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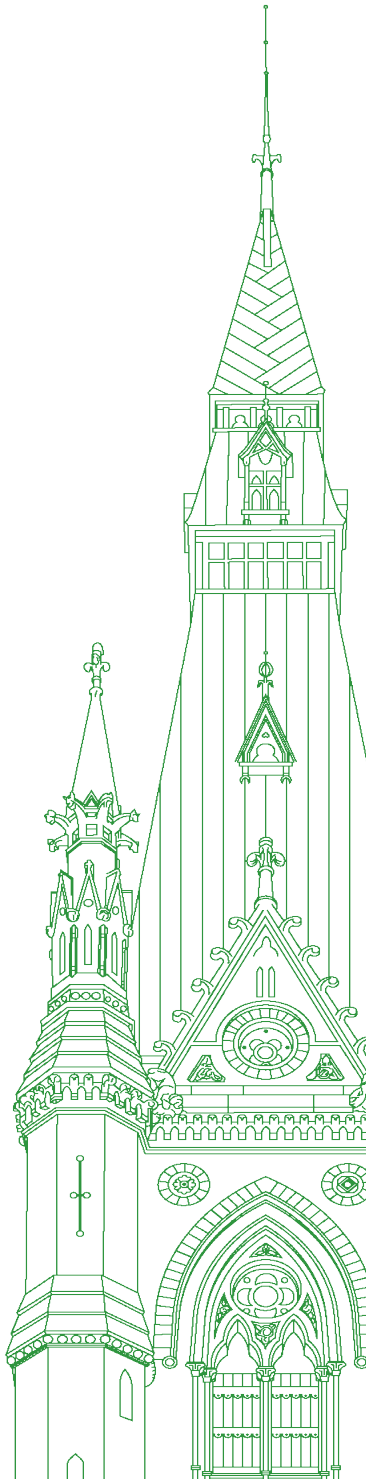

Chair: The Honourable Kirsty Duncan

Standing Committee on Science and Research

Thursday, June 2, 2022

● (1830)

[*English*]

The Chair (Hon. Kirsty Duncan (Etobicoke North, Lib.)): Dear colleagues, I call us to order.

Welcome to our witnesses. We are meeting in a webcast session.

[*Translation*]

Welcome to meeting number 14 of the Standing Committee on Science and Research.

[*English*]

The Board of Internal Economy requires that committees adhere to the following health protocols, which are in effect until June 23, 2022. All individuals wishing to enter the parliamentary precinct must be fully vaccinated against COVID-19. All those attending the meeting in person must wear a mask, except for members who are in their place during proceedings. Please contact the clerk of the committee—and we're delighted to have Cédric tonight—for further information on preventive measures for health and safety.

As the chair, I will enforce these measures, and as always, thank you for your co-operation.

[*Translation*]

Today's meeting is taking place in a hybrid format pursuant to the House order of November 25, 2021.

[*English*]

I'd like to outline a few rules to follow. Interpretation services are available for this meeting. You may speak in the official language of your choice. At the bottom of your screen, you may choose to hear floor audio, English, or French. The “raise hand” feature is on the main toolbar, should you wish to speak.

[*Translation*]

I remind you that all comments should be addressed through the chair.

[*English*]

When you are not speaking, your microphone should be muted. The committee clerk and I will maintain a speaking list for all members.

To our witnesses tonight, welcome. We're delighted to have you. This is a new committee, science and research, and this is our third study on small modular nuclear reactors.

In our first of three panels tonight, we have, in person, John Gorman, president and chief executive officer, from the Canadian Nuclear Association. From Moltex Energy, we have Rory O'Sullivan, chief executive officer for North America; and from Ontario Tech University, we have Kirk Atkinson, associate professor and director, Centre for Small Modular Reactors.

Welcome to all.

Each of you will have five minutes to speak. At the four and a half minute mark, I will hold up a yellow card, and you will have 30 seconds to finish.

We will begin with John Gorman from the Canadian Nuclear Association.

The floor is yours. Welcome.

● (1835)

Mr. John Gorman (President and Chief Executive Officer, Canadian Nuclear Association): Thank you, Madam Chair.

First and foremost, I acknowledge that I'm joining you today from and on the traditional and unceded territory of the Algonquin Anishinabe.

[*Translation*]

I thank the committee for inviting me to appear today on behalf of the Canadian Nuclear Association.

[*English*]

I am the president and CEO of the Canadian Nuclear Association, which is made up of almost 100 companies across the full nuclear energy supply chain in Canada. Our membership is keen to build upon over 60 years of expertise and experience in order to help Canada in meeting its goals for energy security, sustainability and affordability.

These goals have become even more important for Canada and other countries over these past months, following the Russian invasion of Ukraine and the resultant global energy crisis. Canada represents a viable option for strategic low-carbon commodities to fill the gaps and ensure energy security, and nuclear technologies will help deliver on that.

We're encouraged to see this committee's enthusiasm to learn more about small modular reactors—or SMRs for short—given the critical role that we expect this technology will be playing in ensuring national energy security and a net-zero future in Canada and elsewhere.

Canada is emerging as a global leader in the development and deployment of SMR technologies, and we're attracting the interest of key countries around the world. Efforts to promote Canada as the future of SMRs have been coordinated between a set of key utilities. You're going to be hearing from the CEOs later this evening and, of course, they are from Ontario Power Generation, New Brunswick Power, Bruce Power and SaskPower. Together with the CNA, we've created this pan-Canadian SMR initiative.

SMRs are said to be a part of the clean energy efforts by Canadian provinces, including Saskatchewan, Alberta, New Brunswick and Ontario, to meet their climate goals while enabling the reduction of carbon emissions in key sectors such as resource extraction, heavy industry, transportation and buildings. These provinces recently signed an MOU to develop SMR opportunities to meet their respective economic and environmental goals.

SMRs are also a viable option for northern, remote and indigenous communities seeking to replace diesel with a supply of clean and reliable energy.

The past few months have seen significant momentum in the industry to expand this technology. As the committee will learn later this evening with the CEOs of the four utilities, SMRs will be connected to the grid much sooner than many people understand. OPG's Darlington unit will be connected to the grid by 2028. Very small reactors, which are potentially of particular importance to indigenous communities that are considering clean energy options for their economic and social development goals, are anticipated to be online potentially before 2028.

To give a better sense of the technology, SMRs provide stable baseload clean energy that can complement variable renewables like wind and solar. There are three streams of SMRs designed to serve various challenges.

First, SMRs are a source of clean electricity, and that can help to meet the dramatic two to three times electricity generation we're going to require, as has been forecasted to 2050, in our net-zero future.

Second, advanced SMRs offer a combined source of clean electricity and clean, high-temperature heat, which is known as cogeneration. This is important for applications such as resource extraction, for production of clean fuels such as hydrogen and ammonia, for heavy industry in the production of products like steel, cement and aluminum, and for use in mining.

Finally, micro or very small modular reactors can displace diesel generation in remote communities.

To conclude, SMRs will play a critical role in helping Canada and the world meet their unique energy needs.

Now, we have an ask of the federal government, given what we see as a critically important role for SMRs in the future of Canada's energy system. In a nutshell, we are asking for explicit, continued and consistent support of SMRs and nuclear energy in clean energy initiatives and policies—consistent support.

This should include efforts to explicitly champion the technology as a viable solution and to bolster and streamline funding programs to help with SMR demonstration projects; continued collaboration between industry and government; and support for the pan-Canadian SMR development integrated funding ask that we have before the strategic innovation fund.

In closing, I want to thank you again for asking me to speak today and showing your interest in this important topic. We are confident that this next generation of nuclear reactor will not only deliver upon Canada's climate commitments but also position the country as a world leader in this innovative technology.

● (1840)

I look forward to addressing questions, should they come my way.

The Chair: Thank you so much, Mr. Gorman. We appreciate your being here.

Now I'm going to Ontario Tech University and Dr. Atkinson for five minutes, please.

Dr. Kirk Atkinson (Associate Professor and Director, Centre for Small Modular Reactors, Ontario Tech University): Thank you, Madam Chair.

Unhindered by wind speed or cloud cover, nuclear power at all scales is able to meet baseload energy needs 24-7, on 365 days of the year. In Ontario we do this already, with 18 large CANDU reactors generating about 60% of Ontario's electricity with among the lowest CO2 emissions in the world. In a few short years, after more than 50 years of providing low-carbon electricity to Ontario, Pickering Nuclear will be retired, having achieved some of its best-ever performance in the last decade of its life, thanks to continuous innovation in nuclear technologies.

Ontario will need to replace about 15% of its electricity baseload, which is expected to come primarily from natural gas, and it will lose its enviable place in the world as one of the lowest-emitting jurisdictions. This regrettable situation can be alleviated in full or in part by the early 2030s through deployment of small modular reactors, nuclear reactors that generate usable powers of 300 megawatts electrical or less. In fact, Ontario Power Generation is already working towards that, with its first SMR from GE Hitachi expected to come online in 2028. It's a good first step.

SMRs can play a significant role in helping Canada reach net zero if government creates conditions that promote their deployment. SMRs are most often just an evolution of an existing reactor design, even those that involve newer concepts or fuels built on a solid foundation of research and development. For more than 50 years, a small number of nations around the world have been designing, building, operating and decommissioning small reactors within their naval fleets.

Away from prying eyes, several of these reactor types are similar and/or of comparable thermal power to SMR designs in vendor design review with the CNSC. Moreover, in the U.K., Rolls-Royce has been building light water reactors in its factories for decades. It's not magic; Canada can do this too.

As one of very few tier 1 nuclear nations, Canada's extensive nuclear supply chain is eminently capable of building and maintaining SMRs. Should we so desire, wherever you currently see a power station fuelled by coal, oil or natural gas, it is likely that an SMR or series of SMRs could be a clean, slot-in replacement for it. Given that they have been designed with intrinsic safety features that do not require human intervention, SMRs will be even safer to operate than earlier generation power reactors. This fact, together with their individually smaller radiological inventories—the amount of nuclear and radiological material they contain—means that any consequences to the public and the environment are effectively zero, should a highly improbable event happen. This makes the traditional concept of large site boundaries and emergency planning zones a thing of the past.

Despite all the advantages of SMRs, it is important that advocates for them be truthful. SMRs, like all nuclear reactors, will produce a small amount of radioactive waste per energy emitted. For some people, this is a red line, but we must ask ourselves this honestly: What is the bigger risk? Is it better to generate resilient, clean energy where the resultant waste volumes are small and well managed or to make greenhouse gases and accept the devastating consequences of climate change? There is no free lunch.

The consequences of burning coal are well known, and oil and gas, while working to decarbonize through new technologies and methods, have a long road to go and may never be carbon-neutral. Taken over their complete lifetimes, wind turbines, solar panels and batteries all produce waste, and some of them can cause harm. We forget this, as we don't yet require their vendors and operators to manage waste in as costly and robust a manner as the nuclear industry. It is not a level playing field. Fortunately, we have over a century's worth of knowledge in health physics and radiation science and have been applying it to the safe storage of nuclear waste since World War II. Being an early adopter of SMRs, Canada is in an ideal position to become a world leader in developing lucrative new and novel technologies for the management of SMR wastes.

The postpandemic recovery and recent events in Ukraine have demonstrated the fragility in the global energy market. Nations with mal-intent are now able to hold their neighbours hostage through threats of turning off their supply while driving up the price of gas at the pump here in Canada.

SMRs provide energy security while creating highly skilled, high-paying jobs. In Saskatchewan, we are blessed with the abundant uranium reserves needed by SMR vendors across the Western world. In Alberta, oil and gas workers can be assured of long-term job security by re-skilling for the SMR-generated process heat economy in hydrogen and alternative fuels. Our coastal provinces could become pioneers in desalination technologies that may be exported to water-scarce countries, and—particularly close to my heart, given shipping is essential to global trade and also a major emitter of greenhouse gases—shipbuilding provinces like Quebec could become powerhouses in nuclear propulsion by tooling up shipyards to install SMRs in ships that other nations recognize could propel a green revolution in shipping.

Clearly, to embrace this once in a half-century opportunity requires a much larger workforce than exists now, along with new skills and knowledge.

● (1845)

Ontario Tech University, home to Canada's only undergraduate program in nuclear engineering, stands ready with colleagues at universities and colleges across the land to deliver this education and training.

In tandem with this, demonstrated commitment to new nuclear from government in the long term will give confidence to our young people when making career choices. To date, the government has been very proactive in empowering NRCan to develop road maps and plans, and in providing innovation funding to vendors for their design work.

However, leadership needs more. It's not a question of if Canada should—

The Chair: Dr. Atkinson, I'm sorry to interrupt. The worst part of this is having to interrupt when you're giving your testimony. I know our members will follow up with questions.

Thank you.

We are now going to go to Mr. O'Sullivan. I have to say that we're having technical difficulties. It's not possible to use the headset provided, so we will try, but this committee has to have both official languages, so if we can't hear him, unfortunately, we won't be able to continue with the testimony.

Mr. O'Sullivan, let's give it a try. The floor is yours.

Mr. Rory O'Sullivan (Chief Executive Officer, North America, Moltex Energy): Thank you, Madam Chair and members of the committee, for the opportunity to appear—

The Chair: Mr. O'Sullivan, I'm really sorry, but the interpreters cannot hear you at all. That's why we have to use the headset provided.

Are you going to try it one more time?

Mr. Rory O'Sullivan: I'll try the headset and do a final test.

Is this okay?

The Chair: We're good to go. That's terrific.

Mr. O'Sullivan, welcome, the floor is yours.

Mr. Rory O'Sullivan: Thank you for the opportunity to appear today. I'm coming to you from Saint John, New Brunswick, which is the traditional, unceded territory of the Wolastoqiyik, Mi'kmaq and Peskotomuhkati peoples.

I'm Rory O'Sullivan, CEO for North America at Moltex Energy. Moltex is developing a suite of reactor technologies, including a stable salt reactor-wasteburner, or SSR-W, which uses recycled nuclear waste as its fuel source; a waste to stable salt, or WATSS, facility for recycling nuclear waste; and GridReserve thermal energy storage tanks, so our reactor can act as a peaking plant to complement intermittent renewables.

Moltex was founded in the U.K. in 2014. In 2016, we analyzed all of the places we could deploy our reactor technology and decided that Canada was the best option.

In 2018, we were selected by NB Power from among nearly 100 applicants to deploy our technology in New Brunswick, with the goal of demonstrating first-of-a-kind units next to the Point Lepreau nuclear generating station. That year, we moved our head office to New Brunswick, where we've been focused on design and R and D. We've developed meaningful partnerships with first nations groups and built a great team, whom we're very proud of.

In February of last year, Moltex was the very grateful recipient of $50 million in federal funding to continue developing our technology. As part of the terms, we moved all of our IP to Canada. We have also been fortunate to receive funding from the Province of New Brunswick, Ontario Power Generation and many different private investors.

Unlike other nuclear reactors, which use uranium as fuel, our reactor is specifically designed to consume the recycled spent fuel from other reactors. In doing so, we can reduce the volume of long-lived, high-level waste by over 95%. We have the only SMR technology that does not require imported fuel, as it can be fuelled solely by nuclear waste that is already in the country. In Canada, by the time the CANDU fleet reaches end of life, there will be enough spent fuel to power 6,000 megawatts of our reactors. That's enough to power five million homes.

Globally, the market is about 20 times larger than Canada, and we're the only vendor targeting this market. There are several customers in the U.S. and Europe who have expressed interest in second-of-a-kind units since the first one has been demonstrated in New Brunswick.

This is a huge opportunity. A recent study showed that between 2030 and 2060, a global rollout of the two new reactors in New Brunswick—ours and the one that ARC Canada is developing—will create approximately 500,000 work-year jobs, $60 billion in GDP and $5 billion in government revenue.

At this time, we are conducting critical research and development activities to validate our technology. This work is being carried out at Canadian Nuclear Laboratories, the University of New Brunswick, various U.S. labs—cofunded by the U.S.—and at our own laboratory.

We have completed phase one of the CNSC's vendor design review and are preparing for phase two. We have recently partnered with SNC-Lavalin, an international leader in the field and the only company in Canada to have its design licensed through the CNSC. This additional expertise will help ensure that we are successful.

In summary, we are committed to Canada and pleased with the progress here. However, we would like to see more consistent support for nuclear, given its essential role in meeting the country's net-zero goals. Environmental regulatory changes implemented since we picked Canada have extended our deployment time here by about three years. Meanwhile, political commitment to nuclear in the U.K. and the U.S. have shortened deployment times there.

For Canada to maintain its leadership in this sector, we would encourage the federal government to take a stronger leadership role to ensure we meet our climate targets and stay competitive.

● (1850)

The Chair: Thank you very much, Mr. O'Sullivan.

We're glad that we were able to get this sorted so you could present to us. We have a tremendous committee that is really interested in hearing from you.

We are now going to go to our round of questioning, beginning with a six-minute round.

Mr. Tochor, the floor is yours.

Mr. Corey Tochor (Saskatoon—University, CPC): Thank you, Madam Chair, and thank you to the witnesses for being here tonight.

I would like to start off in Ontario, with Mr. Gorman.

With regard to the phase-out of coal on the Ontario grid, could you unpack the net results, in terms of smog days being reduced, and how Ontario was able to accomplish that?

Mr. John Gorman: This is a good-news story that Ontarians and Canadians don't speak about loudly enough at home or on the international stage. Phasing out coal-fired electricity generation in Ontario is the single largest carbon-reduction initiative that has been achieved in North America, if not the world, and it was done on the backs of incremental nuclear. Ninety per cent of the coal-fired electricity generation was replaced by our CANDU generating stations here in Ontario. When we look at the pure amount of clean electricity that is produced 24-7 as baseload power as a viable replacement for coal-fired electricity, nuclear can't be beat.

If I may give you just one additional bit of information, in the United States and increasingly here in Canada, there's a very important initiative under way, called Powering Past Coal. That is looking at the ability to take both conventional reactors and the developing small modular reactors and actually place them on sites where the coal-fired generating stations used to be, to enable the same sorts of economic job profiles and benefits but using clean power instead of coal. It's a very exciting trend that we're seeing worldwide.

● (1855)

Mr. Corey Tochor: Absolutely. They are concrete steps if we want to actually reduce emissions. We have lots of virtue signalling from some people about what it'll take to actually reduce emissions, and nuclear has proven that in Ontario for everyone to see.

I still run into environmentalists—not the normal environmentalists who are concerned about climate change and who want to reduce it, but the extreme ones—who are not excited about nuclear. What would you say to these extreme environmentalists in that regard?

Mr. John Gorman: I've been with the nuclear industry now for three and a half years, but my history of over two decades in electricity has been in the renewables space, specifically as a developer of solar projects, sitting on boards with utilities, helping to guide renewables, as Canada's representative to the International Energy Agency for solar, and as the head of the Solar Industries Association for seven and a half years, where I worked with my colleagues to merge the wind and solar associations. I'm a big proponent of intermittent renewables, wind and solar.

I have to say that when I started in solar over 20 years ago, we were at 36% non-emitting electricity on the world's grids. Despite the billions of dollars of investment in wind and solar, despite the enormous rollout and the cost declines in wind and solar, we're still at 36% non-emitting on the world's electricity grids. Now, wind and solar have helped to keep us on a level playing field despite population growth around the world, but what's clear is that nuclear needs a clean partner that can produce that 24-7 baseload power. If our choices are coal-fired electricity and gas-fired electricity, and if that's the reason we're not making progress on reducing the amount of fossil fuels on the world's grids, it's because we need to bring in more nuclear to act as that partner for renewables. I can tell you that the small modular reactors are very responsive, very flexible and able to help support wind and solar. The deployment of more nuclear across Canada could help expand wind and solar.

Mr. Corey Tochor: Mr. Gorman, could you unpack this a little? I've heard other people state that we are not going to reach our 2050 goals without nuclear. Are you in the camp that believes nuclear has to be part of that mix?

Mr. John Gorman: Without a doubt, nuclear—both conventional and small modular reactors—will necessarily have to be a very important part of the global energy mix as we go forward.

Electricity generation, as you know, Mr. Tochor, is exceedingly important to decarbonization. We're going to have to double or triple the amount of electricity generation we have in this world. This is a math problem. It's not a theology problem. We have to get away from picking a favourite technology and realize that we need everything at our disposal in order to meet this challenge.

Mr. Corey Tochor: Every energy source has negatives. The one perception that may not be reality is at the waste end of things. In the last 10 years, have there been any recorded deaths related to nuclear waste in Canada?

Mr. John Gorman: Canada has an exceptional track record that is respected internationally for the way it manages the entire cycle of every bit of waste it produces. I'm not aware of any fatality from handling the waste here in Canada or, indeed, around the world.

There's a reason for that, Mr. Tochor. It's because managing spent fuel is straightforward, and the nuclear industry takes it very seriously. We produce very little waste, we can account for it all, and we prepay for its safe storage and management.

Mr. Corey Tochor: What percentage of that waste is actually used? The energy we remove from that nuclear material—

The Chair: I'm sorry, Mr. Tochor. Would you like to ask for a written response?

Mr. Corey Tochor: I would ask for a written response on what percentage of the energy is left in the waste afterwards.

The Chair: Thank you, Mr. Tochor.

We'll now go to Mr. Collins for six minutes.

Mr. Chad Collins (Hamilton East—Stoney Creek, Lib.): Thanks, Madam Chair, and thanks to the witnesses for appearing this evening. I'm going to start with Mr. Gorman.

A couple of weeks ago, Mr. Gorman, I listened to you on a podcast on my five-and-a-half-hour drive home to Hamilton. You were talking about the benefits of SMRs. There were some counterpoints given to you. I want to dig a bit deeper into some of the discussion you had on that episode.

As a long-time municipal councillor, I know there's always an element of push-back from neighbours, the community and stakeholders when we deal with applications, whether it's for waste, companies coming to town with a new technology, electricity, or energy from waste facilities, which is the common one I've had to deal with over the years. Oftentimes, people can be quite critical of things that are new. For me, the question is, with this technology.... Again, we're hearing dates of 2028, 2030 and even beyond, in some cases. I think the counterpoint to you, that day I listened to the podcast, was that SMRs are an expensive science experiment. I think the lady who was on with you referred to them in that way. Some in the community might go down that path, at some point in time.

My question to you is, what role does government play from an education standpoint? At some point in time, you'll be dealing with stakeholders. These facilities and SMRs will be a part of our life, from an energy perspective, with the benefits you just talked about. You and others will be making these presentations in front of very large crowds and communities with environmental stakeholders, who will put up their hands and provide some push-back. I guess the question I have is, what role does the government play in terms of assisting with education efforts and dispelling some of the myths that have come about over the last number of years as SMRs are talked about, either in mainstream media or small communities in different parts of Canada?

● (1900)

Mr. John Gorman: The short answer I'll give off the bat is this: The most important thing government can do, when it comes to new technologies we're using to confront the climate crisis and lower GHGs, is to be consistent. Be consistent in talking about the tools we are going to use to tackle this crisis. While the federal government—your government—has made significant progress, especially over the last short number of years, in identifying nuclear and small modular reactors as essential parts of a net-zero future, we see how that language is not being used consistently by all policymakers. It is not being applied consistently with various financial and tax incentives we see coming out of this government, including the most recent green bond framework, tax incentives and rapid amortization measures that have been extended to other clean technologies.

If we want investors, industry, academia and the whole nuclear ecosystem to be able to deliver on its full potential, we're going to need a strong, consistent signal from all levels of government that nuclear is needed for a clean, net-zero future.

When I started in solar just over 20 years ago, that is exactly what they called solar: an “expensive science experiment”. I find it ironic that some of the people who are the biggest proponents of solar are now looking at small modular reactors and calling them an “expensive science experiment”. We are a handful of years away from deploying various technologies that will demonstrate that if we can put them out and they can deliver on the promise of mass production, which small modular reactors are promising to do from a price standpoint, we're going to see, the same way we saw with wind turbines and solar panels, that the cost is going to come down very dramatically, and it will be a very important tool.

Mr. Chad Collins: Thanks, John.

Through you, Madam Chair, my next question is related to what John just talked about in terms of policies and financing.

You spoke to those two issues in your opening, but you really didn't get into detail in terms of what you were looking for with continued support, I think was the phrase that you used. You just reiterated it there. In detail, can you provide the committee some ideas in terms of recommendations relating to policy and financial support?

Mr. John Gorman: We have seen some support for specific technologies come from the federal government through the strategic innovation fund, and that has been helpful. However, Canada's advantage at this time in the world, with the development and deployment of small modular reactors, has everything to do with the extreme level of coordination and co-operation we've seen between, in particular, four provinces and four utilities that have put together an integrated plan for the development and deployment of small modular reactors.

We have an integrated ask in front of the government that goes beyond specific technologies and looks at how it is that this integrated ask before the SIF can actually encourage the entire ecosystem to develop in a pan-Canadian way that is not only going to result in the deployment of needed technologies in various areas that help reduce emissions, but also create incredible economic advantage and supply chains throughout the country.

● (1905)

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

[*Translation*]

It is now Mr. Blanchette-Joncas' turn.

You have six minutes, Mr. Blanchette-Joncas.

Mr. Maxime Blanchette-Joncas (Rimouski-Neigette—Témiscouata—Les Basques, BQ): Thank you very much, Madam Chair.

My question is for Mr. Gorman.

Thank you for joining us this evening. Canada has a plan to achieve net-zero emissions by 2050. A number of proponents, including those of small modular reactors, argue that this technology will help reduce greenhouse gas emissions to zero. However, it seems that the technology related to small modular reactors will take several years to commercialize. The very first small modular reactors are expected in Canada toward the end of this decade. So the industry is still far from being able to provide the Canadian network with a substantial amount of energy.

Could you tell us about the technology involved in small modular reactors and whether it will become mature enough to have a meaningful place in the energy transition in Canada?

Mr. John Gorman: Through you, Madam Chair, I thank Mr. Blanchette-Joncas for his question.

[*English*]

I think that's a very fair comment.

Small modular reactors, the first of their kind, are being deployed only now, and the first ones, as you rightly point out, are not going to be connected to the grid or used for other off-grid applications until later this decade.

That being said, Canada is a remarkable place that requires small modular reactors for various needs. It's not only the jurisdictions across this country, like Alberta, Saskatchewan and some of our eastern provinces, that need to shift away from fossil fuels to cleaner electricity. We're going to have to double or triple the amount of electricity that we currently generate, and it all has to be clean. It's a huge challenge.

Because of that, some of the first planned SMRs, the ones you referred to that Ontario Power Generation chose, General Electric Hitachi, will be connected to the grid by 2028, but in fact they have a licence to do at least four of those units at the Darlington site.

In addition, Saskatchewan, which also has a challenge in phasing its electricity grid off of fossil fuels, is aiming to—and has stated this publicly—construct four or five units of the same size, perhaps with the same technology. In other places across Canada, we envision that there are jurisdictions that are going to use these bite-sized small modular reactors to meet their electricity needs.

I think an important point here is, just in Canada, on the electricity side, we need multiple units, which is going to mean multiple units being deployed after 2030.

On the heavy industry side—steel, cement, mining, the high-temperature heat that's going to be needed to decrease GHG emissions—that's where you're going to see that some of these other technologies, some of which will be available even before 2028, are going to be deployed in multiples again.

We have a challenge leading into 2030, and that's why we need more wind, more solar and more storage, and we need to deploy it as quickly as possible. However, we also need to be looking beyond 2030 into the massive challenge of doubling or tripling the amount of electricity we have. We need to be able to look at reducing GHGs and heavy industry, cement, steel, oil and gas, etc., and that's a challenge that's going to last beyond 2030 into 2050, so, yes, everything that's on table, everything that's coming—

[*Translation*]

Mr. Maxime Blanchette-Joncas: Mr. Gorman, I will interrupt you because time is running out. Thank you for giving us that information.

I want to put in perspective this whole technology, which is not well developed, it is not mature.

We want to achieve net-zero emissions by 2050 and invest in this technology, which is still not developed and is not marketable. According to some arguments in favour of this technology, it could help us reach our net-zero objective by 2050.

I am trying to understand the benefits of developing this technology, which is not mature and is still not operational, as opposed to renewable energies that are already mature and can be used.

● (1910)

[*English*]

Mr. John Gorman: Through you, Madam Chair, I think the short answer is that we need absolutely every clean energy technology that is on the table now—so conventional, nuclear, water, solar, wind and short-term battery storage—and that is available now. We have to deploy, deploy, deploy, but we also have to recognize that there are technologies that are going to be available later this decade and then scaling up through 2030 to 2050, which are going to help us out of necessity and be needed to meet those net-zero goals. That includes adding small modular reactors. It includes bringing on hydrogen. It hopefully includes bringing on board long-term storage.

The short answer, again, is that this is about math, not theology. We have such a massive challenge in front of us in terms of the amount of clean electricity generation we have to produce that we have to deploy all of these technologies, develop them and then scale them up.

The last thing I would say to you is this: If 20 years ago we had said that solar and wind were under development and not ready for prime time, and we hadn't invested in that worldwide and here in Canada to scale it up, we would not have the solar and wind available to us at an accessible price point now.

[*Translation*]

Mr. Maxime Blanchette-Joncas: I want to go back to your opening remarks.

Of course, I heard the positive words describing that technology—sustainability and reliability. The only word I did not hear you say is “safe”.

Can you tell us more about the potential source of plutonium and enriched uranium in small modular reactors? We know that the concentration will be proportionally higher than in traditional reactors. What can you tell us about that situation?

The Chair: Mr. Blanchette-Joncas, I am sorry, but your time is up.

[*English*]

Perhaps you would like to ask for a written response.

[*Translation*]

Thank you, Mr. Blanchette-Joncas.

[*English*]

We'll now go to Mr. Cannings for six minutes, please.

Mr. Richard Cannings (South Okanagan—West Kootenay, NDP): Thank you, and thank you to the witnesses for being here. I must say, it's nice to have witnesses here in person. It's a very welcome change.

I'm going to start with Mr. Gorman.

With this narrative, SMRs will be key or at least useful in getting remote communities, especially indigenous communities, off diesel. However, when I speak to indigenous leaders and people who work with indigenous communities on energy issues, they have been unanimous in rejecting this narrative.

On top of that, we've had the Anishinabek chiefs in assembly, the Chiefs of Ontario and other groups who have come out and said they don't want nuclear technology to replace diesel. They want energy systems that they can implement themselves, that they can understand themselves, that they can employ their people to run. They want systems that have proven technologies that are cheap and available now. They want to get off diesel now, not in 2035.

I'm just wondering how you answer those concerns, because it seems to be radically opposed to this narrative I hear again and again that this will get all of these communities off diesel.

Mr. John Gorman: I would like to start by saying that the nuclear industry writ large, not just our utilities here in Ontario, New Brunswick and across the country but other parts of the industry, such as Cameco, are some of the most active partners with the indigenous people. The nuclear industry takes indigenous relations and partnerships very, very seriously. A tremendous amount of effort is being based on delivering trusted relationships and partnerships.

I would say also that the industry recognizes that small modular reactors are a new concept to northern indigenous communities and that there is going to be a very long and engaged cycle of consultation and learning and listening by both sides as they consider the possibility of using small modular reactor technologies in their communities. Certainly there is no way forward, as Canadians realize now, for deploying anything, let alone a small modular reactor, in a community that does not want it. May I just say, however, that we're at the beginning of those conversations and the learning cycle around small modular reactors. They're new. Some of those conversations are going very positively. We have champion communities that are engaging with us, champion economic development bodies and indigenous development bodies. We have major initiatives under way to consult with indigenous peoples to see how that fits.

The very last thing I'll say, Mr. Cannings, is that wind and solar and available storage technologies are not meeting the needs of indigenous people to get them off diesel. We have to look at other solutions as well.

● (1915)

Mr. Richard Cannings: Thanks.

I'd like to quickly move on to our energy needs for the future. In Canada, the group that puts out those projections or scenarios, if you will, is the Canada Energy Regulator. Its report last year on Canada's energy future had a timeline of the various energy sources that would be powering Canada in terms of electricity generation.

For nuclear, it shows, in 2019, 95,000 gigawatt hours—I'm not sure if that's per year—and then by 2050 that will go up to 96,000. That's a gain of 1000 gigawatt hours, which to me doesn't sound like a huge increase compared to their projections for wind, which goes from 32,000 to 188,000. It would be twice as big as nuclear by 2050. Solar would be going from 2,000—and you know solar far better than anyone else in this country, probably—to 62,000 by 2050.

Here are the experts projecting ahead for nuclear, showing, basically, a stagnation, and yet these other energy sources are showing dramatic increases. Could you quickly comment on that?

Mr. John Gorman: I would start by saying that the speed at which we're seeing all clean-energy technologies evolve in the face of this climate crisis is enormous. The cycles for development are urgent right now. That's why you're seeing such fast development.

The CER, until this very first year, had never tried to do a future forecast based on anything except existing policies and planned projects. It's new to the game. When it did that study, Ontario Power Generation hadn't announced its technology selection. Westinghouse hadn't announced its technology selection or its projects for deployment.

The Chair: Thank you, Mr. Gorman.

Mr. John Gorman: Things have just changed very dramatically. We can expect future change that's hard to forecast and predict.

The Chair: Thank you, Mr. Gorman, and thank you very much, Mr. Cannings.

You have a very interested committee. We have three witnesses who have given us their time, so we want to make sure we're getting all these questions in.

Ms. Gladu, the floor is yours. This is a five-minute round, please.

Ms. Marilyn Gladu (Sarnia—Lambton, CPC): Thank you, Chair, and thank you to the witnesses.

I want to start with Mr. O'Sullivan.

You spoke on the topic of the extension of deployment by three years. The former finance minister has mentioned that Canada needs to become more competitive, and that some of the regulatory burden that's in place is hampering that.

Could you detail some of the regulatory things that are causing this delay in your deployment?

Mr. Rory O'Sullivan: Certainly. First of all, the Canadian Nuclear Safety Commission is probably one of the highest-regarded regulators in the world. It's their regulatory regime, which is robust and open to innovation, that is appealing to innovative, new and safer technologies.

The one I am referring to is the environmental Impact Assessment Act change, which has increased the timelines for large infrastructure projects.

● (1920)

Ms. Marilyn Gladu: Is that Bill C-69?

Mr. Rory O'Sullivan: Yes. Some of the smaller SMR projects are exempt under that licence. We have two megaprojects—the waste recycling facility and the reactor—so we're firmly in that and it is a challenge. It seems to be a very long process. The steps in it make sense and are required, but it's a long time.

Ms. Marilyn Gladu: Thank you.

I have a question for Mr. Gorman.

Ontario is anticipating having brown-outs because the nuclear upgrades and expansion at the nuclear plants here haven't gone according to schedule. They're predicting brown-outs as early as 2024.

Will there be any concrete, commercialized SMR technology that we can put in place to address that?

Mr. John Gorman: You're right. The Pickering nuclear plants are scheduled for retirement mid-decade. Given the amount of electricity they produce, it's going to be a tough gap to fill. Small modular reactors, even these first ones that Ontario Power Generation is bringing to Ontario to connect to the grid, will not be available until after that point, which is later this decade.

We are facing a demand for electricity that is coinciding with the Pickering plants coming off. That demand for electricity is growing, so it is a real issue. Of course, you'll have the CEO of Ontario Power Generation here to talk about a strategy for bridging that.

As a little side note here, I'll say that when we talk about doubling or tripling the amount of electricity generation that we have in this country to be able to fuel-switch and electrify things like transportation, electric vehicles, etc., people have a hard time getting their heads around how much electricity that's going to take.

I'll give you an example.

I was speaking to the CEO of one of the steel companies in Ontario, which is going to install an electric arc furnace to power its furnaces. That one company alone is going to require more than a gigawatt of additional electricity just to power its own operations.

This future in Canada in terms of not only creating enough electricity to replace fossil fuels, but also being able to switch these industry players away from fossil fuels for high-temperature heat and electricity is going to be just enormous. We have to start deploying quickly.

Ms. Marilyn Gladu: I have a question for Mr. Atkinson.

What can a federal government do to accelerate the commercialization and actual production of SMR units?

Dr. Kirk Atkinson: To accelerate these technologies requires not just a commitment, but some significant investment to allow the capabilities to be put into place. One capability often overlooked is actually the workforce that can do the work to make these things happen. We are probably quite behind on that right now, especially when we look further to the west of the country, where we know that in Alberta and Saskatchewan the expertise in nuclear does not yet exist. It resides pretty much in Ontario and New Brunswick, with a little bit of legacy knowledge in Quebec.

Unless we address that aspect, nothing else is going to come through quickly enough, or we're going to rely on other nations to provide to it to us.

The Chair: Thank you so much, Dr. Atkinson, and thank you, Ms. Gladu.

We will now go to Monsieur Lauzon.

The floor is yours for five minutes, please.

Mr. Stéphane Lauzon (Argenteuil—La Petite-Nation, Lib.): Thanks, Madame Chair.

[*Translation*]

Mr. Gorman, Mr. Atkinson and Mr. O'Sullivan, thank you for joining us today. It is a pleasure to see witnesses in person.

Mr. O'Sullivan, you piqued my interest in nuclear waste and using that waste as a raw material. Is that technology mature now? What are the residues of the technology? Can you tell us more about it?

● (1925)

Mr. Rory O'Sullivan: Yes, of course. Thank you for your question.

[*English*]

It is a technology that we are developing. It is new. It is innovation that we're developing here in Canada. A lot of the work we're doing to validate it is going on, as I said, in the Canadian Nuclear Laboratories, to verify the science and ensure it can happen safely.

The main product left behind, the biggest volume.... Instead of a CANDU bundle about this size, which is currently high-level waste, the main residual waste is the uranium, and it's no longer high-level waste.

In the CANDU bundle this size, there's a very small amount of high-level waste inside of it, which makes the whole thing radioactive for a long time. We can take out that small bit of long-lived waste and use it as fuel, and the 99% that's left is essentially almost natural uranium, which can be disposed of much more safely and easily. We'll still need the deep geological repository that Canada is looking at building at the moment, but hopefully we can make the job easier by making it smaller and simpler.

Lastly, as we develop the process, we're working with the Canadian nuclear regulator to make sure that this is all done to the highest standards. There's also an international regulator, the International Atomic Energy Agency, which we're working with and which monitors the safety of this process.

Mr. Stéphane Lauzon: All right. Thanks.

Can you give me a short answer for the next question, please? That was great, but I have a couple more questions.

[*Translation*]

How could science and research help you find a short-term solution for disposing of that waste?

[*English*]

Mr. Rory O'Sullivan: The fundamental science was based on experiments done across the U.S. laboratories over the last 20 to 30 years. We have taken that existing knowledge, amended it specifically for CANDU spent fuel, and made our own changes. We have our own patents filed to improve the process.

[*Translation*]

Mr. Stéphane Lauzon: Mr. Atkinson, you talked about the old generation of technologies. I am familiar with cogeneration. You talked about research and waste reduction. You talked about the decision to be made between nuclear waste and climate change. Of course, we want the better of the two options.

Do you have a plan in your research over the short and medium terms to achieve net-zero emissions, so that we don't have to decide between nuclear waste and climate change?

[*English*]

Dr. Kirk Atkinson: If you're talking about a comparison of energy sources and nuclear, we know that in the long term, to dispose of nuclear fuel, unless we use a technology such as Moltex, we will need a repository to store this. We can't get around that part.

Right now, we obviously use storage, surface side, in casks that are very robust and very safe, and that will last for a very long time.

My point about waste more generally was that when we consider other forms of energy, we're not considering the risks of what large-scale solar and the production of minerals for a lot of the other different technologies are doing to the world. We worry so much about the radiation side that we forget about the toxicity.

Mr. Stéphane Lauzon: I have a question for Mr. Gorman.

[*Translation*]

You have an opportunity to do business with all the nuclear companies across the country, so I think you are in the best position to answer my question.

What is the relationship—

● (1930)

The Chair: I'm sorry, Mr. Lauzon, but your time is up.

[*English*]

Mr. Stéphane Lauzon: Is that it?

I'll ask my question and he can send me the answer.

[*Translation*]

What is the relationship between the nuclear industry and this country's hydroelectric companies? What about science-based relationships? What is those companies' response to the nuclear sector and the possibility of purchasing that energy to transmit it into the networks?

[*English*]

The Chair: Thank you, Mr. Lauzon. We have come to the end.

I'd like to thank all three of our witnesses. Thank you for your time and expertise. We appreciate your coming to this inaugural committee. We're most grateful, and we hope you've had a good experience. We look forward to another conversation.

I see Mr. Cannings and Monsieur Blanchette-Joncas have questions.

Mr. Richard Cannings: Yes. I had an important question for Mr. O'Sullivan. I'm wondering if I could submit it, so that he could answer by—

The Chair: Yes. That would be fine, but we really have to get to our second panel.

Could you make it short, Mr. Cannings?

Mr. Richard Cannings: I want a response to the letter by 10 or so of the top American scientists and nuclear experts, who wrote to the Prime Minister and asked for a high-level study on Moltex's process, because they were extremely concerned about the proliferation of plutonium and the environmental indications.

These are not the extreme environmentalists we heard about—

The Chair: Okay. Thank you.

Mr. Richard Cannings: These are top American diplomats and—

The Chair: Thank you, Mr. Cannings. I think the question has been understood.

With that, I'm going to briefly suspend. We have a second panel.

I'm sorry. Go ahead, Mr. Blanchette-Joncas.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Madam Chair, I lost a bit of time earlier because Mr. O'Sullivan's headset had to be adjusted. Would it be possible to make up for the lost time?

[*English*]

The Chair: Mr. Blanchette-Joncas, as you know, I do my utmost to be fair, and I think you all know I am fair. I can't help that there were technical difficulties.

I'm sorry. We really have to go on to the second panel. I hope that you will respect why.

Thank you.

We will briefly suspend.

● (1930)

_____(Pause)_____

● (1935)

The Chair: Dear colleagues, I'm going to call us back to order. We have two more panels to get through.

I'd like to welcome all our witnesses on this second panel. Thank you for joining us tonight. This is an inaugural committee on science and research, and this is the first study on small nuclear reactors.

First we have, from Bruce Power, Michael Rencheck, president and chief executive officer. From New Brunswick Power Corporation, we have Brett Plummer, chief nuclear officer and vice-president nuclear. From Ontario Power Generation Inc., we have Ken Hartwick, president and chief executive officer.

Welcome, everyone.

You will each have five minutes to speak. After four and a half minutes, I will hold up this card. It tells you that you have 30 seconds left.

We have to have interpretation, so if we have technical difficulties and the interpreters can't hear you, we're not going to be able to continue with the witness. For that, I'm very sorry.

We will begin with Mr. Rencheck from Bruce Power for five minutes, please.

Mr. Michael Rencheck (President and Chief Executive Officer, Bruce Power): Members of the committee, good evening. My name is Mike Rencheck, president and CEO of Bruce Power. Thank you for the opportunity to speak with you as part of your study on small modular reactors.

First, I would like to acknowledge today that I am speaking from the traditional lands and treaty territory of the Saugeen Ojibway Nation, the traditional harvesting territories of the Georgian Bay Métis Council of Ontario, and the Historic Saugeen Métis.

Bruce Power provides 30% of Ontario's electricity safely, reliably, and at low cost while producing zero-carbon emissions. Bruce Power is proud to be able to support the fight against climate change while powering our economy with a made-in-Canada solution and a revitalized, thriving domestic supply chain.

While the world is trying to figure out ways to phase out coal-fired electricity generation, Ontario has already shown how it can be done, with Bruce Power providing 70% of the power needed to achieve this while creating good jobs and producing life-saving medical isotopes. In fact, our pan-national isotope partnership includes the Saugeen Ojibway Nation. I would be happy to discuss this with you in more detail.

Bruce Power takes its responsibility for a net-zero future very seriously. From our net-zero 2050 strategy, including a commitment to be net zero by 2027 in our operations, to our issuance last year of the first-ever nuclear green bond, to the exploration of new nuclear technologies, we are demonstrating leadership in helping Canada reach its net-zero objectives.

In addition, through Bruce Power's project 2030, we are building toward a new site output goal of 7,000 megawatts by 2030, adding approximately 1,000 megawatts of clean energy to the Ontario grid in support of climate change targets and future clean energy needs through continued asset optimization, innovations and leveraging new technology.

We are proud to have been recognized, in the federal government's SMR action plan and in the interprovincial small modular reactor strategy unveiled in March, for our potential role in developing new nuclear technology. We are also pleased that the government provided support recently, through the strategic innovation fund, for the Westinghouse eVinci reactor project that Bruce Power is supporting. We also fully support the SMR project currently being undertaken by Ontario Power Generation at its Darlington site.

Bruce Power, along with our industry, was pleased to see the support for nuclear technology included in the 2022 budget, including support for SMRs from the Canada Infrastructure Bank and the Canadian Nuclear Safety Commission.

With respect to regulation, Bruce Power believes there needs to be a focus on de-risking to enable small modular reactors and other nuclear innovation by streamlining the Impact Assessment Act requirements, licensing, and environmental assessments in general. If we are to meet our net-zero goals in the electricity sector by 2035, we must ensure that regulatory requirements, including impact assessments and licensing, can be done in a timeline that meets our needs for climate change target dates.

Creating optionality by providing and developing a path forward to site and technology selection will help attract much-needed private capital investment and help get the ball rolling on clean energy nuclear projects that we all know will be needed to further decarbonize our economy in sectors well beyond electricity.

To create these options and develop this needed momentum to secure a global leadership role for Canada, all levels of government must work with industry to share in the financial and risk challenges associated with environmental regulations and the CNSC licensing of the technology.

The federal government must also continue to help our industry innovate and lead the fight against climate change through clear policy signals. We continue to seek inclusion of nuclear in the federal green bond framework. Amending other existing programs and measures could create a level playing field for nuclear to compete with other clean technologies. In addition, nuclear and other supplemental technologies, such as hydrogen, should be looked at to further decarbonize our industries.

● (1940)

Canada is a world leader in nuclear, and its CANDU reactors are used around the world. The government needs to support and continue to build on this advantage.

We're at an inflection point in our fight against climate change, and we all understand that the time to take action is now. There has never been a more exciting time in our industry. We are saving lives with new cancer treatments—

The Chair: Mr. Rencheck, I am so sorry to interrupt, but I know our members will be eager to hear from you in response to questions. Please accept my apologies.

We will go to Mr. Plummer from New Brunswick Power Corporation.

Go ahead, please.

Mr. Brett Plummer (Chief Nuclear Officer and Vice-President Nuclear, New Brunswick Power Corporation): Thank you, Madam Chair.

Good evening. My name is Brett Plummer. I am vice-president nuclear and chief nuclear officer at New Brunswick Power. Thank you for the invitation to provide information regarding how small modular reactor technology can help achieve Canada's climate change objectives and add to its economic resiliency.

As background, New Brunswick Power and the Province of New Brunswick were involved in the development of the pan-Canadian small modular reactor road map and action plan. Leveraging New Brunswick's 40 years of nuclear experience, we are actively working with other provinces, utilities and organizations, such as Saskatchewan, Ontario, Alberta, Ontario Power Generation, Bruce Power, SaskPower and Canadian Nuclear Laboratories for the pan-Canadian development and deployment of small modular reactors.

Canada will not achieve net zero by 2050 without nuclear. Many studies from reliable organizations support this conclusion. Renewables and hydro alone will not get Canada to net zero without an increase in nuclear power. Small modular reactor technology is an important technology that the federal government should be aggressively pursuing and supporting.

Small modular reactor technology will be part of the massive electrification of Canadian society in developing clean fuels and supporting clean manufacturing, clean transportation and clean heat while we retire coal and other carbon fuels.

Advanced small modular reactors integrate with renewables, and we will need all the clean energy generation we can build to support the 2050 decarbonization goals. Advanced small modular reactors are critical to support intermittent renewable energy sources when the sun does not shine and the wind does not blow. Advanced small modular reactors being developed in New Brunswick will have a high temperature output and can be used for cogeneration to play a major role in decarbonizing heavy industries, such as in western Canada.

Canada can broaden the nuclear supply chain to build new opportunities in eastern and western Canada. Modular construction methods, as well as advanced manufacturing methods, will also be developed to expand the economic impact across the country with first nations.

By virtue of Canada's being an early mover in the development and deployment of SMR technologies, the larger market opportunities beyond Canada to assist with global efforts to decarbonize are opened up. This current opportunity could be lost if SMRs are not supported. Canada can prosper economically by developing the IP and manufacturing capability in Canada, representing a significant contribution to combatting global climate change while building an economic benefit for Canada. We need a government to streamline policies to support the large-scale buildup of nuclear and to provide financial guarantees and backstops.

Thank you for your interest. I'm pleased to answer any questions you may have.

● (1945)

The Chair: Thank you so much, Mr. Plummer.

Again, we're really grateful to all of you for joining us.

We're going to try Mr. Hartwick. I have to be clear: We have to be able to hear, and it's going to be hard with the boom mike. We will try for a very short time, because I don't want to take time away from our members.

We'll see if we can hear you. Please try.

Mr. Ken Hartwick (President and Chief Executive Officer, Ontario Power Generation Inc.): Thank you very much. Can you hear me?

The Chair: That sounds good.

Wait, no, Mr. Hartwick. I'm sorry, but the interpreters cannot hear you. I'm very sorry, but we cannot allow a presentation without translation. I apologize.

Mr. Ken Hartwick: Thank you. I will rejoin.

The Chair: Again, I apologize.

With that, dear colleagues, I will again thank all our witnesses.

We are grateful to all of you for your time and effort, and we are now going to go to members' questions.

This time, we will start with six-minute rounds, and we begin with Ms. Gladu.

The floor is yours.

Ms. Marilyn Gladu: Thank you, Chair, and thank you, witnesses.

I would ask Mr. Hartwick if he could submit a written brief of the comments he wanted to make. That would be very well received.

I'm going to start with a question for Mr. Rencheck.

You talked about a few of the projects—the Weston project and the SMR projects. Have you experienced any difficulties with those projects from a regulatory point of view?

● (1950)

Mr. Michael Rencheck: At Bruce Power, we're supporting OPG and Westinghouse in the development of those projects. Initially, in getting started, there has been some difficulty within the CNSC in obtaining funding to be able to staff up to process the licences for those projects. However, that's been remedied in the last budget, and I understand that this is beginning to move forward at a very good pace.

Part of the global network of small modular reactors, and particularly the memorandum of understanding between Canada and the United States on nuclear co-operation, would allow the harmonization of cross-border standards, so that the efforts to accelerate the licensing process and share information from the regulators, as well as the suppliers, would help to speed that up.

That regulatory framework is currently being considered to be modernized. As that progresses, it will certainly enhance the ability to license new reactors. That process is just getting started and really needs to keep pace and accelerate in order to meet our climate change needs.

Ms. Marilyn Gladu: Excellent.

As you know, we expect to see an increase in the demand for power and electricity, from electric cars to new plants that are going to be formed. Do you have any concerns about the demand that's headed towards us?

Mr. Michael Rencheck: Yes, when you look at the demand, it's projected to increase by two to five times. The issue of importance will be around power density: the ability to generate massive amounts of power to be able to supply industries and transportation.

As we look at the electricity market, we're going to need all forms of clean energy going forward. Power density and capacity will be needed to ensure that we're not misusing land requirements that could be better used for farming or other production, while at the same time meeting the needs of citizens.

Ms. Marilyn Gladu: Very good.

Mr. Plummer, you talked about the need for government to streamline policies. Could you elaborate on that?

Mr. Brett Plummer: Yes. The policy we were referencing specifically was more around the environmental impact associated with licensing the first of a kind—and even more of a concern in my mind is the nth of a kind—as we build out.

Ms. Marilyn Gladu: Is that the assessment from Bill C-69?

Mr. Brett Plummer: Yes, Bill C-69. That's correct.

One of our technologies, the first of a kind, fits within the project list. It basically will go through an existing environmental assessment utilizing the province and the CNSC, but as you build out, especially with Moltex, which has a larger capacity, and also with fuel conversion, it really falls into the impact assessment of Bill C-69, as well as the additional units associated with our ARC clean energy, the other technology. Presently, this is a long process, so we're looking for ways not to get around the process but to streamline it.

The other aspect, to your question associated with Mr. Rencheck, is that the CNSC, the regulator, has been extremely co-operative to this day and, as Mr. Rencheck said, is ramping up, but again, we need to look ahead to the future with the build-out and building the nth of a kind, and we're not going to be able to go through the same process for the nth of a kind versus the first of a kind. Once the reactor design is standardized and has been reviewed and approved, really the only assessment at that point should be around any changes associated with the site characteristics or location.

Ms. Marilyn Gladu: Excellent.

You spoke of the road map for nuclear technology. What can the federal government do to accelerate our progress into nuclear?

Mr. Brett Plummer: At this point, the number one thing is to attract private investment. We need additional financial support.

At present, we've had a lot of difficulty in gaining that financial support for small modular reactors. We need to carve out a specific allocation to have the seed money to help us get through vendor design review and regulatory reviews, and also to get through some of the preliminary design.

Once we do that, then the private investment sees the commitment from the Canadian government and is ready to invest. We need that financial seed money, that carve-out. We also need financial guarantees, and we need financial backstops.

Ms. Marilyn Gladu: Very good.

I have one last question for Mr. Rencheck. We've seen a lot of supply chain issues across the country. Have you had difficulty, from a supply chain perspective, in your industry?

Mr. Michael Rencheck: Canada has a made-in-Canada solution for nuclear. Our supply chain is predominantly in New Brunswick, Ontario and Saskatchewan. We are able to fully supply—we were, even through the pandemic—and continue with our refurbishment projects, which are progressing on time and on budget and really serving the needs of all Ontario citizens.

That supply chain being here, in Canada, is very unique in the world. We can build and construct nuclear plants here, with Canadian citizens, creating great jobs and great economic development, even in rural areas. It's a fantastic opportunity for jobs.

As an example, over the last several years, we've had 21,000 applications for 1,000 positions—

● (1955)

The Chair: I'm sorry, Mr. Rencheck. I'm going to have to interrupt.

Ms. Marilyn Gladu: We're out of time.

That's tremendous. Thank you.

The Chair: I'm sorry. Ms. Gladu, thank you so much for the questions.

Colleagues, we do our best to be fair to members and all of our witnesses. If you would like to invite Mr. Hartwick back, members, that's an option. As Ms. Gladu said, he could submit his remarks, but if any of you want to get a question to him on the record and ask for a written submission, that is possible as well.

We will now go to Monsieur Lauzon for six minutes.

[*Translation*]

Mr. Stéphane Lauzon: Thank you, Madam Chair.

First and foremost, I want to thank all the witnesses.

I would also like to thank Mr. Hardwick. I'm really disappointed we couldn't hear him speak.

I would like to put a first question to Mr. Rencheck.

When you talked about your technologies, you talked about wind turbines, but you also talked about nuclear power. Is your company transitioning from wind power to small modular reactors or is that part of a whole that is moving forward in terms of technology?

[*English*]

You're on mute. We can't hear you.

Mr. Michael Rencheck: I'm sorry. I have hearing difficulties. I had a very hard time hearing the translation on my end, but I will answer the question that I believe I heard, which relates to wind power and small modular reactors.

When I look at an energy system, I think you'll need to have a balance of both intermittent resources and reliable baseload generation. When you get an overcommitment in one category of intermittency and we're subject to extreme weather events, like the one that happened in Texas a year ago.... About 180 people died because of the intermittent sources and their dependencies on other technologies.

I think there's a way to complement both the intermittent sources and the baseload sources to create a stable, reliable and resilient electricity grid that's producing clean energy. That comes from a diverse portfolio of generation sources that would include solar, wind, nuclear and carbon capture with sequestration, among other technologies. It would be regionally sized and allocated for those regions that have the resources to utilize it, including hydro.

[*Translation*]

Mr. Stéphane Lauzon: Thank you. I will try to speak a bit slower, so that the interpreters can understand me properly.

My second question is once again for you, Mr. Rencheck.

A report from Stanford University and the University of British Columbia we received yesterday clearly shows that small modular reactors produce from two to 30 times more nuclear waste than traditional nuclear power plants over the long term. You talked about net-zero emissions.

Does your technology make it possible to achieve net-zero emissions or should this study be reviewed? Can you explain the nuance between the two?

[*English*]

Mr. Michael Rencheck: Again, is that question for me? I'm having a very difficult time hearing. If it is, I can answer that question.

The first thing—

Mr. Stéphane Lauzon: I can repeat it very quickly, if you want.

Yesterday, a study conducted by Stanford in collaboration with the University of British Columbia was published and showed that in the long term, small nuclear reactors would produce two to 30 times more nuclear waste.

Could this kind of revelation—led by top Canadian and American scientists—cause you to reconsider your position on small nuclear reactors?

● (2000)

Mr. Michael Rencheck: First, the study was just released yesterday. You may have also seen a letter by Dr. Reyes, who was the inventor, and also faculty at the University of Oregon, who predominantly stated that the assumptions used in that study for the NuScale small modular reactor were in fact incorrect. In his letter, he outlined that it is not accurate and therefore should be disregarded.

With that already issued by the inventor of the NuScale technology, I think that report needs to be examined in detail before any conclusions would be drawn from it or actions taken from it.

[*Translation*]

Mr. Stéphane Lauzon: Thank you, Mr. Rencheck.

Mr. Plummer, you have a lot of experience and have been working in the energy sector for a very long time. You talked about cogeneration technology, where heat is recovered to produce electricity.

Can you tell us a bit about that technology? Are steam turbines used?

Can you tell us about how heat is recovered to be transformed into energy?

[*English*]

Mr. Brett Plummer: The small modular reactors we are developing operate at a high temperature, somewhere in the order of 600°C. This is very conducive to industrial heat.

I will just make a point. When we think about small modular reactors, we think predominantly electricity, but we really need to think energy. Then we think solar, wind, nuclear, when we really need to think about the integration of all of this energy into energy packages, energy farms, because of the intermittency of solar and wind and, basically, the backstop of nuclear.

This high temperature from nuclear can help generate hydrogen and ammonia, which is a hydrogen carrier. It can also be stored in solar salts. You can store a tremendous amount of energy. You could help to take care of the peaks on the electrical grid. You can also take advantage of when the wind is blowing and the sun is shining to use that energy as you see fit, and distort, potentially....

These high-temperature reactors can be used in many different ways to support the transformation and generation of clean fuels and the electrification—

The Chair: Thank you, Mr. Plummer.

Thank you, Monsieur Lauzon. We appreciate this.

Again, just as a reminder, if you have a question for Mr. Hartwick, please get it on the record.

We'll now go to Monsieur Blanchette-Joncas.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you very much, Madam Chair.

My question is for Mr. Plummer.

The New Brunswick Power Corporation is currently focusing on small modular reactors, among other things. I would like to hear your comments on Canada's competitive advantage when it comes to producing that technology.

[*English*]

Mr. Brett Plummer: We were early movers on the small modular reactor in north America, and also in western Europe.

We took the lead in basically collaborating, coming up with a pan-Canadian approach, a road map and an action plan. As a result, we're well down the road through a regulatory review process, through the vendor design review of phase one and phase two, on many of these technologies.

There's an economic advantage there, as long as we continue to support nuclear and small modular reactors. That competitive edge is the fact that we were early movers, and also the fact that many different vendors came to Canada because we have a graded approach associated with evaluating the safety of innovative new technologies.

Now, if we don't act and support the small modular reactors, we will lose that advantage in a very short period of time.

[*Translation*]

Mr. Maxime Blanchette-Joncas: One of the economic arguments used is obviously standardization—large-scale production of small modular reactors. But to achieve economies of scale, many units will of course need to be produced and cost efficiency will need to be achieved.

Do you have any data on that? How many units need to be produced to achieve true economies of scale?

● (2005)

[*English*]

Mr. Brett Plummer: First off, we will need to standardize design. These are small modular reactors. They're very simplistic. They will not require the staff that's on some of our larger safe operating units, but we do need a standardized design. They will require some kind of support centre for all different activities, to minimize the cost.

It is a fleet concept. We will be manufacturing with advanced manufacturing technologies. Again, these are small modular reactors, so these components can be built in a factory and standardized, with quality assurance, to eliminate some of the issues we're seeing around the world with large-scale nuclear build-out, associated with taking design and turning it into the actual components or assembling the components with the integration in the field.

There's a tremendous advantage there. What we will need to do in order to have this build-out is to all work towards getting the first of a kind. We will have to make sure we do the preparation for the nth of a kind, so that once we prove the technology through the first of a kind, we are ready to execute through the supply chain in manufacturing to support the nth of a kind. We've done supply chain studies in New Brunswick. We are basically working with organizations within Canada to make sure we understand what's ahead of us from a manufacturing standpoint.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you, Mr. Plummer.

Can you tell us exactly how many small modular reactors will need to be produced to achieve profitability?

[*English*]

Mr. Brett Plummer: We will need a tremendous amount of energy. You've already heard testimony that we're going to need two to five times the existing energy we have. This will be a combination of all of the above. A lot of it will be local, provincially driven by what you have for an advantage with the new province. For example, Quebec is blessed with hydro, as is B.C. In New Brunswick, it will be a combination. We are very diverse. We have some hydro and we have wind and solar, but we also have nuclear. It will be a combination thereof.

That said, a lot of people are leaning towards at least.... One model is 24% nuclear across Canada. If you do the math—again it's a math problem, as Mr. Gorman said—

[*Translation*]

Mr. Maxime Blanchette-Joncas: I have to interrupt you, Mr. Plummer. I'm sorry, time is running out.

When it comes to production, you say you don't have any data. So on what data are you basing your belief that global production or demand will be sufficient to support that production at scale?

[*English*]

Mr. Brett Plummer: There are multiple documents out there. There's a very good study done by SNC-Lavalin on engineering net zero that basically has one model to achieve it within Canada. There's also information out there from international groups, such as the Intergovernmental Panel on Climate Change, associated with driving why nuclear is important and how it's going to be a component within the energy mix going forward. There are many studies. MIT has done a study as well. They all come to the same conclusion: We will need nuclear, and it will be a large percentage of the component for clean energy.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you very much.

Mr. Plummer, how many small modular reactors do you think you can produce over the next five years?

[*English*]

The Chair: May I suggest, Mr. Plummer and Monsieur Blanchette-Joncas, that we ask for a written response on this?

Thank you so much.

[*Translation*]

Thank you, Mr. Blanchette-Joncas.

[*English*]

We will now go to Mr. Cannings for six minutes.

Mr. Richard Cannings: Thank you, again, to the witnesses.

I'm going to start with Mr. Plummer and ask a question I was hoping to ask Mr. Sullivan of Moltex before, but we ran out of time. Since I understand that's the technology New Brunswick Power will be banking on for SMRs, perhaps you can answer it, as well.

The question revolves around a letter that was sent to the Prime Minister a year ago, I believe, by 10 or so American nuclear experts, nuclear regulators, Harvard professors, top diplomats and White House advisers from past American presidencies, who were very concerned about the Moltex technology.

They had two concerns. One is around a fact that Moltex tries to sell as a benefit, and that is reducing the volume of waste that we get from CANDU reactors by 95%. The trouble is, we're ending up with 5% of the really nasty stuff that is still serious waste, and there's plutonium involved. They are concerned, as are others, about plutonium, because it gets potentially into nuclear proliferation, weapons and things like that.

Moltex has called this technology “proliferation-resistant” for various reasons, but a 2009 review by experts from six U.S. national labs found that it was as susceptible to misuse for proliferation as the standard reprocessing technology.

So there's that concern, and the second one is talking about the long-term risk of the waste. Moltex claims the removal of plutonium would reduce the long-term risk from a deep underground radioactivity waste repository, a claim these experts say has been discredited repeatedly.

Finally, they urge that Canada, before making any further commitments in support of this reprocessing, convene high-level reviews of both the non-proliferation and environmental implications of the Moltex reprocessing proposal. They believe that such reviews will find reprocessing to be counterproductive on both fronts.

That was a long lead-up question, but I'm wondering what your response to that is. Since it came out a year ago, I assume you have something to reply.

● (2010)

Mr. Brett Plummer: We've seen the report, and I'm not going to try to comment or discredit the report. I will give you our professional opinion from New Brunswick Power.

We believe that in the future there's energy in used fuel. We need to take advantage of that energy. The world has been reprocessing fuel for decades. Thirty per cent of the used fuel around the world is already reprocessed, and reprocessed safely. We have to have trust in our regulators, internationally and across Canada, to make sure, as we go down and evaluate this process, that we can do it safely.

It will reduce the volume and it will reduce the toxicity of the waste that's left. It's a tremendous amount of energy for future generations, and again, it's done in other parts of the world.

We believe this is the path to go.

Mr. Richard Cannings: Do you have any concerns? Someone, I'm not sure whether it was you, Mr. Plummer, or Mr. Rencheck, talked about making sure that we can use these technologies across countries so that we could export this IP and export this technology.

There are countries like the United States, which has a long-standing history going back to the Jimmy Carter presidency of really being wary or very negative about processes involving plutonium. Is there any concern about whether that will be a strike against the Moltex technology, at least in terms of trade with the United States?

Mr. Brett Plummer: Is the question for me? I apologize.

Mr. Richard Cannings: Yes. I'm sorry, Mr. Plummer.

Mr. Brett Plummer: No, we don't have any concern, because we have trust in the process through our regulators, again internationally and across Canada. From, basically, a fuel supply standpoint with the build-out that we're going to need in nuclear, and also from a national security standpoint, we believe that in the future we will want to reprocess fuel. I believe that if we follow our processes and we do it safely, it will help us in the future.

● (2015)

Mr. Michael Rencheck: I can add to that question, as well.

The process has been under way for decades in France. France reprocesses nuclear fuel, and they've been doing it for other countries successfully for many decades: Germany, Japan and the U.K. Quite frankly, that fuel has been reused over and over again. What it produces, effectively.... What you would get in terms of waste, if you use nuclear energy for your entire lifeline, would be a footprint about the size of a pop can. The residual left over is vitrified into glass logs. The studies I'm familiar with show that those glass logs last for a minimum of 10,000 years, with the possibility of 100,000 years. The only reason they don't go to 100,000 years is that they don't really have the empirical data to prove it, so they stop at a much shorter time frame. Those logs are vitrified and pretty much impermeable, so the waste is contained and stored.

Thank you.

The Chair: Thank you, Mr. Rencheck, and I'm sorry to interrupt.

Mr. Cannings, thank you for the questions.

Dear colleagues, we're now going to go to the five-minute round.

We'll go to Mr. Williams.

Mr. Ryan Williams (Bay of Quinte, CPC): Thank you very much, Madam Chair, and thank you to our witnesses.

Mr. Hartwick, I'm going to give you a few questions. You can answer me, but you can certainly submit in writing to the committee. I'm probably going to get into this with other witnesses.

Number one, what is the short-term, medium-term and long-term vision for Ontario Power Generation and energy? Number two, given the demand for energy in the build-out, do you have a worker shortage right now in labour, and where do you see that in the future? Number three, do you support an energy corridor in Canada, and what does that look like?

I'll start with Mr. Plummer. Certainly, it's the same kinds of questions for the medium and long terms.

One thing we spoke about briefly.... I think you mentioned hydrogen. When we look at Canada in the long term, we talk about hydrogen being a major form. This is in the long term, probably 30-plus years out. Number one, can you tell me how nuclear plays a role and how you see that? When we look at Canada right now, natural gas is going to power hydrogen development. Do you see nuclear taking that over, and would you see that at the source—around cities, for instance?

Mr. Brett Plummer: I do see nuclear playing a large role—not the only source, but playing a major role in hydrogen and ammonia generation, especially with the high-temperature reactors that can run the electrolyzers to generate hydrogen. I believe there is a perfect partnership between other energy sources and nuclear, used intermittently, especially with the appropriate storage system used in between. For example, you can use the intermittent power to generate the hydrogen, and nuclear can supply the grid. When the wind blows and the sun shines, you can use that power for the grid, and you can use nuclear to develop the hydrogen, ammonia, or other synthetic fuels, or to support manufacturing.

I see, in the future, an integration of energy, as I mentioned before. Nuclear is very conducive to that.

Mr. Ryan Williams: Thank you.

Mr. Rencheck, I'll ask you the same question.

Mr. Michael Rencheck: I see the same: an integrated energy system. I think we're going to need all the clean energy we can make. Clearly, natural gas will play an important role in the creation of hydrogen, but so will nuclear. We'll be able to do it at scales that are quite large and therefore able to power economies.

You also asked about a worker shortage. We haven't seen that in the nuclear industry. Our young people are flocking to the industry, because they see what we're doing to protect the environment and save lives through medical isotopes. For example, for 20 operator positions last spring, we had over 1,000 applications. In the last two years, we've had nearly 30,000 applications for about 2,000 positions, so our young people are attracted to this environmentally friendly technology. They want to make a difference, they want clean energy, they want to protect the environment, and they want to save lives.

Mr. Ryan Williams: I will follow up on the long-term strategy before I get into the short term.

You need a buy-in from the government. Mr. Plummer, I heard you talk about financial supports. Is there anything else you would recommend, or that you need? What should the government be doing over the long term, at this point, such as supporting R and D?

● (2020)

Mr. Brett Plummer: Yes, we need help with research and development. We have tremendous universities, partnerships, memos of understanding and collaboration within Canada and also with other countries associated with research and development. We need support, through research and development, for these innovative power energy sources—not just for nuclear, but for others as well.

Mr. Ryan Williams: I'm sorry. I'm just going to cut you off. If there's anything else, don't hesitate to submit it in writing. I have only 30 seconds left.

My last question is about the short term. Mr. Hartwick, you can submit this in writing, too. When we look at needing two to five times the energy, and when we see the addition of electric cars coming into our grids, first, can we handle that within a five-year period? This is in the short term.

Second, if we can't, how do we see this from an energy generation standpoint? What does the government need to help with in the short term to ensure that we can add the energy we need as quickly as we can?

I'm out of time, so please submit those answers in writing.

Madam Chair, thank you, as always.

The Chair: Mr. Williams, I appreciate that you ended it in that way, in asking for the written answer. Thank you.

With that, we will now go to Ms. Bradford for five minutes.

Ms. Valerie Bradford (Kitchener South—Hespeler, Lib.): I'm going to address these questions to both Mr. Plummer and Mr. Rencheck. I'd like to hear from each of you.

We'll start with the first question, for Mr. Plummer.

Does your organization partner with any post-secondary or research institutions to improve SMR technologies?

Mr. Brett Plummer: Yes, we do. We are looking ahead at what we're going to need for skills and labour. We presently partner with the University of New Brunswick. We partner with the Canadian Nuclear Laboratories in Chalk River. We also partner locally with New Brunswick community colleges to make sure we understand the curriculum we'll need going forward for the skills that folks will need to operate these plants and the research and development that we'll need to develop these reactors.

We have multiple partnerships and also memos of understanding, to the point where, honestly, the nuclear program at the University of New Brunswick has actually doubled. As Mr. Rencheck was saying, there's a tremendous interest from young folks in the new small modular reactors that we're developing. We've seen a doubling with the enrolment at that university.

Ms. Valerie Bradford: That was a lengthy answer.

Mr. Rencheck, does Bruce Power partner with post-secondary research institutions?

Mr. Michael Rencheck: Yes, and I won't repeat all the names that Brett just mentioned.

The answer is yes. We also do that through the CANDU Owners Group for technologies and our Nuclear Innovation Institute, where we're creating the next generation of nuclear.

We're partnering with other companies and with universities in trying to advance this technology.

Ms. Valerie Bradford: What shortfalls in SMR technology can further research help overcome?

Mr. Rencheck.

Mr. Michael Rencheck: First, just moving through the design process in a solid and effective manner would enable us to enter the licensing and permitting processes very quickly. Also, there is performing some of the work around advanced fuels that is occurring. Sharing that R and D technology across the border between Canada and the United States through different organizations will get us the best technology that will be fastest to address climate change.

Ms. Valerie Bradford: Mr. Plummer, does your organization support any scientific research through private funding, providing access to resources or offering professional insights?

Mr. Brett Plummer: If you're asking if we invest, basically, in private entities that are doing research for the small modular reactors, we do.

Presently, at this early stage, it's mostly related to environmental studies on site that are associated with small modular reactors, and doing baseline studies.

● (2025)

Ms. Valerie Bradford: How about you, Mr. Rencheck?

Mr. Michael Rencheck: We invested particularly in looking at the climate effects on the Great Lakes and the environment, and how that would factor into clean energy going forward. That also set the stage for entering the licensing process and environmental permitting process.

We also do a lot of technology work through the CANDU Owners Group and Canadian national labs on nuclear technology and advancing that. These technologies are similar to technologies that will be used in small modular reactors.

Ms. Valerie Bradford: How can the scientific community best support the evolution of SMR technology? What would be the best thing it could do? How could it get the most bang for its buck? What would be the most effective research area it could be focusing on?

Mr. Brett Plummer: There needs to be continued work on advanced modularization or advanced manufacturing technology to make sure we can develop these reactors at the scale we've been discussing and with the quality we've been discussing, and to meet the demand, essentially, for decarbonization.

I believe, as well, that, as Mr. Rencheck mentioned earlier, advanced fuels is an area that we need to continue to work on, especially with the capacity and capability within Canada.

Ms. Valerie Bradford: My time is up. Thank you, both.

The Chair: Thank you, Ms. Bradford, and thank you for being so succinct.

We will now go to Monsieur Blanchette-Joncas for two and a half minutes.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you very much, Madam Chair.

Mr. Rencheck, I understand that Bruce Power is the only private company operating a nuclear power plant in Canada and that you are also analyzing the possibility of building small modular reactors. However, some experts are questioning the economic viability of small modular reactors.

Have you estimated the cost, in dollars per megawatt hour, of various small modular reactor projects by comparing it with the cost of existing electricity production technologies?

[*English*]

Mr. Michael Rencheck: I had a very hard time hearing the translation, but I will answer the question I believe I heard.

Quite frankly, in the construction of large projects, like any project, including hydro projects or other large infrastructure projects, we have to be able to advance the design of the project first and ensure that we have an adequate supply chain. As we do that, we're then able to construct the projects in a timely manner and meet schedule and budget. This condition is predicated on having advanced designs. I think this is where the support needs to come in from the government, to be able to flesh out these designs and get them to a point at which we can buy the materials here in Canada, from our supply chain, and build.

If you look at the overall cost per megawatt hour and look at what exists right now in Ontario, it's quite telling. According to the Ontario Energy Board, today the cost of hydro power is about 6¢, the cost of nuclear is about 9¢, wind is about 15¢ a kilowatt hour, gas is about 15¢ a kilowatt hour and solar is about 49¢ a kilowatt hour. That pricing exists in an electrical grid that has deeply decarbonized. Deep decarbonization is believed to be below the 50 grams equivalent of CO2 per kilowatt hour, and Ontario is presently at 35 grams. We have a good footprint. We have a good plan and a good road map to do that.

We're very similar to Nordic countries with the type of hydro production we have. Ontario's grid is 60% nuclear, 25% hydro and about 8% to 10% renewables, with the rest powered by gas and other entities. To create a clean grid that has the capability of powering an economy, and to get to reasonable cost targets per megawatt hour, I think building it out along those lines will be necessary.

The Chair: Thank you, Mr. Rencheck.

[*Translation*]

Thank you, Mr. Blanchette-Joncas.

[*English*]

We will go to Mr. Cannings for two and a half minutes, please.

Mr. Richard Cannings: Thanks. I will continue with that question, and either Mr. Plummer or Mr. Rencheck can answer.

I would echo these concerns about cost. The government is putting considerable funds into this technology right now. I think New Brunswick was in for $86 million over the last few years. I wanted to know more about the timeline. We hear that it will be cheaper energy, because we'll be building it in factories. How many units are we going to have to build before we get to a place where SMRs are cost competitive with wind, solar, hydro and even conventional nuclear? The latter has a real history of cost overruns and expensive power up front. Those solar and wind prices you quoted are much higher than they are elsewhere in the world. I don't want to go down that rabbit hole.

What is the business case for this? How many years will it be? We know the first ones will roll off and be built in 8, 10 or 15 years. How many years will it be before we get to the production levels that will bring those costs down to make it worthwhile?

● (2030)

Mr. Brett Plummer: It really comes down to how well we're supported and how well we're prepared to do the nth of a kind. If we're prepared to do the nth of a kind shortly after the first of a kind.... These are not conventional reactors. They're small modular reactors. If we take all the lessons learned and have advanced manufacturing, we believe we can recoup our money very quickly as far as getting the cost down from the first of a kind to the nth of a kind.

The other thing to remember about nuclear is that we're not talking 10-20 years. A nuclear power plant, even a small modular reactor, has a lifespan of 60-80 years. When you stabilize the cost at under 10¢ a kilowatt hour, which is what we're projecting with very early initial estimates, and you estimate that cost over that lifespan, it's very economical.

The Chair: Thank you, Mr. Cannings.

To all our witnesses, first of all, we are very grateful that you took your time and provided us with your expertise. I'd like to apologize to Mr. Hartwick. To come and to be gracious, and to sit through and not have an opportunity to speak.... I'm very sorry. I'll remind our committee that we can invite him back, and he can also submit a brief.

It's a new committee, and you have a very interested committee. I thank you all, and we will briefly suspend before our third panel.

● (2030)

_____(Pause)_____

● (2035)

The Chair: I am calling all of you back to order.

We are at our third and final panel of the evening. I'd like to welcome all our witnesses. We appreciate your joining us. It's an inaugural committee on science and research. We look forward to hearing what you have to say.

From SaskPower, we have Troy King, acting president and chief executive officer; from Electricity Canada we have Francis Bradley, president and chief executive officer; and from Global First Power, we have Jos Diening, managing director.

Welcome to all.

Each of you will have five minutes to speak. At the four and a half minute mark, I will raise a yellow card to let you know you have 30 seconds left. We aim to be fair.

Again, we welcome you, and we look forward to hearing from you.

We'll begin with Troy King, for five minutes.

Mr. Troy King (Acting President and Chief Executive Officer, SaskPower): Thank you, and good evening.

My name is Troy King, and I'm the acting president and CEO of SaskPower.

SaskPower is working toward a future with net-zero greenhouse gas emissions while continuing to provide safe, reliable and cost-effective power to our customers. We are currently on track to have renewables make up 50% of our generation capacity by 2030, resulting in a 50% reduction in our greenhouse gas emissions from 2005 levels.

To get there, we are making significant investments in a large portfolio of renewables and other generation sources. In fact, by 2035 we expect to rebuild 75% of our existing generation fleet, a system that took 93 years to build. While important, we cannot rely on renewable generation alone. Wind and solar are intermittent sources that are available only when there is adequate wind or sunlight. We also need reliable baseload power available all the time, regardless of conditions.

Currently, the bulk of baseload power generation in Saskatchewan is provided by fossil fuels. With the federally mandated retirement of nearly 1,400 megawatts of conventional coal-fired generation by 2030, there will be a clear gap in our ability to provide reliable baseload power.

In some provinces, baseload power is largely provided by hydroelectric generation; however, Saskatchewan doesn't have the geography to support abundant hydroelectric generation, and the options available to Saskatchewan for non-emitting baseload power are limited. SaskPower is considering a number of options to fill this baseload need, including natural gas, carbon capture technology, geothermal, and nuclear power from small modular reactors, or SMRs.

With the exception of traditional natural gas generation, the other baseload generation options available to Saskatchewan have not been proven at a commercial scale. This means that SaskPower will need to take risks in adopting one of these emerging technologies.

We believe nuclear power from SMRs has the best potential for success in the near future and will fit into Saskatchewan's future power mix of non-emitting generation. That mix is expected to include existing hydro, wind, solar, import, biomass, geothermal and potentially carbon capture technologies, as well as traditional natural gas generation required to back up intermittent renewables and provide peaking services.

In order to enable an emerging technology like SMRs to be a reality in Saskatchewan by the 2030s, we have already engaged in a multi-year planning and regulatory project to potentially bring SMRs to the province. SMRs are expected to play a critical role in the fight against climate change, both through enabling electrical utilities to generate reliably and safely without emissions, and also in the innovative application of advanced reactor designs to assist in decarbonizing various industries.

For the past number of years, SaskPower has collaborated with Ontario Power Generation, Bruce Power and NB Power to evaluate the potential for a pan-Canadian deployment of small modular reactors. By working with this group, we're able to leverage the breadth of experience and knowledge they bring when it comes to nuclear innovation, operating nuclear facilities and managing nuclear waste.

Our decision whether to construct an SMR won't be made until 2029, but we must make significant investments to advance our planning work in order to inform and enable that decision.

In addition to providing stable, safe, emissions-free power, SMRs bring potential for significant economic spinoffs for both Saskatchewan and Canada as a whole, including supply chain opportunities, good-paying jobs, opportunities for economic reconciliation with indigenous peoples, and investments into education and training programs.

SaskPower and the other provincial partners are clearly doing their part to advance SMR technology to provide a solution to meet carbon reduction emission goals; however, we believe the Government of Canada has an important role to play as well.

First, the federal government can share the risk of advancing innovative, first of a kind SMR projects by sharing in the development phase costs. The utilities have already proposed a funding plan, and we would encourage members of the standing committee to support it.

Second, regulatory clarity and consistency as we move through the new federal impact assessment process are another high priority.

Timely federal investments to support the development and expansion of the nuclear supply chain to support SMR deployment across Canada are also very important. Federal investment is also required in nuclear R and D and training, especially in jurisdictions new to nuclear power, such as Saskatchewan.

The move to a net-zero future in the electricity industry will be a substantially larger lift in Saskatchewan than in other jurisdictions in Canada that already have significant legacy hydro resources. The lift will require not only taking on significant risk in new technology development but also making significant financial investments.

SaskPower will be looking to the federal government to share in that financial investment needed to make this shift, including the construction of SMRs in Saskatchewan, with the goal of ensuring that the future cost of electricity is competitive in all regions across Canada.

● (2040)

Thank you for your time. I will be pleased to answer any questions you may have.

The Chair: Thank you very much, Mr. King. We appreciate your being here.

We will now go to Electricity Canada and hear from Francis Bradley for five minutes.

[*Translation*]

Mr. Francis Bradley (President and Chief Executive Officer, Electricity Canada): Thank you, Madam Chair.

I am happy to be here this evening for your study on opportunities related to small modular nuclear reactors in Canada.

[*English*]

I would like to begin by acknowledging that the land on which we gather is the traditional territory of many indigenous peoples. [*Technical difficulty—Editor*] today from the traditional lands of the Kanien'kehá:ka, or the Mohawk nation.

[*Translation*]

Electricity Canada is the national voice of electricity in Canada.

[*English*]

Our 42 members generate, transmit and distribute electricity to industrial, commercial and residential customers from coast to coast to coast.

[*Translation*]

Canada's energy future is electric.

[*English*]

Electricity is a key economic, environmental and social enabler essential to Canadian prosperity. By the government's estimate, Canada will need two to three times the amount of electricity it produces now to decarbonize the other sectors of the economy to reach net-zero emissions by 2050. To do this, the government has committed to a net-zero grid by the end of 2035.

Fortunately, we have a strong start. Canada's electricity grid is already one of the cleanest in the world. Our sector has reduced GHG emissions by nearly half since 2005. More than 80% of electricity produced in Canada is non-CO2 emitting, and 15 percentage points of that are from nuclear energy already.

Like earlier witnesses, we believe that Canada will need an "all of the above" approach to meet the energy needs of decarbonization. That means using a mix of every tool we have available to meet expected energy needs at an affordable cost.

SMRs will be an important option in provinces without substantial hydroelectricity resources as they build a net-zero grid. They also offer an additional option in areas that are experiencing substantial growth and demand. The SMRs' smaller size means they could replace fossil fuel plants. It also means they can be located closer to electricity demand and be right-sized for that use.

This also means advantages for use in remote locations and industrial uses. Right now, remote communities that aren't connected to the grid rely on expensive and dirty diesel generation. SMRs could offer a cleaner and more affordable alternative. For remote industrial uses, like mines or other projects, SMRs could be a reliable source of both electricity and heat.

SMRs offer electricity when you need it, regardless of the weather or the time of the day. This will be important to backstop and to balance the growth of variable renewables like wind and solar, and will make the system more efficient and reliable. After all, using an "all of the above" approach means making sure we use them together.

How do we ensure that the opportunity of SMRs turns firmly into reality?

First, we make sure that there are appropriate resources to facilitate the growth of the SMR ecosystem. Canada is a leader in SMRs. To support this, the federal government has launched an SMR action plan that has identified steps to facilitate the technology's deployment and growth, and Electricity Canada is happy to have joined. The federal government can support the success of this plan by providing appropriate funding to continue the technology's development. Funding programs should be sufficient and timely, so that proponents have access to funds when needed.

Second, we must think about the approval process associated with building an SMR. As you heard earlier this evening, Ontario Power Generation has begun work on an SMR at its Darlington facility and expects it to be in commercial service by the end of the decade. Demonstrator projects at other existing nuclear sites are going to follow. However, without an approved site, a potential proponent must spend substantial money and time to secure the licensing before even considering investing in an SMR itself. Announced federal support for preplanning studies could help address financial issues, but not time ones.

Third, we must be ready to answer Canadians' questions about what expanding nuclear power means for them. Nuclear energy is safe, cost-effective and essential to meeting net zero. Understandably, Canadians may still have some concerns, but if we're serious about meeting net zero, we need to work together to address these and ensure support among the public we serve.

SMRs will be an important piece of our clean, affordable and reliable electricity system for decades to come. To do so, industry and government must continue to work together. After all, 2035 is less than 13 years away. That's just 4,961 days to build a net-zero grid. That may sound like a lot, but tomorrow it's going to be 4,960 days.

● (2045)

Thank you very much. I look forward to the discussion.

The Chair: Thank you very much, Mr. Bradley. We appreciate your being here and your remarks.

We will now go to Global First Power, and Mr. Diening, for five minutes, please.

● (2050)

Mr. Jos Diening (Managing Director, Global First Power): Good evening, members of the Standing Committee on Science and Research.

My name is Jos Diening, and I am the managing director of Global First Power.

Before I begin, I'd like to acknowledge that the project I will be discussing tonight is located in the unceded territory of the Algonquin Anishinabe, which is also covered by the Williams Treaties. As I am joining virtually, I'd like to acknowledge the land from which I am calling, which is the Williams Treaties First Nations Mississaugi territory.

On behalf of the Global First Power team, I'd like to thank you for this opportunity to speak about small modular reactors, our company and our first micro modular reactor project.

Global First Power is a joint venture between Ontario Power Generation and Ultra Safe Nuclear Corporation.

We are proud of Global First Power's vision, which is to use small modular reactors to play a key role in achieving Canada's climate goals and enabling energy security in the areas we support.

SMRs are inherently safe, low-carbon and cost-effective generation options to provide the energy people need, regardless of location. We see micro SMRs as a solution for remote communities, mines or heavy industries that currently depend on diesel for energy needs. This diesel is expensive at times, is difficult to transport to remote locations, and has emissions that impact the environment. We offer a reliable, clean, cost-competitive alternative to this. We want to bring micro SMRs to these locations to provide reliable power and energy security.

In addition, we have a lot to be excited about. We're proud that we are on track to build Canada's first micro modular reactor at Chalk River Laboratories, a site owned by Atomic Energy of Canada Limited and managed by Canadian Nuclear Laboratories. We are still in the designing and planning phases of this project, but we expect that the plant will be in commercial operation by the late 2020s.

We're proud that we're targeting to complete our environmental impact statement and submit it, as part of our licence to prepare the site, to the Canadian Nuclear Safety Commission by the end of this year. This is an exciting time for Global First Power and the nuclear industry.

Our project is a commercial demonstration that aims to showcase the technology and the benefits of SMRs as an energy solution. Our proposed micro SMR is an Ultra Safe Nuclear Corporation-designed micro modular reactor. It is a generation IV reactor that has inherently safe characteristics, and each unit can provide up to five megawatts of electrical power once installed. That power runs 24 hours a day, seven days a week for 20 years.

This is approximately enough electricity to power 5,000 homes or the life of an average mine. Multiple units can be deployed to meet the specific energy needs of remote mines and communities, offering an abundance of energy that can be leveraged not only to power homes and industries, but also to enhance infrastructure such as water treatment, communications and our greenhouse food production.

SMRs are small, and ours is very small. Our micro modular reactor, when built, together with an adjacent power generation facility, will have a footprint the size of an Olympic running track. In addition, due to their modular design, the construction period is short, approximately one year. This is achieved by the modularization of our plant, with the bulk of the manufacturing being completed offsite.

As mentioned at the beginning of my remarks, the primary market for Global First Power plants is off-grid applications in mining camps or remote communities that have traditionally been dependent on diesel power. Our reactors can provide an abundance of reliable, non-carbon emitting power to those communities. One micro modular reactor, over its 20-year lifespan, provides energy equivalent to up to 200 million litres of diesel fuel.

In addition to our mission of a cleaner energy solution, we also believe that engaging with the communities in which we plan to build our power plants is extremely important. We have done and plan to continue to do extensive outreach. We succeeded in achieving five capacity and relationship agreements with indigenous communities and organizations. These agreements have varying levels of engagement, with four communities providing traditional and cultural knowledge that we will use as part of our environmental impact submission.

We will continue this dialogue with communities as we progress through the next steps of our Chalk River project, and we hope and expect to collaborate with even more indigenous communities in the future, when we deploy SMRs to other sites after our commercial demonstration is successful.

We believe that small nuclear needs to be part of Canada's climate change plan, and that small nuclear enables other renewable energy sources by providing stable baseload power that can be relied on when intermittent renewables such as solar and wind are not generating. By enabling renewables and getting communities and industries off diesel, SMRs can be a central part of not just Canada's fight against climate change, but the world's.

● (2055)

Thank you for this opportunity, and I'm happy to take questions.

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

Again, thank you to all our witnesses. We're grateful, and we have an eager committee that wants to ask you some questions.

This will be a six-minute round, and this time we begin with Mr. Tochor.

Mr. Corey Tochor: Thank you, Madam Chair, and thank you to all our witnesses.

I have a question for Mr. King.

You mentioned economic reconciliation, which is very important to everyone on this committee. Can you unpack a little what SaskPower is doing on that front and how you plan to utilize SMR projects to help with economic reconciliation?

Mr. Troy King: I want to start by restating that SaskPower hasn't made any decisions yet. We are starting on that path of investigating SMRs as an option to provide a solution for non-emitting energy here in Saskatchewan.

A big part of the entire process of licensing and preparing to make a decision will be going through the duty to consult process, working with various first nations across the province. In particular, when we get to the point of identifying sites, we are going to want to look at those individual sites and the communities they impact.

We think there are opportunities for first nations involvement, whether it is through participation in the project itself.... We know that these projects can be very capital-intensive and require a lot of funding up front.

We're looking at ways to design the construction of it to allow potential for various partners to participate in the ownership of it. We're also looking for potential on the employment side and on the supply chain.

Again, we're at the very early stages of our SMR journey here in Saskatchewan.

Mr. Corey Tochor: Mr. King, if you don't decide to go with SMRs, and you need between two and three times the baseload power to handle the needs of the EV and the other projects that we believe are going to come on stream, what is SaskPower probably going to use? Is it natural gas?

Mr. Troy King: That's about all that's commercially available to us.

SMRs, to us, provide the best option for moving forward. However, in the time frame for us to get our first SMR in place, we're looking at a target date of 2034, if everything goes well, and that would be around the 300 megawatts size.

To replace all of our current thermal generation.... We have about 3,600 or 3,700 megawatts of thermal generation today, and that's not including growth. SMRs look to be part of that solution, and ideally we could have up to four SMRs by the mid-2040s. However, as I think I noted in my earlier comments, in Saskatchewan, where we do not have access to hydro generation, we have very limited options in terms of providing baseload non-emitting power. We can certainly have access to wind and solar; however, that's intermittent energy, and SMRs are one of the two options that we believe are available to us to apply baseload power as we go forward.

Mr. Corey Tochor: I just want to unpack a bit about the EV.

What's going to happen in five years' time, with vehicles that...? I'm not sure if it's going to be through regulation or the industry, or the product will get to a point where people will want to drive more EVs, but right now, seemingly, by far the biggest segment is people who are environmentally conscious and want to switch to EVs.

Most of that power is coming from natural gas, currently, in Saskatchewan, so they're making the switch from gasoline compression engines to EV, and then that power is ultimately coming from what right now?

● (2100)

Mr. Troy King: We are about 75% thermal based in our generation fleet.

Mr. Corey Tochor: Okay. Thank you kindly.

Switching gears a little and going on to Francis, we were talking about the cost associated, and I quickly wrote down some of the dollar per cents that you have for the kilowatt cost.

Have we ever looked at the carbon footprint of all the other power sources, be it hydro, with all the carbon that is in the cement that is needed for that, or with the wind power, with the steel that needs to be smelted, usually, typically through coal in other countries?

Have you guys done an analysis on the carbon footprint per kilowatt per cents?

Mr. Francis Bradley: Madam Chair, it's a very interesting question. We do not have current studies on that. I know there have been studies that have been undertaken in the past. We can certainly get back to the committee with that information.

I would also note, for example, that you mentioned hydrogen, and there are carbon emissions. There are carbon emissions in any manufacturing facility, but there we're talking about, for example, facilities where you would spread the carbon emissions of building that facility over the life of the facility. These are facilities whose lives are not measured in years or decades. We have facilities that are more than a century old that are continuing to operate today. When you calculate what the carbon emissions are of rebar and concrete, for example, in a hydro facility, you then have to spread that out over the life of that facility, which is multi-generational.

Mr. Corey Tochor: Thank you kindly. I believe I'm out of time.

The Chair: You are, Mr. Tochor. Thank you so much for the questions.

We will now go to Ms. Diab for six minutes, please.

Ms. Lena Metlege Diab (Halifax West, Lib.): Thank you very much, Madam Chair.

I welcome our witnesses to our historic parliamentary Standing Committee on Science and Research.

Let me just do my best here to ask a couple of questions in relation to science and research in this domain.

When we talk about SMRs, for you and the panels that came before, obviously, this is what you are into and what you do every day, but I would say that it's not a topic familiar to many people. In terms of research and science, what I'd like to know is....

To be fair, maybe I'll ask Global First Power and Mr. Diening to answer first, since he hasn't gotten a crack at the can yet. Then I'll follow with Electricity Canada and Mr. Bradley.

How do we train? Are we training enough people? Do we have enough labour? How is the research going in this sector? How does Canada compare to our international peers? Any suggestions, comments or feedback you can give on that, I would be interested to hear from you. I left it very broad deliberately, but I would love to get input from you. Do you work with our educational institutions or with our research companies? Is there any collaboration with those types of institutions?

Mr. Jos Diening: With Global First Power being a generation IV reactor, we do have innovations we're working on. Fuel is one of our major ones. As part of our project, we're building a fuel manufacturing facility at the Chalk River laboratories, managed by the Canadian Nuclear Laboratories. I think the support the Canadian government has been giving CNL to revitalize that nuclear research hub, which is internationally known, has been really beneficial in developing the key aspects of our fuel within that facility.

Mr. Francis Bradley: Madam Chair, the member has put her finger on an issue of very significant concern to the electricity sector overall: What are the skills and what are the skill sets that are going to be required for the future, particularly when we're talking about a requirement to double or triple over the next 30 years the amount of clean electricity that we produce?

You heard from one of the earlier speakers that currently they have the human resources they require, but that's becoming an increasing challenge. It will become an even greater challenge because of the very significant build-out that's going to have to occur in the future.

Yes, our individual members—and a number of them have been on the panel, including Mr. King, who is a member of Electricity Canada—work very closely with educational institutions. We also work very closely with an organization called Electricity Human Resources Canada to attempt to address precisely what we see in some areas as skills gaps today. There are clearly some challenges with respect to the human resource requirements we're going to have into the future.

● (2105)

Ms. Lena Metlege Diab: How do you see government helping? How can we, as parliamentarians, help? Is it federal or provincial? Does it matter which level of government? What can we do to assist?

We had a previous witness who mentioned that younger researchers were exiting the work. I think he was referring to New Brunswick specifically. We just concluded a study on retention and attraction of top talent. I'm wondering what we can do and how we compare internationally.

I will ask you, Mr. Bradley, and then I'll ask Saskatchewan Power after that, since you referenced them.

Mr. Francis Bradley: In terms of what the Government of Canada can do, I talked earlier about supporting research development demonstration and assisting when it comes to trying to figure out how we're going to site these and move them through assessment processes.

From a human resources perspective, we have seen support from the Government of Canada to undertake labour force studies and to work with the sector to help develop what the skill sets and skill requirements are going to be for the future. Not only is this going to require an all of the above approach, but it's going to require all hands on deck. Federal, provincial and every single level of government and academia will need to get on board.

Ms. Lena Metlege Diab: Mr. King, please, what good work are you doing in Saskatchewan? What can you point us to in that direction?

Mr. Troy King: I echo the comments that Francis made.

In Saskatchewan, I think we definitely have a bigger lift to do, as we do not have a nuclear industry here in the province of Saskatchewan. We will likely be leveraging heavily on our partnerships with the other existing utilities that do have a nuclear industry—

The Chair: Mr. King, I am so sorry to interrupt.

Perhaps Ms. Diab would like a written answer here.

Ms. Lena Metlege Diab: Certainly, Mr. King, if there's anything you can contribute to that, it would be great. Thank you.

Thank you, Madam Chair.

The Chair: Thank you, Ms. Diab and Mr. King.

Again, we are grateful to all of the witnesses for joining us.

We will go to Monsieur Blanchette-Joncas for six minutes.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you very much, Madam Chair.

If I may, I would like to recognize and thank the witnesses who are joining us this evening.

My first question is for Mr. Bradley.

Mr. Bradley, I heard in your presentation that Electricity Canada would like to see investments being made in small modular nuclear reactors and in other technologies, so as to reduce the dependence on fossil fuels.

I understand it is important to support this technology. But I am trying to see how Canada can compete with large markets such as the Russian, U.S. and Chinese markets, which have more diplomatic force and more production force. We know that those markets' competitive advantages consist in them being able to ensure a high-volume standardized production of small modular nuclear reactors and achieve economies of scale.

So I would like to hear your thoughts on that. Do you have any data for us that would help us understand how we could compete with other international markets?

● (2110)

Mr. Francis Bradley: Thank you for that very interesting question.

[*English*]

I think what we need to be looking at, and what many of the speakers presenting today were talking about seeking to develop, is essentially an expanded homegrown Canadian sector.

We actually have a history of this. This is not new in our nuclear space. We built a CANDU ecosystem in the 1960s, 1970s and 1980s. We did not rely on technology and expertise from other players. The same is true in many other areas of operation with respect to electricity. We are world leaders when it comes to electricity generation for hydro and when it comes to high-voltage electricity transmission.

As I said earlier, we're going to have to take an “all of the above” approach. It isn't just making sure we're developing an SMR ecosystem here in Canada; we're also going to have to develop other areas as well, like carbon capture utilization and direct air capture. We need to continue to expand wind, solar and nuclear and look at new technologies to improve the efficiency of our networks. We're going to have to look at transmission.

With two to three times the growth needed, all of these are going to have to be on the table, but we do have a record of actually developing homegrown sectors for this.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you very much, Mr. Bradley.

I am happy that you gave the example of the CANDU reactor, but Canada has actually not sold that reactor internationally in several decades.

I understand that the idea is to develop expertise, but I was asking you about competitive advantages. We want to stand out and be independent, but the markets we want to compete with are stronger. Their diplomatic forces outmatch Canada's.

Why invest in a technology knowing that it will be harder for Canada to compete internationally?

[*English*]

Mr. Francis Bradley: To go back to something that one of the other speakers talked about, that it's a matter of math, I think it is. There are very limited pathways for us to be able to get to net zero 2050. The pathways that bring us to net zero 2050 will require an “all of the above” approach. We will not be able to get there without relying on everything, including nuclear, and including all of the other technologies as well. If we take one of those options off the table, the math simply doesn't work.

As I said in my comments earlier, if we are serious about trying to achieve a net-zero economy by 2050—if we truly are serious—we're going to have to have all of these options available to us. We're going to have to pursue every opportunity to produce electricity that's non-emitting.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you, Mr. Bradley.

I understand your point of view on diversifying technologies, but the small modular reactor technology is not mature and is not developed. It will not be usable for another 10, even 15 years, so not before 2030 or 2035. As we know, Canada is trying to achieve net-zero emissions by 2050.

I remain optimistic, but I would like to know whether you have any data for us on whether that technology will really enable Canada to achieve net-zero emissions. If not, why not invest in technologies that are being developed in Canada, which are already mature and where we already have a competitive advantage? Why not let other countries with more force produce standardized small modular reactors and achieve economies of scale?

We could then use that technology over the short or the medium term. But in the meantime, we could focus on what is being done efficiently in Canada.

[*English*]

Mr. Francis Bradley: We're actually very close in terms of our approaches to this. The challenge, though, is that existing and current technologies that are available to us will not be sufficient for us to be able to reach 2050, whether one is talking about the current nuclear technology or the current technology with respect to carbon capture and utilization, or the current technology with respect to direct air capture. All of these things are going to have to be pursued.

They are not mature technologies today, but if we said that we shouldn't pursue technology until it's mature, we wouldn't have the amount of wind and solar that's coming on board today—

● (2115)

The Chair: Mr. Bradley, I'm sorry to interrupt.

[*Translation*]

Mr. Blanchette-Joncas, thank you for your questions.

[*English*]

We will now go to Mr. Cannings for six minutes, please.

Mr. Richard Cannings: Thank you to the witnesses. I must say that I took Ms. Diab's comment about bringing this back to science and research.... As a scientist myself, I wish I could stay on topic, but when you put a subject like nuclear power and climate change in front of a committee like this, things go off in all directions and into very important policy questions. I must admit that my first question is one of those non-science questions.

Mr. Diening, I've been following the Chalk River project for some time. Thank you for the land acknowledgements, but I must say that I know that the first nation on whose lands you operate, the Kebaowek First Nation, has been quite vocal in its objection to the continuation of nuclear industry on its lands, and has asked for an UNDRIP process to be heard for that consultation. It has heard nothing as yet from the government or from you or your partners in SNC-Lavalin, as far as I know.

I'm wondering if you could give a quick comment on that. I think it's important. We're talking about using these technologies in other first nations communities, and yet we're starting off on the wrong foot here, I think.

Mr. Jos Diening: As I mentioned in my opening remarks, engagement with the communities that we operate in is extremely important to Global First Power. We have spent extensive time in the community listening. We understand that building a plant in these communities is not a right of ours; it's a privilege. It's something that we need to earn.

We have spoken with the communities on both the Ontario and the Quebec sides of the Ottawa River, and we will continue that engagement and that communication.

I think the most important thing for us is that we listen and understand the impact that our project will have on those communities, and that we find ways for us to share the benefits with the communities that we operate in.

Mr. Richard Cannings: Thank you.

Now, to get more into the technology side of things, did you say...? I forget whether it was a micro or a mini, or whatever your SMR is. What did you say its footprint was? Did I hear that it's an Olympic-sized running track?

Mr. Jos Diening: Yes, that's correct. We're a micro modular reactor.

Mr. Richard Cannings: It's a micro modular reactor. It's not micro modular like a hot water tank in my basement—it's something a little bigger.

An hon. member: [*Inaudible—Editor*]

Mr. Richard Cannings: I was curious. I was just wondering what a micro modular size was.

In terms of getting back to the science and technology and the training that's necessary for the new technicians we'll need for an industry such as this, if you build something like this in a community, is there an opportunity for that community to staff the facility with people from that community?

Again, that's what seems to be very important to the remote communities and indigenous communities I talk to. They want to be able to give their residents a chance to do that work. However, nuclear power seems like something a little more complicated than running a diesel plant.

● (2120)

Mr. Jos Diening: The Chalk River facility that we're creating will be the commercial demonstration of our micro modular reactor. As we do our community engagement, it's definitely our intent to work with the local communities and find ways to engage them in the work that we do.

I agree that there's potential to operate and work within our facilities. I think it's an important thing for us. We are entering these remote communities, and I think it's important that we provide back to the communities and that we engage them as much as possible.

Mr. Richard Cannings: To clarify, then, if your technology is sold to some company, or whatever, that builds your technology in a remote community, say in northern Alberta, the people in that community could be trained to operate that facility.

Mr. Jos Diening: Global First Power is an owner and operator. We would look to the local communities to help staff our facilities in their communities. That is correct.

The Chair: Thank you, Mr. Cannings. You are always on time.

Dear colleagues, we're now going to go to the five-minute round, and we go to Mr. Soroka.

Mr. Gerald Soroka (Yellowhead, CPC): Thank you, Madam Chair, and all the witnesses, for coming today.

Mr. Diening, Mr. Cannings brought up an interesting point with regard to talking with indigenous people. However, I am also curious about the challenges or issues you've found with this government and its approach to the utilization of SMRs for energy in Canada.

Mr. Jos Diening: At this point, there are a couple of things that I'll speak to.

First of all, when you look at the breadth of new projects that are coming to the Canadian Nuclear Safety Commission for approval, there were some concerns in industry about whether CNSC would have the capacity to handle these projects. As we know, in the last several budgets, significant funding was provided to CNSC to build capacity to continue to be able to handle this new surge of projects coming its way.

When we look at the support through CNL with the lands owned by Atomic Energy of Canada Limited, which is an arm's-length organization of the federal government, we've seen a lot of support through that process and we hope to continue to see that support as we continue to develop our project.

Mr. Gerald Soroka: I was also curious.... One of our previous witnesses mentioned that there are tax incentives, green bonds or other benefits granted by the federal government for renewable energy, but not for nuclear energy.

Could you expand on how SMRs are more beneficial than renewable energy or other methods, and how SMRs are more cost-effective than these other renewables?

Mr. Jos Diening: When we look at the reason for this renewal in the SMR and the nuclear industry, it's really around climate change. You look at all the different aspects that are required to go after climate change, and all these different supply sources are required to meet the updated demands within the electricity market.

I don't see Global First Power's micro modular reactors competing with renewables. I think we help enable them and we help fill in a gap in the electricity market where solar and wind are not generated.

I don't really see it as competition for us. We're collaborating and working together, and we enable each other.

Mr. Gerald Soroka: You don't really see direct competition. It's more about how to balance each other out.

Mr. Jos Diening: That's how I see it.

Global First Power is an off-grid market, so it's a little different for us. We're not connecting into the larger grids. We're working in remote communities that aren't connected to the grids.

● (2125)

Mr. Gerald Soroka: Thank you for that.

Mr. Bradley, in February 2022, Electricity Canada published a report regarding the state of the Canadian electricity industry. In that report, they were talking more about the ambitions of net zero by 2050. I need to know how big a role you think nuclear needs to play in order to bring those carbon emissions to net zero by 2050.

How much electricity will we be producing through nuclear to help with that?

Mr. Francis Bradley: There are a lot of different projections of what the specific pathways will look like as we go out to 2050. We don't subscribe to a specific pathway as we look to the future.

What we know is that the math just does not work if you take any one of them—in this instance, nuclear—off the table with respect to what the future's going to require. Any kind of non-emitting electricity generation is going to be required. All of them will be required for us to be able to close the loop between now and 2050.

To your earlier question about—

The Chair: Mr. Bradley, I'm sorry to do this to you. It's the worst part of this. I apologize.

Mr. Soroka, thank you.

With that, we will go to Mr. McKinnon for five minutes, please.

Mr. Ron McKinnon (Coquitlam—Port Coquitlam, Lib.): Thank you, Chair, and thank you to all of the witnesses for being here.

We have talked with all of our panellists tonight, largely about implementation and commercialization issues. I really would like to get to the science of this. I'm wondering if our witnesses have any insight into where we should be putting our research efforts to move the dial on the science.

Where do we need to advance the science to make small modular reactors or any of this technology more effective and more viable, sooner?

I'll start with Mr. Diening.

Mr. Jos Diening: Madam Chair, thank you to the member for that question.

For Global First Power, our real differentiator is the fuel. A lot of our safety story is around the FCM fuel, for which we are building a manufacturing facility at Chalk River. The research really is around proving that the fuel story is as we expect it to be. Focusing on that would really significantly help us get to fuel manufacturing more quickly, which would allow us to get our plant online even more quickly.

Mr. Ron McKinnon: Thank you, sir.

Mr. Bradley, perhaps you can give us some insight as well.

Mr. Francis Bradley: Sure. We have emerging technologies. We have some that are very close to demonstration. In my view, what we need to be thinking about now is how in the next several years, once we get to demonstration and implementation, our focus then needs to shift to how we are going to be able to manufacture in an effective manner.

We need to be able to get to a place where Wright's law can come into play. As we begin manufacturing and doing multiples of the same unit—much of this work in the past in the nuclear space was bespoke, one-off projects—we need to get into a world where we can start driving the costs down very significantly by manufacturing multiples of the same unit.

Mr. Ron McKinnon: I'll ask Mr. King as well.

Mr. Troy King: I would agree. For the first SMRs that go into production, starting with OPG, it's critical that the project go well and that we get a lot of learning from that. As Mr. Bradley has mentioned, from there I think the success of the SMR here in Canada and Canada's success in reducing its carbon footprint will be on how we're able to maximize the efficiency in terms of the construction and operation of these SMRs. As you mentioned, it will be critical to put our investment into ensuring that we learn as quickly as we possibly can from the first ones and drive that cost down so that it is a sustainable option for us going forward.

● (2130)

Mr. Ron McKinnon: I think Mr. Diening hit closest to the mark that I was looking for. Talking about fuel, for example, do we need to put more research into different fission processes, different sequences of radioisotopes and their secondary production in existing processes to get more out of the processes and maybe to find more energy and newer technology directions?

Mr. Diening, perhaps you'd like to expand on that a bit.

Mr. Jos Diening: Global First Power is an owner-operator. We're not a technology company per se. Our focus is on getting this next evolution in the fuel right and on getting that done correctly. After that, we can look at expanding to different forms of fuel or different forms of generating power.

To loop back to your first question, we're laser focused on finishing this first commercial demonstrator, but I think the next big thing we need to do is to learn how to manufacture these plants at scale and really build a lot of them, because there's a huge demand for them throughout Ontario, especially in the north.

Focusing the science on how we modularize and how we build these faster, ensuring that we keep the quality and safety are, I think, things that will really benefit Global First Power.

The Chair: Thank you so much to Mr. McKinnon and Mr. Diening. We have a hard stop tonight, but I'm going to give a very brief question each to Mr. Canning and Monsieur Blanchette-Joncas. I would suggest that they ask for written answers, because it will be a hard stop.

Monsieur Blanchette-Joncas.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Thank you very much, Madam Chair.

Mr. Bradley, if possible, please send to us additional data on the questions I asked you earlier on the energy transition and the possibility of deploying small modular reactor technology while remaining competitive internationally.

Mr. King, I would be interested—

[*English*]

The Chair: You had one question, Mr. Blanchette-Joncas.

[*Translation*]

Thank you, my friend.

[*English*]

Mr. Cannings, you have one question too. It's a hard stop.

Mr. Richard Cannings: This is one question, and it's for Mr. King and Mr. Bradley.

Regarding the narrative we hear that the reason we need more nuclear is because it is this baseload power, I'm wondering about the development of better provincial interties. Would that be one of the options that Saskatchewan is considering? Is it one of those things that we need to consider nationally as a major way of providing baseload power to provinces that don't have clean power now?

The Chair: Thank you, Mr. Cannings.

Thank you to our witnesses for your time and expertise. We are most grateful. We hope you've had a good experience tonight.

I thank everyone who supports this committee.

To my dear colleagues on this committee, thank you for all of your work.

Good night, everyone. The meeting is adjourned.