if we consider energy efficiency and security?

Dr. Christopher Keefer: Nuclear energy plays a vital role because, in particular, Canada's electricity demand is very variable between seasons. If we look at Ontario, we see peaks of 26 gigawatts in the summer and probably 22 gigawatts in the winter—that may increase with increasing electrification, EVs, heat pumps, industry—and lows in the summer. What we see with alternative forms of energy, like wind and solar, is that they have a role up to a certain point, but they don't produce reliably when we need power the most.

Nuclear is very good at providing the backbone. In a time of growing need, when electricity demands are booming with AI, it provides a reliable source of 24-7 power for things like data centres. Hopefully, we're going to be reshoring more industry here, so there's a vital role in that capacity as well.

Jeremy Patzer: I'm happy to see that the Liberals have finally gotten on the boat with supporting nuclear. It took them a few years to get there, but I guess it's better late than never.

What did we miss in the last 10 years by them not supporting and embracing nuclear as an opportunity to expand our backbone, as you say?

Dr. Christopher Keefer: It definitely is a welcome turnaround. I've padded the pavement here in Ottawa, since about 2022, to help shape that response and I think bring some sense to the conversation.

Listen, the best time to build a nuclear reactor was yesterday, and failing that, it's today. For sure, we've lost some time, but I am encouraged to see a national nuclear energy policy replacing the SMR road map, which I think was policy by focus group and was frankly very unrealistic. I see some sense coming back into the room, and I appreciate that.

Jeremy Patzer: Were you consulted as part of the national strategy?

Dr. Christopher Keefer: I was not.

Jeremy Patzer: What advice would you have for the government if they were to consult you?

Dr. Christopher Keefer: As I mentioned in my testimony, I think we need to primarily lean into backing our national technology: CANDU reactors.

There are great opportunities in exports. The Prime Minister and the natural resources minister were in Turkey, where there's serious talk building off previous efforts to deploy CANDU reactors in Turkey. Export finance is going to be vital for that. We see an enormous benefit back home in our industry among our workers and suppliers for things like the refurbishment and new builds of CANDU reactors in Romania, for instance. That's a really concrete thing that can be done.

Of course, in order to enable those exports, you need to be building at home. We need domestic reference plants, and we need to move with real urgency to accomplish that.

● (1130)

Jeremy Patzer: That gets to the next question.

There's obviously a lot of work happening at Darlington, but I would say that Saskatchewan is poised to be the next province to deploy nuclear reactors. What advice do you have for Saskatchewan? What are the opportunities that lie ahead for Saskatchewan to develop nuclear?

Dr. Christopher Keefer: You're absolutely right. Saskatchewan is very well positioned, in large part because of SaskPower and the electricity market that you guys have in that province. I'm very enthusiastic. There's strong pan-partisan support for nuclear in the government and in the opposition, and I think there are great opportunities.

You also have the situation with the refurbishment of coal plants, but these things aren't going to last forever. That gives an off-ramp to eventually replacing those jobs with equal or better jobs in the nuclear sector. We certainly saw that with the retirements of coal stations here in Ontario. I personally know of a number of workers who transitioned into those new positions. The pay was better, the benefits were better and the workplace was cleaner and safer. I think those are extraordinary opportunities.

The Athabasca basin is extraordinary. Right now, 25% of the world's uranium is produced by two mines there that Cameco owns. There are some new junior miners coming on board, which will bring an equal amount—about 30 million pounds of uranium—online every year. We are going to be the powerhouse and supplier for the western world there. We can turn that uranium into natural uranium fuel for CANDU reactors. We can avoid converting it to uranium hexafluoride gas and spinning it in complex enrichment machines...and to bottlenecks there. We fabricate every CANDU pellet and fuel bundle here nationally, and it gives us unparalleled energy security in a world in which, unfortunately, we're seeing significant strife, deglobalization and conflict.

Jeremy Patzer: We have about a minute left.

The government wants to more than double electricity grid capacity by 2050. Without nuclear, is that even possible?

Dr. Christopher Keefer: I admire the ambition of the aspiration. These projects are going to take time. I think we're making really positive strides in creating a one project, one process review in terms of environmental assessment and indigenous consultation. I think we're moving in the right direction. We probably need to move faster.

Of course, there are going to be other sources of power on the grid. Our group welcomes a diverse array of sources in proportions that make sense. A 100% nuclear grid for a province doesn't make sense, but a number of provinces—Saskatchewan first, the Maritimes, building on Point Lepreau, and Alberta and others—have a real opportunity to make a meaningful contribution to doubling that, but also doubling it with reliable electricity, which we're increasingly starting to appreciate.

Jeremy Patzer: Thank you.

The Chair: We'll move on to Ms. McKelvie for six minutes.

Jennifer McKelvie (Ajax, Lib.): Thank you, Mr. Chair.

My questions are for Ms. Malik.

Thank you for coming today, and congratulations on your new presidency. Thank you for serving.

I am a former member of WiN Canada and was very fortunate some time ago to participate in some of your initiatives, including your conference, and also in some of the work you do, particularly with elementary school students and trying to engage youth. I was wondering if you could speak to some of the recent initiatives you have around all age groups, focusing on the elementary and high school levels, and then later on the university level.

Priya Malik: In terms of the programs WiN Canada offers, we have an outreach program in partnership with Skills Ontario, and that's how we tap into elementary schools and high schools. In the past, schools have invited us to bring awareness about the nuclear industry.

Part of my testimony was that we need to strengthen the awareness of pathways. We are strengthening and bringing in awareness of the nuclear industry by getting into schools, removing the stigma about nuclear, educating students on what nuclear can do and providing them with information about the career options that exist in STEM, where there is a future in nuclear, starting once they graduate. There's a pathway. That's in elementary schools and high schools.

Moving on from that to once they graduate, a lot of the organizations we collaborate with have internship opportunities, co-op opportunities and skilled trades opportunities, where you can participate in those sectors. We also have a mentorship opportunity at WiN Canada, where we in bring diverse talents and pair them with whomever they're interested in learning from. That coach and mentor relationship helps them learn about the industry, build their own road map and see where they want to take their careers.

Once you are a senior member or senior leader, we also have a program for that, which is our LEAP program. That helps women who want to see themselves going into leadership roles. We have a road map looking at how they can get involved early, going from elementary school and high school to mid-manager roles and senior management, to get into the senior leadership roles in nuclear.

● (1135)

The Chair: Ms. Malik, I'll ask you again to slow down a bit for our interpreters. We appreciate it. Thank you so much.

Please go ahead.

Priya Malik: I'm sorry about that.

Jennifer McKelvie: I get it. I talk really fast, especially when I'm excited about a topic. What's more exciting than nuclear energy?

About one in five workers in the industry today is a woman. Can you speak to the goals around increasing recruitment? Can you also speak to retention? What is retention data saying?

Priya Malik: Certainly, retention has been one of the issues in the industry, because as we know, this is a traditionally male-dominated industry. Women can find themselves isolated in the sense that they need to establish credibility repeatedly, which makes women leave the industry. Once they start their career, they don't see any other women around them.

This is why Women in Nuclear Canada exists. We bring all women together. We have all of these programs for them depending on where they are in their career trajectory. They can join Women in Nuclear Canada. Women can feel supported, can feel motivated and can see someone else doing the same thing, and that helps them get the confidence to build their own career and continue to advance it.

What are we doing for that? I think we need support. We need to strengthen the education-to-employment pipeline. That's one thing that Women in Nuclear Canada is working on. We're supporting STEM education. We have sponsorships and apprenticeships exposing more women to the nuclear field. We've also been working on getting more collaboration within organizations that already have reach in the industry.

Lastly, I would say encourage inclusion in the workplace and retention. Government funding and workplace programs can encourage employees to look beyond recruitment and address retention, advancement and leadership development.

Jennifer McKelvie: It's interesting that nuclear isn't just a little box anymore, like it used to be. There are medical applications. There are all kinds of different applications, as well as energy. It sounds like you're really looking at the breadth of that.

Can you speak to that a bit? Are you seeing any differences in the trends among the different nuclear disciplines, so to speak?

Priya Malik: I can't speak to the details in the data in terms of trends, but I can speak to Women in Nuclear Canada's landscape and what we are seeing and our observations. We are seeing a lot of women in mid-manager roles. They're excited. They want to start their careers. That's happened because their families have been in the nuclear industry, so that has encouraged them to be in the industry.

McMaster University has an engineering program. It motivates a lot of women to start their career in engineering and continue their career, because it leads them to having internships and co-op programs, which attract them and create opportunities for them.

Should I slow down?

The Chair: No. I have to stop you there.

Thank you both. That was great.

Thank you for your measured approach towards the end.

● (1140)

[*Translation*]

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

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

Mr. Keefer, thank you for being here. It's always interesting to hear from you. I also like to thank you for the document you gave me, because last week we were with Mr. Gitzel from Cameco—but I'll come back to that.

First of all, I'd like to say that I have some reservations about the federal government's strategy on nuclear energy. To give you a sense of those, let me make the following analogy: I feel as though we're trying to buy a Ferrari when perhaps all we need is a Hyundai.

The fact is, nuclear power costs are very high. The people who appeared before the committee last week gave us the example that, if we look at the depreciation cost per megawatt, it is $110 for nuclear power and $150 for small modular reactors—whereas the cost is $40 per megawatt for hydroelectricity.

That difference seems quite significant to me, and I see many new technologies emerging, particularly when it comes to storage. I follow various industry sites in China and see the progress they're making, which never ceases to amaze me. You responded to one of my colleagues by mentioning the peak demand we have to manage. I am also aware that certain peak-load management technologies are becoming increasingly efficient. In fact, there are people in my riding who are able to manage peak demand.

When I put all this together and consider the time it takes to build a nuclear project, I wonder whether, in 10 or 15 years—by the time these projects are completed at the cost they entail—we might not have technologies that are both simpler and more efficient. Is it wise to invest so much money in energy projects like nuclear power?

Dr. Christopher Keefer: Thank you for the question, but I'll continue in English.

[*English*]

My interpretation was not there, but I understood you very well. Thank you.

A key thing to make a distinction of is that every kilowatt hour is not equal, so reliable baseload nuclear energy provides a stronger service to an electricity grid. I'll be the first to admit that nuclear electricity, in terms of newbuild LCOE, is higher. Amortized over a plant that lasts 80 years, that cost changes significantly once you've paid off the cost of capital of initially building the plant. Your hydroelectricity figure of $40 a megawatt hour refers to legacy hydro. We're not building new hydro for that cost, so that's also important to consider. In Ontario, prior to starting on the SMR, which has required more financing, nuclear was the second cheapest cost of electricity after legacy hydro.

I share your concerns about small modular reactors. I think the industry really moved in the wrong direction. This was a public relations pitch to solve a public relations problem with a nuclear engineering solution. We've always scaled up nuclear energy. It turns out that the engineering challenges of scaling down are probably more significant. We're luckily seeing Saskatchewan, for instance, consider large nuclear technology, and the Canadian consensus.... We were arguing against SMRs from the get-go in 2020—you may remember my appearances at committee—and we're very refreshed to see a return to large reactor technologies.

In terms of China, there are absolutely extraordinary advances in the scale of their manufacturing. Unfortunately, like EVs, they're flooding the market, and that makes it very difficult to compete.

Lastly is the question of whether in the 10 years it takes to build a nuclear reactor, new technologies will emerge. We are seeing a plateauing in production volumes out of the Chinese solar sector. Batteries are still going up a bit, but the key issue here is that batteries are fabulous for four to eight hours of storage; they are not applicable to long-duration storage where we're going to charge them in the summer and discharge them once in the winter. Nuclear works incredibly well with batteries, so this shouldn't be a culture war of one energy source versus another. The distinction is that you can reliably charge those batteries any time of year, but when the wind disappears for two weeks and the sun is not shining, you can't charge those batteries. Again, everything is a mix. There's a role for everything.

I do appreciate the question. I hope I've clarified things a bit.

● (1145)

[*Translation*]

Mario Simard: Thank you.

I saw something about metal-air batteries which, apparently, were going to change the world in the way you've just described—though I'm not really up to speed on that.

The other point that strikes me as essential—which Mr. Gitzel from Cameco came to tell us this week—is that we need to eliminate the risks associated with projects. One way to achieve this is to identify a specific technology. Once we've mastered it, perhaps future reactors will cost less. In this case, there seems to be some indecision—according to the document you gave us earlier—between AP1000 technology, on the one hand, and CANDU technology on the other.

To eliminate the risks associated with one of them, we need to focus on that one. I fully understand that the government will not be able to do both. So, strategically, we will have to choose one technology and focus on it. However, I doubt this will even be possible, given that the government aims to build 10 new reactors by 2050.

[*English*]

The Chair: I'll allow a quick answer, Mr. Keefer, but we're already at time, so you have 30 seconds.

Dr. Christopher Keefer: It's important to standardize on one reactor technology in terms of the large...now that we're also introducing the BWRX-300 SMR supply chain. It's an industry that's already struggling, frankly. We're seeing excellent work by my colleagues at Women in Nuclear to put people into this industry. It needs to be careful in terms of those sorts of ambitions. For something like CANDU pressure tubes, every single one has been made in Arnprior by Nu-Tech for the Canadian fleet and the global fleet. That's standardized between different sizes of reactors—

The Chair: Thank you both.

Colleagues, we're on to our second round. We got a bit behind time because of some technical difficulties, so I have agreement from the last two speakers that we'll reduce their time to three minutes each to make up a bit of time.

Let's start this round with Mr. Kelly for five minutes.

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

Dr. Keefer, in your opening statement and in your response to the last question, you have diminished or spoken down on the role of small modular reactors. You were doing so, I thought, by way of contrast with large reactors. They are two different things trying to solve different problems.

Do you think there is a role for small modular reactors in extremely remote locations, for example for power for national defence, for Arctic defence and for some of the most remote industrial operations, like the oil sands even? Is there any application that makes sense to you for small modular reactors?

Dr. Christopher Keefer: First off, I don't want to be too simplistic here. If we have small grids, SMRs are going to fit on them. There's going to be a cost premium paid for diseconomies of scale, and those jurisdictions will have to decide on whether that's worth it. Obviously, getting fuel, oil and diesel to our remote Arctic bases is a major cost. Atomic Energy of Canada Limited did work on the SLOWPOKE reactor, so that's definitely worthy of concern and attention.

I'm going to leave it there just so that I don't use up too much time.

Pat Kelly: You characterized the small modular reactor strategy as “policy by focus group”. I would like you to elaborate on that point if you can.

Dr. Christopher Keefer: Absolutely.

One example I'll give you is in New Brunswick. When the population was surveyed, there were concerns with nuclear waste being produced at Point Lepreau. This is a single nuclear plant producing a tiny volume of very well-managed nuclear waste. The small modular reactor investigation basically argued that we should invest in not one but two technologies—molten salt reactor-based technology and fast reactor technology—to deal with that very small amount of waste. Those technologies have really struggled and have not been commercialized whatsoever, so it was very naive.

Again, this was focus group-based and a nuclear-engineering solution to a public-relations problem. I think we've done the work on the public relations front, and common sense has returned.

Pat Kelly: You also sort of rebutted some of the testimony we heard last week regarding the AP1000. It was put to the committee that this is proven technology that the rest of the world embraces, whereas the rest of the world has rejected it, certainly on a commercial basis without export subsidies or other incentives. Is there room for more than one technology in Canada's nuclear policy? If not, what would you say to critics who say that the AP1000 comes at no cost to the taxpayer whereas the CANDU is a taxpayer-funded strategy?

● (1150)

Dr. Christopher Keefer: It's precisely because the CANDU is a tax-funded reactor—and I'm talking over the last 70 years—that we have all the benefits I discussed in my speech, with IP revenues and a hyperlocalized supply chain that we've seen really thrive with the CANDU refurbishments. I would be incredibly skeptical of a claim that there would not need to be provincial or federal backstopping to de-risk capital going into nuclear projects. We know that there are tail risks. I guarantee you that more than private debt and equity markets will build any reactor.

Pat Kelly: I want to get one question in for the Canadian Union of Skilled Workers on the skills training needed to fill the positions at the CANDU plant. Are those skills transferable to other technologies, or is your membership focused on just the one technology?

Cody Quan (Director of Education and Training, Canadian Union of Skilled Workers): Electricians working in nuclear power plants can transfer the technology across models, and we're prepared to do so.

Pat Kelly: You're agnostic about technology—just get something built.

Cody Quan: No, we're prepared to build, and we're prepared to support workers and the skills to build.

The Chair: Thank you both.

We'll go on to Mr. St-Pierre for five minutes.

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

I want to wish my colleague a happy birthday today, putting him on the spot.

Voices: Hear, hear!

Eric St-Pierre: It's always good to put that on the record.

Mr. Keefer, last year you authored a piece in Maclean's magazine entitled “How Canada Can Become a Nuclear Superpower”. One, I'm wondering if you can provide a copy of this article to the committee. I think it would be useful for us to consider it. Two, can you explain why Canada can become a nuclear superpower?

Dr. Christopher Keefer: I'm encouraged by the ambition to do so by this new government. Of course, we have oil and gas and we have nuclear technology.

We have a proven track record of exports. We have competed in international markets against alternative products from much bigger companies and much larger states than Canada alone. We have exported reactors to Argentina, Romania, Korea and China. They're some of the best-performing reactors around the world. There are unique value propositions to CANDU, such as the fuel security that comes from natural uranium. Every country that has imported fabricates their own fuel.

Medical isotopes are an incredible strength of the CANDU reactor system. We can produce, at volume and at scale, isotopes that I encounter in my everyday work as an emergency physician in the form of sterile equipment, with the safety that brings.

Canada has had that ambition before. I think we're returning to it, but we have to revive it. We have to make investments to come back to the superpower status we had in the 1980s, 1990s and early 2000s.

Eric St-Pierre: Thank you. We look forward to reading the article.

Last week, we heard from Cameco CEO Tim Gitzel, who seemed to be surprised that Canada would offer support for CANDU construction in other countries. You've written about this extensively. For the benefit of this committee, and to get that commentary on the record, do you believe Canada supporting CANDU deployment is at all surprising?

Dr. Christopher Keefer: I don't think it's surprising at all. We own the IP. If you look at all the international negotiations for AP1000 reactors, who's there? It's the U.S. EXIM Bank, the State Department and the U.S. ambassador. We are absent from that because we do not control the technology. Shareholder ownership is not industrial policy based upon IP that we own. We haven't had the experience of being involved in either kind of project yet, but the returns we see in terms of the supply chain and engineering services are huge.

I mentioned the CANDU Owners Group, now rebranded as Conexus. They help manage a global fleet based here in Canada. Everyone is a bit blindsided, I think, by the high construction costs, which are very real, but again, this asset lasts for 80 years. On the work that goes into major component replacement, engineering and strategic decisions, it's a wonderful thing that it's headquartered in Canada. It provides wonderful revenues and fundamentally a tax base upon which things like health care can be funded.

● (1155)

Eric St-Pierre: Both CANDU and Westinghouse are Canadian in their own distinct ways. Given that electricity procurement decisions are under provincial jurisdiction, do you believe Canada's approach should be supporting both reactor designs, and do you believe the government's nuclear energy strategy got that balance right?

Dr. Christopher Keefer: I think the strategy got things broadly right with a focus on CANDU projects and exports. It's not quite as decisive as I might like.

The testimony I gave hopefully created a strong distinction between a private corporation owning a minority stake, as in the case of Cameco, and a majority stake, as in the case of Brookfield, which is a private equity firm with offices in New York. It's a very different concept of ownership, which I think is really key to understand.

It makes sense. You're absolutely right. It's the provinces' jurisdiction to build that technology and choose it, but the federal government is going to play a massive role in providing the financial backstop. If you look at Saskatchewan, I believe annual government revenues are somewhere around $2 billion. A large reactor project is going to be somewhere around $10 billion or $20 billion, so the federal government is going to be involved, and it should, I think, play a strategic role in backing the technology we own.

You can imagine one day exporting an enhanced CANDU 6 overseas and being in competition with Westinghouse trying to deploy an AP1000. We could find ourselves in that situation. If we finance Westinghouse technology, we are disadvantaging our own technology and the greater proportion of benefits it brings back to Canadians.

Eric St-Pierre: That's great—

The Chair: That's pretty much your time. You have about 15 seconds.

Eric St-Pierre: I had more questions, but that's it.

The Chair: Thank you, Mr. St-Pierre.

[*Translation*]

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

Mario Simard: Thank you, Mr. Chair.

Mr. Keefer, I'll let you finish your answer about the contrast you just referred to between AP1000 and CANDU technologies, and what the best strategy for the federal government might be.

Before that, however, I'd just like to add something. I don't know if you saw this in the media a few days ago, but there was talk of Canada's intention to power data centres using gas. Gas is an energy source that competes with nuclear power and may be less expensive. Looking at the overall picture, might people be tempted to turn to less costly technologies, even if they are less environmentally friendly? Isn't that a drawback for nuclear power?

I'll let you finish your answer and perhaps elaborate on that.

[*English*]

Dr. Christopher Keefer: For the sake of the committee's time—I've made those opinions fairly clear and I've distributed our most recent report, where you'll find those arguments—I'll focus on what I understood of your last question, which is that there are potentially cheaper sources of energy to deploy.

Gas is one that can provide reliability. Certainly, it can be complementary. I think one of the reasons Saskatchewan is so interested in nuclear energy, however, is that it doesn't want to put all of its eggs in one basket. It imports most of its gas from Alberta. We're going to be exporting increasing amounts of gas to Asia. The price could change dramatically over time.

That's how you see these technologies being decided on and balanced, to a certain degree. There's no question that we need natural gas, for instance, in Ontario to meet peak demand in summer or winter. We can't have hospitals blacking out or people freezing in their homes, but nuclear plays a significant role in Ontario, in particular, in reducing gas use. That is certainly something I celebrate given the benefits, particularly in air quality, which has downstream effects on my patients.

The Chair: You have 30 seconds.

Is it okay?

[*Translation*]

Mario Simard: That's fine.

[*English*]

The Chair: That's great.

[*Translation*]

Thank you, Mr. Simard.

[*English*]

I have Mr. Bélanger, followed by Mr. Danko, for three minutes each.

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

My question is for Dr. Keefer.

Correct me if I'm wrong, but I think I heard you say Cameco owns 49% of Westinghouse and Brookfield owns the other 51%.

Cameco owns uranium mines in Saskatchewan. How could it not have a penchant for U.S. technology with that scenario and that dynamic?

Dr. Christopher Keefer: They serve a global market in uranium exports. We are seeing what would be simplistically thought of as a global commodity start to shatter, with Russia and China getting their uranium from Kazakhstan and Australia, and the free world essentially getting their uranium almost entirely from Canada, with a bit from Australia.

Cameco fuels a global market. It fuels all of our reactors. It's actually involved in fabricating fuel bundles for CANDU, so it sees a real benefit there. It's absolutely the ownership stake in Westinghouse that has radically changed the direction it's under.

As I noted in my testimony, this is very much an American reactor technology. Nuclear reactors are very distinct from other products, where you could maybe see corporate ownership having a bigger impact on the control over those technologies. There is legislation within the DOE that restricts certain parts of the technology to those owners.

Westinghouse was owned by British Nuclear Fuels, so it was a British reactor then. It was owned by Toshiba in Japan. It was a Japanese reactor then. You didn't see headquarters, engineering or all that high-value-added work that we see in nuclear that these folks work in, and women in nuclear work in, moving to Britain or Japan. It's always been very much understood as an American reactor.

I have huge respect for Cameco and what it's doing by producing fuel and mining uranium responsibly, but I think we have to be careful of claims of equivalency between the AP1000 and CANDU in terms of national industrial policy and benefits to Canadians.

● (1200)

Jim Bélanger: Thank you.

The Chair: Mr. Danko, you have three minutes.

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

I have a few questions for our friends with the Canadian Union of Skilled Workers, Mr. Quan and Mr. Campbell.

You represent construction in the electrical trades, but when we're talking about nuclear, we're talking about a broad suite of skilled trades workers who are needed and about expertise in construction all the way through to the physics of actually running the facilities. You mentioned Canada's nuclear energy strategy and the national energy strategy building certainty for long-term markets in the context of current uncertainty, we'll say. Of course, to complement the billions and billions in federal investment going into energy and nuclear, we have team Canada strong's $8 billion for workforce development.

I'll give you the opportunity to talk about the importance of building up the availability of workers in the skilled trades at the same time that we're creating certainty for workers to go into the jobs in the industry.

Cody Quan: It's not a case of one or the other. It's a case of both needing to happen at the same time.

As we look toward building reactors and building new technology, of course we need to be mindful of how we train individuals. We have a lot of practice in this. The investments the government has been putting into training are welcome, but they need to be tied not just to training people, but to real-world placements at the end of those training efforts. We could train all kinds of people, but if they never enter the industry, it's a fail, to be frank.

We have lots of industries, as we see with tariffs and with oil and gas, where people are transitioning. This is an opportunity for us to take those skills and transfer them into the nuclear sector, but it needs to be done with a coordinated effort and it needs to be done in time, with you preparing to de-risk nuclear investments.

John-Paul Danko: Do you have any specific comments on the team Canada strong approach, with incentives for employers and incentives for workers to go through and complete their apprenticeships as a way to encourage young Canadians to go into the skilled trades?

Cody Quan: I don't have the stats in front of me, but a significant portion of people who enter the skilled trades don't complete them. These funds definitely help to make sure that more people reach the completion of their certificate of qualification and contribute meaningfully to these sectors. Funds like those you've described are absolutely of benefit whenever the means are real-world placements where we're training people and they're getting an opportunity to work in that field. As our friend from WiN mentioned, when you can see a model that you can follow and a pathway, that's exactly what's needed, and the investment helps us.

The Chair: Thank you both.

Thank you, colleagues.

Those were great questions and great responses. There were some very interesting perspectives on different technologies building the workforce for nuclear. Thank you, on behalf of the committee, for appearing before us today.

Colleagues, we're going to take a five-minute break as we set up for the new panel. We'll get Monsieur Simard ready to take the gavel.

We're suspended.

● (1205)

_____(Pause)_____

● (1210)

The Chair: Colleagues, we're back in session.

Let me welcome our witnesses.

From Fusion Fuel Cycles Inc., we have Matt Cloutier, chief operating officer. From General Fusion, we have Matthew Whittington, director of government relations.

Thanks for joining us, gentlemen.

Folks, we had some technology problems with Bruce Power. We will invite them back to another meeting.

We have two witnesses for this second panel. As always, all witnesses have conducted a mandatory witness onboarding test.

Let me make a few comments for the benefit of the new witnesses. Please wait until I recognize you by name before speaking. As a reminder, all comments should be addressed through the chair. As you know, you will each have five minutes for your opening remarks, after which we will open the floor to questions.

We're going to begin with you, Mr. Cloutier, for five minutes.

Matt Cloutier (Chief Operating Officer, Fusion Fuel Cycles Inc.): That's fantastic. Thank you for having me here today, Chair and members of the committee.

My name is Matt Cloutier. I am the chief operating officer of Fusion Fuel Cycles, a joint venture between Canadian Nuclear Laboratories and Japan's Kyoto Fusioneering.

Fusion is the process that powers the sun. Under extreme heat and pressure, light atoms are forced together, fuse and release massive amounts of energy. Companies around the world are working to harness that process to produce electricity.

Most leading fusion designs use a tritium mix as fuel. Tritium is extremely scarce, so a fusion plant must continuously supply, recover and recycle it. This is the fusion fuel cycle, and every fusion plant needs one.

Our message is simple. Canada can be a leader in the global fusion economy because it starts with an advantage no other country has: tritium and the accompanying fusion fuel cycle expertise.

In Chalk River, Ontario, UNITY-2 anchors this advantage. Canada's flagship fuel cycle demonstration project is under construction. Shovels are in the ground and we are building. UNITY-2 is the world's first fusion fuel cycle demonstration facility that provides the solutions that global fusion plants will require. As we advance toward commissioning and testing, our goal is to demonstrate safe, reliable and efficient operations that give the industry the confidence to adopt these made-in-Canada technologies.

We are already exporting expertise, designs, components and systems across four continents, with global commercial demand advancing far faster than we anticipated. This work builds on decades of Canadian tritium expertise developed through the CANDU program, alongside our skilled workforce and established nuclear supply chain.

Canada holds most of the world's civilian tritium, which is a by-product of our CANDU reactors. Our allies already rely on us. OPG supplies tritium to the EU and the United Kingdom, while the U.S. Department of Energy's fusion road map points to UNITY-2 as the sole answer to a global gap.

Canada's nuclear energy strategy recognizes this opportunity. It explicitly names UNITY-2 and commits to anchoring fusion fuel cycle capabilities here and leveraging them internationally. We welcome that direction.

The next step is implementation. Other countries are investing. Private investors have put over $20 billion into fusion, including $6 billion last year alone. The United Kingdom, Germany, China and Japan are committing billions in budgets. Given its starting advantage, Canada can lead with a much lower investment. Decisions being made now will shape global fusion markets and supply chains.

We encourage the committee to include four recommendations in its report.

First, support the development of a Canadian qualification standard for fusion fuel cycle systems, positioning Canada as a trusted place to test and validate these technologies.

Second, establish clear, predictable export control rules and processes for fusion technology, enabling Canadian companies to serve allied markets while maintaining appropriate safeguards.

Third, fund specialized tritium workforce training to develop the people needed for a growing international industry.

Fourth, strengthen fusion partnerships with G7 allies that open their fusion programs to Canadian companies, supporting the Canadian export of fusion fuel cycle technologies and expertise.

Canada has an opportunity to turn its tritium advantage into skilled jobs, made-in-Canada expertise and lasting export opportunities. Seizing that opportunity is one way we can become masters of our own destiny. The world needs the fusion fuel cycle to make fusion a commercial reality. Canada is already building it.

Thank you. I welcome your questions.

● (1215)

The Chair: Thank you, Mr. Cloutier.

Mr. Whittington, you have the floor for five minutes.

Matthew Whittington (Director of Government Relations, General Fusion): Thank you, Mr. Chair and members of the committee.

My name is Matthew Whittington, and I'm the director of government relations at General Fusion. I'm pleased to be here today to discuss the role of fusion in Canada's nuclear future.

As Matt said, fusion, in the most basic terms, is essentially recreating the conditions of the sun and stars inside of a machine. It has the potential to transform how the world produces energy by providing reliable emissions-free baseload power, with low ongoing fuel costs and without high-level radiation risks and the spent fuel associated with traditional conventional nuclear fission.

General Fusion was founded in British Columbia in 2002 with a simple goal: to commercialize fusion energy. We now employ more than 140 people. We've raised over $700 million and have built a strong network of partnerships with leading Canadian and international laboratories, industrial organizations, and government partners. Fusion Fuel Cycles Inc., which Matt works for, is an example of a partnership of ours.

Direct support from the federal government has been critical in helping us advance our homegrown fusion technology, build a globally recognized company and create a domestic fusion supply chain. That support has culminated in what we call LM26, Canada's fusion machine, which we operate at our facility in Richmond, B.C. LM26 is a large-scale fusion demonstration machine; it's quite unique from a global perspective. We operate it, as I said, in Richmond with a milestone-driven program that is designed to prove that we can achieve commercially relevant fusion conditions.

2026 has been a year of very exciting progress for General Fusion. In June, we were named the world's top green-tech company by Time. In July, we became the first publicly listed fusion company in the world, listing on the Nasdaq. In October, we announced a major technical milestone: compressional plasma heating on the LM26 machine to electron temperatures over 12,000,000°C, otherwise known as more than one kilo-electron volt, which is a standard measurement used in the industry. We measured that in collaboration with the UK Atomic Energy Authority. We're now moving into the next phase of our growth, scaling our workforce, upgrading the LM26 machine and working towards the deployment of a first-of-a-kind fusion plant, targeted around 2035.

One other notable milestone from 2026 was the signing of a framework agreement with Renexia, an Italian renewable energy developer, to collaborate on the potential commercial deployment of our technology in Italy. This demonstrates growing international interest in deploying made-in-Canada fusion technology, and that interest reflects the growing enthusiasm about fusion's potential to help solve the world's energy challenges.

Globally, there are about 50 companies working to commercialize fusion, and there is a global race to see which companies and countries are able to do that first. Canada's G7 counterparts are acting assertively within their own domestic fusion ecosystems to accelerate the development of fusion with funding programs and strategies, most notably in the U.S., the U.K., Germany and Japan.

Global regulatory efforts are also rapidly advancing, and regulators have acknowledged the lower risk profile of fusion as compared with conventional nuclear fission. Canada has a strong foundation to build on: decades of nuclear innovation, a highly skilled workforce and a proven record of developing and exporting Canadian nuclear innovations. We welcome the government's early actions to build on these strengths, including the inclusion of fusion in the national nuclear energy strategy and in the regulatory readiness process that is under way at the Canadian Nuclear Safety Commission.

At the same time, as the only G7 nation without a federal fusion strategy, Canada has an opportunity to show more ambition to establish itself as a leading fusion nation. We believe that the country or countries that are the first to win the race to deploy fusion will be the energy superpowers of the future. Winning that race requires a commitment to building and supporting commercial fusion here at home. A harmonized regulatory framework and a coordinated strategy to support deploying a first-of-a-kind fusion plant in Canada would help align the policy, research and investment needed to win that race.

● (1220)

In closing, thank you again for the invitation. I encourage the committee to consider how fusion energy can help support Canada's nuclear future, strengthen its energy security, advance its innovation agenda and grow its advanced manufacturing and export sectors.

Thank you.

The Chair: Thank you, Mr. Whittington.

Thanks to both our witnesses.

Colleagues, we got a bit behind time. With your agreement, we are going to end with Mr. Simard in the second round and have just three speakers in the second round. Mr. Simard is going to be taking the gavel at about 12:35, but we should end on time. I know that some of you have some time pressures.

We are going to start with you, Mr. Kelly, for six minutes. Please proceed.

Pat Kelly: Thank you.

Mr. Whittington, you have a demonstration machine in Richmond. What does it do? Does it generate electricity? If so, how much? What does it produce?

Matthew Whittington: Yes, we have a demonstration machine. We call it the LM26 machine. Really, what the machine is intended to do is demonstrate the science of fusion.

In order to generate electricity from fusion, you need to create the conditions of the sun and the stars. This machine is proving that we can do that. We can take a plasma, which is ionized gas, and compress and heat it to the point that it produces fusion. This demonstration machine is not intended to be connected to the grid and generate electricity. It's designed to prove that we can, in real life, with demonstrated and validated results, create the reaction that would generate electricity.

● (1225)

Pat Kelly: Does the technology exist to convert the reaction you produce into electricity?

Matthew Whittington: That's a great question. One of the advantages to our approach—we're trying to demonstrate the science—is that we have a milestone-based program. I talked about hitting 10,000,000°C, or what we call one keV. The machine has a milestone program that would hit 10 keV and then hit the Lawson criterion.

The Lawson criterion means that you've reached the conditions under which you can extract more energy from the fusion reaction than you put in. Once we demonstrate the science on this demonstration machine.... Most of the other technologies that would be involved in creating power are conventional technologies. You take heat from that fusion reaction and put it into a heat exchanger, and then you can generate steam and run a steam turbine. Those are the conventional balance of plant technologies that are used for all sorts of other types of energy.

Pat Kelly: What's stopping you from immediately doing so?

Matthew Whittington: Well, it's the science, really. Fusion has not been demonstrated anywhere in the world at a commercial level. A small number of other companies have hit the same milestone we've hit of one keV.

Nobody has proven that they can create fusion and contain it in a machine. The science is moving very quickly, but really, that's what's stopping us: demonstrating that we can create the fusion reaction and reach the Lawson criterion—that would prove we have a concept—and then contain it within a machine and prevent the rest of the machine from degradation because of the power of the energy of that reaction.

Pat Kelly: On the inability to create commercial power, “commercial” means cost and cost-efficiency, but you're saying that even if we set aside the commercial criteria, you're not there yet; you don't have the ability. There does not exist the ability to convert at any price with the technology that currently exists. Is that correct?

Matthew Whittington: It's just a question of the stage the technology is at. Along with our company, there are approximately 50 companies in the world all working towards reaching this criterion where you're generating more energy from the reaction than you put in. You can think of it as a technology readiness challenge, but it's one that's going to be solved in a very near-term time span.

Pat Kelly: I feel like we've been just around the corner on this my whole life. What's different now?

Matthew Whittington: You're very right. People have been working on fusion since the 1960s. There is a common joke in the fusion industry: It's always 10 years away and always will be.

That is rapidly changing these days. One example that might prove fusion is getting close to a commercially relevant level is the scale of investment now going into the fusion industry globally. It's hitting record levels every year. I think we saw about $5 billion of investment go into private fusion companies last year. There are now sites being selected and other demonstration programs being advanced. You're seeing hyperscalers and folks building AI data centres, partnering with fusion companies for future needs.

Pat Kelly: I have a minute left.

Mr. Cloutier, you gave some clear recommendations. I'm probably only going to have time to ask you about one of them.

In the first one, you spoke about qualification standards and supporting the establishment of them. What does that mean? What are you looking for? What problem are you trying to solve with that recommendation?

Matt Cloutier: When we're looking at the supply chain of nuclear fusion, as Matt said, it's an emerging industry that's had a massive amount of investment over the last year and over the last number of years. As we look to the supply chain, there are some key codes and standards that need to be built and unified. Whoever unifies those codes and standards and builds their equipment upon them will be the de facto standard globally. Our request is that there be a standard anchored in UNITY-2 for the fuel cycle as we demonstrate the technology for the first time.

● (1230)

The Chair: Thank you both.

Mr. Saini, I wish you happy birthday. As a birthday gift, you have six minutes.

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

Thank you to the witnesses for coming.

This question is for Matt.

Canada has a rare combination: a tritium supply from its CANDU fleet and a decade of tritium-handling expertise at Chalk River. How can Canada use those advantages to attract international development or investment in those?

Matt Cloutier: That's an excellent question.

First and foremost, I wish you happy birthday.

Gurbux Saini: Thank you.

Matt Cloutier: To answer your question, there are a number of ways we can leverage our tritium expertise to enable foreign investment and have the future of fusion anchored in Canada.

One, the global fusion industry needs the tritium fuel produced by CANDU reactors during the start-up of operations. This tritium fuel needs to be sold and exported to different places around the world. I know the U.K. has a signed agreement with Ontario Power Generation. The EU, through ITER, has a signed agreement.

That's a great starting point, but we're just exporting a single resource. What we need to do is build the supporting supply chain around tritium. That's where the fuel cycle comes in. What houses the tritium? What expertise is required in tritium? The fuel cycle is the natural next step to make sure it's a Canadian-made export given in association with the tritium exports.

The other thing is the workforce. There's the International Tritium Academy through Chalk River, which can bring the global workforce to Canada and have it Canadian-trained as we look to operators and commercialization.

Gurbux Saini: I'll go back to Matt.

UNITY-2 was expected to be commissioned in late 2026. Can you update the committee on where the project stands, what it will demonstrate and why an integrated fuel cycle test facility matters for the global fusion industry?

Matt Cloutier: Absolutely.

UNITY-2 is largely on track. We will begin commissioning our key systems at the end of this year. We will start commissioning with the fuel effusion tritium in early 2027. Our plan is to begin commissioning late this year into 2027 and have a fully commissioned system and a fully operating facility at the end of 2027.

The data extracted during the commissioning is as equally important as, if not more important than, the data from the operations. This will be the first time, as you noted, that all the systems will be integrated together with a commercial fuel source.

The idea is that you will gain an advantage on what works. If you think about it, you have all these different pieces of equipment and systems, and as you go downstream, they've never been connected before. Once you get beyond a single test stand of a single operating pump—versus a pump in a house, a car or whatever it may be—you will learn a lot from the downstream and upstream systems. That's what UNITY-2 will do, and it will be the only place in the world where you can do that.

Gurbux Saini: Matthew, General Fusion has reached an important LM26 milestone and recently became the world's first publicly listed fusion company. What are the next technical milestones? What would reaching them mean for Canada's position in the global race to commercialize fusion?

Matthew Whittington: After hitting the milestone that we call one keV, the next milestone is 10 keV. That means 100,000,000°C. These are extremely hot temperatures. If we can prove that we can do that, the next milestone is what we call the Lawson criterion, which means you are generating more energy from the fusion reaction than you are putting into it. Those are our next major technical milestones that we hope to complete by 2028.

In parallel to that, we have a lot of work to do to deploy a demonstration plant at scale, which involves finding a site and achieving the funding and financing conditions necessary. If we were able to do all that, building this kind of plant in Canada would make Canada a real leader in the global fusion race.

● (1235)

Gurbux Saini: Thank you very much.

[*Translation*]

The Vice-Chair (Mario Simard): You have two minutes left, if you wish, Mr. Saini. It's your birthday, so things are good. You have one minute left, sorry.

[*English*]

Gurbux Saini: I'll go back to Matthew, please.

Many of the components of a fusion plant draw on the same skills and suppliers as Canada's CANDU fleet. How can Canadian nuclear suppliers and workers position themselves now for fusion opportunities over the next decade?

Matthew Whittington: That's another really good question.

We invite all of Canada's nuclear supply chain to work with us. We have a number of critical partnerships with the companies you mentioned that are part of the CANDU supply chain. They can help us develop the components necessary for a fusion plant. One of the advantages of our company being located in Canada is that we have an incredible base of industrial knowledge and expertise to draw on.

[*Translation*]

The Vice-Chair (Mario Simard): I would like to thank my committee colleagues for allowing me to ask questions while acting as chair. By way of thanks, I am going to deprive Mr. St-Pierre and Mr. Guay of their speaking time. That will surely please everyone.

I'm only joking, of course.

Mr. Cloutier and Mr. Whittington, as an MP, one must sometimes be humble. I therefore confess that I am somewhat overwhelmed by the technical aspects of your remarks.

I'd like to focus on the concerns that I, for one, have regarding this study. I understand the federal government's strategy of wanting to build new reactors by 2050, and I have the distinct impression that the costs associated with the strategy are disproportionate. I would therefore like to understand, based on your remarks, how the areas you are working on—fusion—can make reactors more efficient and reduce the associated costs of nuclear energy production.

I fully understand the research value of what you are doing and the possibilities it offers. However, as we've been saying, the government hopes to have its strategy in place by 2050, with two reactors operational by 2035 and four by 2040. I don't know how the work you're doing fits into that and might provide an opportunity for the government.

[*English*]

Matt Cloutier: I'm happy to go first.

● (1240)

Matthew Whittington: Sure.

Matthew Cloutier: You would know more about fusion power plant pricing, so I'll leave that to you.

I think I'll start with what FFC is. It's very simple. I work with a number of scientists and very smart people. I myself am an engineer, so they need to explain it very simply to me. We are a supply chain company. We are a specialty engineering supplier, taking existing CANDU technology and some of the smart scientists at CNL and translating that technology into the fusion space.

When we look at what FFC does, we are essentially at the point of the spear of the Canadian supply chain and the existing CANDU supply chain. We want to sell fuel cycle technologies to the fusion industry in Canada and definitely export them abroad. We are already exporting them abroad to four different continents.

When we talk about the price for Canadians, we are building technology that today is building a workforce. We are working with local fabricators, suppliers and specialty equipment manufacturers, all in Canada, and exporting that expertise globally to the fusion industry, which has raised over $20 billion in the public space. Largely, where I see Fusion Fuel Cycles fitting is to be an enabler for the Canadian technology and supply chain.

I'm sure Matt has the specifics on the fusion power plant.

Matthew Whittington: If you want to compare fusion to nuclear energy or other existing energy technologies in terms of where it fits and from a cost basis, it has a couple of advantages over nuclear fission. It benefits from a lower risk profile. You're not using uranium as a fuel, so there's a lower radiological risk. That means, in general, regulators around the world have acknowledged that it will have a lighter regulatory regime. There are some efficiencies and, as you can imagine, some cost implications of that.

As well, there are lower ongoing fuel costs. Because of the fusion fuel cycle that Matt described, which works differently from the fuel for conventional fusion reactors, most types of fusion reactors that are being developed—and ours for sure—have very low ongoing fuel costs. You're essentially breeding your own fuel as the machine operates. We have produced studies that show that our fusion technology would have a very competitive, levelized cost of electricity versus other dominant forms of energy right now.

[*Translation*]

The Vice-Chair (Mario Simard): Yes. Thank you.

Mr. Cloutier spoke about the CANDU reactor, among other things. Would that also apply to the work you're doing, if the government decides to go ahead with AP1000 technology? Would it apply to small modular reactors? Could the work you're doing be put to the same use for both technologies?

[*English*]

Matt Cloutier: That's an excellent question.

I'm not an expert in the SMR space or on the AP1000, so I'm happy to get back to you with comments on the tritium production in those facilities.

I think the biggest thing from fusion fuel cycles is that CANDU production and tritium production are just the start of what Canada can export in fusion. As we look to the next order, there is the existing supply chain and the existing tritium-handling expertise that stay in Canada and can be transitioned into a fusion ecosystem and industry.

[*Translation*]

The Vice-Chair (Mario Simard): Thank you very much. Mr. Patzer, the floor is yours for five minutes.

[*English*]

Jeremy Patzer: Thank you very much, Mr. Chair, and I appreciate you stepping in to fill in.

Mr. Cloutier, I think you were cut off when you were answering one of my colleagues about the Canadian qualifications piece. I'm wondering if you want to finish that thought quickly.

Matt Cloutier: Yes, no problem. Thank you very much for your question and the additional time.

As we look to standards and qualification in an emerging industry, it's important to note that UNITY-2 and the fuel cycle don't have holistic standards that have been set out. When we look to set new standards in an industry, a number of things need to be true, but the biggest ones are the anchoring dataset and the validation of standards. You build the technology for the first time and test it by itself in a lab setting, and then you put it all together and test it in a commercial setting. That's what UNITY-2 is. Then once that technology is validated, it goes into a set of codes and standards, and they're oftentimes picked up around the world as the codes and standards.

As we look to fusion being deployed globally and fuel cycles being required for fusion to be deployed globally, the UNITY-2 standard—the Canadian standard, the made-in-Canada standard—will be the one that is used globally. As we look to other industries, areas and nations that are looking to build fusion, they'll have to build the UNITY-2 product if we focus on codes and standards now. It's a great moat and anchor.

Jeremy Patzer: Right on.

I'll admit that I'm a bit naive when it comes to fusion. What are some of the basic materials? Does Canada own or have all the materials or other resources required to fully develop this? Where are we sitting with this?

Matt Cloutier: I'm happy to go quickly and then have Matt fill in some of the gaps.

From a fuel cycle perspective, the materials are fairly standard. There are some critical minerals, like lithium, that will be heavily leveraged and utilized in the future for fusion power plants.

At FFC, as we look beyond the fuel cycle, looking at natural resources and the advantages that Canada has is the key next step to continuing with our natural advantages. Instead of building up from square one, we start on the third leg of the ladder, and we move up one more.

It's over to you, Matt.

● (1245)

Matthew Whittington: I agree.

Obviously, from a fuel perspective, we have a great stockpile of tritium as a result of CANDU reactor production here. From a raw materials perspective, there are a lot of different approaches to fusion that are taken by different companies around the world. Some of them rely on more specialized materials, like lasers or superconducting magnets.

From General Fusion's perspective, our approach is much more mechanical- and engineering-forward and mostly uses existing materials. If you're thinking of raw materials, they're steel and tungsten. We do use lithium, as Matt said, but it's mostly things that we have in Canada.

Jeremy Patzer: What about containment? Obviously, you're doing superheating and things like that. There's always going to be a bit of risk inherent in that, so what does the containment protocol look like?

Matthew Whittington: We have a CNSC licence to operate our facility in B.C. on our demonstration machine. Our technology uses lithium, as Matt mentioned, as the material that protects the rest of the machine from the energy that's produced during the fusion reaction. What we refer to as our secret sauce is the liquid lithium barrier that keeps the rest of the machine safe.

Jeremy Patzer: You mentioned that there's no national strategy. What would a national strategy look like? Do you have any opinions as to why there currently isn't one? What would you want to see in one if there was one?

Matthew Whittington: In terms of why there isn't one, it's my understanding that NRCan is very aware of the fusion ecospace. They did make some commitments within the nuclear strategy. What I've heard from them is that it maybe wasn't time to pursue a full fusion strategy.

We think it's very important, because we want to have the policy pieces in place to support us and other fusion companies in building a first-of-a-kind demonstration plant that would show that Canada has the technology other countries would want in order to operate fusion. A number of things need to go into such a plant: a regulatory framework to support it, and siting, funding and financing considerations that would need to be considered.

Our objective is to build a first-of-a-kind plant in Canada, and we would like the government to agree that's an important objective. That can then produce important benefits for Canada by showing that we've developed this technology here and deployed it.

Jeremy Patzer: Thank you.

[*Translation*]

The Vice-Chair (Mario Simard): Thank you very much, Mr. Patzer.

Mr. Guay, you have the floor for five minutes.

[*English*]

Claude Guay (LaSalle—Émard—Verdun, Lib.): Thank you, Mr. Chair.

Mr. Cloutier, the first question is for you.

We know that we have a rare combination of tritium supply here because of our CANDU fleets. We also have decades of experience in handling the tritium at Chalk River.

I can confirm something you said. Last year, I was part of a delegation to the U.K. The U.K. wanted to talk to us about nothing but fusion and tritium supply, but I believe this will be just one part of the ecosystem in the future for fusion.

How can we use that advantage to attract more fusion developers and investment here in Canada, just as General Atomics has done, and how can we also focus on the fusion supply chain to build that? First is the overall ecosystem, and then it's the fusion supply chain.

Matt Cloutier: Thank you very much for the question.

In terms of how we look to enable further investment in our existing advantage, I'll start with Fusion Fuel Cycles as the perfect example of that. We are 50% owned by Canadian Nuclear Laboratories. We have Kyoto Fusioneering, which is a foreign Japanese fusion developer that has made a significant investment in enabling Fusion Fuel Cycles and has invested in Canada and supported the technology there.

As we look to our tritium advantage, we need to make sure that we anchor in that advantage. We have, I believe, 70 years of tritium-handling expertise. Nobody else in the world has that. We have the vast majority of civilian tritium. We need to make sure that we handle that value carefully and build on enabling the fuel cycles that go around the tritium we are selling around the world, and we need to make sure that we are building a workforce there and are looking at the second-order effects. If we look at the tritium, we have that advantage. Then we look to essentially owning the fuel cycle globally through a Canadian supply chain and look to what surrounds the fuel cycle and keep on building from our existing advantage there.

From a supply chain perspective and to get fusion developers to focus in Canada, having many of the supply chain advantages and the balance of plant advantages in your home nation, with strong regulatory clarity and certainty, would be a great starting point. You would get the fuel from Canada, you would get the supply chain in Canada and you would get the regulatory certainty in Canada, and then, really, you would become a very powerful ally to the fusion community.

● (1250)

Claude Guay: Thank you very much for that answer.

Mr. Whittington, you can probably expand on that from your point of view. You're probably right that in the nuclear strategy, fusion is part of what I would call the innovation pillar of the government, and maybe in the future we can develop even more.

I'd be interested in your viewpoint as well on the overall ecosystem. Mr. Cloutier talked about the fuel cycle supply chain, the tritium from the CANDU fleet, regulatory expertise and the skilled workforce. What matters most for keeping fusion development and supply chains here in Canada?

Matthew Whittington: I agree with everything Matt said.

I would add, from our perspective, that the ambition to be the first, or to build a first-of-a-kind commercial fusion plant, in Canada would be the piece that would anchor all of those things together. It's perhaps analogous to a sector like critical minerals, for example, where Canada has the raw materials, mines them and does some processing but is often shipping some of those raw materials elsewhere to do the most value-added part of that process to refine those materials.

We don't want to be in a situation where we are experts on the fusion fuel cycle but we're not building the rest of the power plant and we're not keeping the IP of the commercial operation of a power plant in Canada. Having the ambition, the policies and the regulatory framework necessary to bring everything together and build power plants that we could then export to other countries, as we do with CANDU reactors, is the part that we see as missing from the current nuclear strategy.

Claude Guay: On that good note, Mr. Chair, I'm going to pass it back to you.

[*Translation*]

The Vice-Chair (Mario Simard): Thank you very much, Mr. Guay.

Mr. Whittington, in closing, I am curious to hear a little more about the technology you're working on. Can existing reactors be upgraded? Would that be possible?

[*English*]

Matthew Whittington: From a siting perspective, yes, certainly. By making use of those balance of plant facilities and the infrastructure that's there from a transmission and distribution of electricity perspective, there is absolutely the potential for retrofits.

[*Translation*]

The Vice-Chair (Mario Simard): When you talk about regulations, what do you mean more concretely? If you're the fusion specialists, what might the regulations look like?

[*English*]

Matthew Whittington: The CNSC has begun a process that they call “regulatory readiness for fusion”. They are looking at it. They've published a discussion paper that looks at what a regulatory framework for fusion would look like. They are in the process. Before a fusion plant that produces electricity is built in Canada, we will need that process to finish.

From our perspective, it's important to harmonize with the way that global regulations are going on fusion. Both the U.S. and the U.K. have very clearly set up frameworks distinct from those of fission. Recognizing that fusion is lower risk, they have their own regulatory framework. In the U.K., for example, it's similar to the framework for some types of medical procedures, such as cancer treatments with certain types of particle accelerators. It's a much lower level of burden than with fission regulations.

We continue to participate in the CNSC process, and we'd like to make sure that we're harmonizing with our G7 counterparts.

● (1255)

[*Translation*]

The Vice-Chair (Mario Simard): Gentlemen, thank you very much for your testimony. That concludes our meeting for today.

Is it the pleasure of the committee to adjourn this meeting?

Some hon. members: Agreed.

The Vice-Chair (Mario Simard): Go in peace.

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