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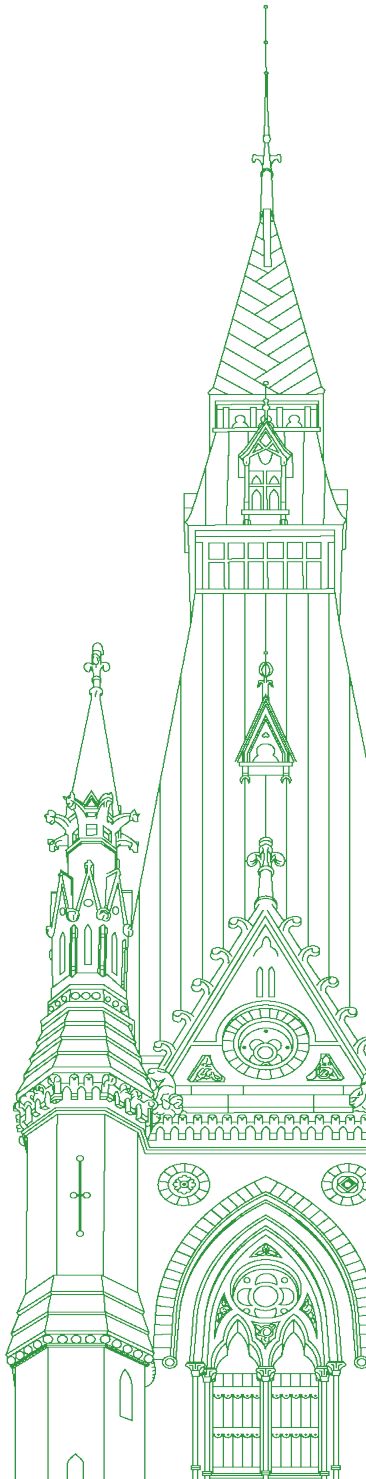

Chair: Ms. Valerie Bradford

Standing Committee on Science and Research

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● (1100)

[*English*]

The Chair (Ms. Valerie Bradford (Kitchener South—Hespeler, Lib.)): I call the meeting to order.

Welcome to meeting number 91 of the House of Commons Standing Committee on Science and Research.

Before I begin, I'll ask all members and other participants to consult the cards on the table for guidelines with respect to our earphones and feedback. We need to protect the hearing health of our interpreters. Thank you all for your co-operation.

Today's meeting is taking place in a hybrid format.

For those participating virtually, I'd like to draw your attention to a few rules. Please wait until I recognize you by name before speaking. Click on the microphone icon to activate your mic, and please mute it when you are not speaking.

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

For members in the room, please raise your hand if you wish to speak. For members on Zoom, please use the “raise hand” function.

The clerk and I will manage the speaking order as best we can, and we appreciate your understanding in this regard.

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

Pursuant to Standing Order 108(3)(i) and the motion adopted by the committee on Tuesday, January 31, 2023, the committee is resuming its study of science and research in Canada's Arctic in relation to climate change.

It is now my pleasure to welcome, as an individual, Aldo Chircop, professor of maritime law and policy. As well, Dr. Heather Exner-Pirot, director of natural resources, energy and environment at the Macdonald-Laurier Institute, is joining us by video conference.

Up to five minutes will be given for opening remarks, after which we will proceed with rounds of questions.

Dr. Exner-Pirot, I invite you to make an opening statement of up to five minutes.

Dr. Heather Exner-Pirot (Director, Energy, Natural Resources and Environment, Macdonald-Laurier Institute, As an Individual): Good morning, Chair and committee members. Thanks for inviting me to appear this morning.

I would like to preface my remarks by sharing my own involvement and experience with Arctic research.

In 2003, I began my career working for the University of the Arctic, a network of universities, colleges, research institutes and other organizations concerned with education and research in and about the north. I later completed my Ph.D. at the University of Calgary in political science, focusing on Arctic security.

After that, I worked at the International Centre for Northern Governance and Development at the University of Saskatchewan. I spent two terms, one as chair, with the Canadian Northern Studies Trust, which administered over $1 million annually in student scholarships.

Currently I am the managing editor of the Arctic Yearbook, an annual peer-reviewed publication focused on Arctic politics and security. I am a global fellow with the Wilson Center's Polar Institute, a member of the North American and Arctic Defence and Security Network. I'm a member of the Yukon Government's Arctic Security Advisory Council, and I sit on the board of the Canadian Rural Revitalization Foundation. My recent work with the Macdonald–Laurier Institute has focused on energy and resource development and on indigenous industry relations in western and northern Canada, but I'm still active in Arctic research.

I say all of this because when we think of Arctic research, we tend to think of climate change and the natural sciences, which is reflected in the study itself. No one will dispute that this is important and a priority. However, the focus on climate change has often come at the expense of other areas of study. The funding bias in favour of environmental sciences and against social sciences, business and engineering is well documented. The University of the Arctic conducted analysis of global academic publications in Arctic research last year. It found that almost a third focused on environmental sciences, while only 9% were in the social sciences, 4% in engineering and 4% in the humanities. A report released in April by UArctic, which was funded by Global Affairs Canada, showed an even starker divide with regard to funding. That's not surprising, as natural science research is structurally more expensive than social science and humanities research. However, it is symbolic of what we prioritize.

I have observed through the conferences I've attended, the research proposals I've assessed and the articles I've peer reviewed that Canadian Arctic studies have their own biases, and research funding gets applied to a relatively narrow set of research questions. Climate change, traditional knowledge, renewable energy and the negative impacts of resource development sit at the top of the list. There's nothing wrong with this list, but there are dozens of other important fields of study that lack funding and people.

I will provide two quick examples.

First, to my knowledge, there is not a single Canadian economist who specializes in the Arctic region. I know of only one or two Arctic economists from Alaska and Russia. Think about that. The region's environment and original inhabitants are well studied, but there is not a robust group of thinkers helping to inform economic development.

The other is the narrow lens we apply to understanding climate change. Looking only at sea ice changes—which is well funded and studied—one might expect shipping in the Canadian Arctic to grow dramatically. In fact, this is often taken for granted and repeated in speeches and op-eds. In my own research, however, I have come to understand that other factors are much more important than sea ice changes with respect to whether shipping increases in the Canadian Arctic, namely the economics of resource development. Investment decisions are tied to commodity cycles, not sea ice melt. I expect the lack of intellectual diversity and multidisciplinarians in Arctic studies means we often miss important considerations for many research questions beyond my own narrow research interests.

Finally, I want to touch on some of the trade-offs of our approach to conducting research with northern and indigenous communities.

There's a long history of scientists using traditional knowledge without requesting permission or providing credit, of entering traditional territories and conducting experiments without notifying or obtaining consent from local governments, and of getting funding to advance scientific goals and academic careers without ever returning knowledge or research that is useful to Arctic communities. This is well acknowledged. I'm sure you have heard, and will hear, from many researchers about the work that has gone on to remediate and change these circumstances, with many new positive relationships. This is to be applauded. However, I've also seen layers of bureaucracy applied to Arctic research that have made it more expensive and exclusive, have placed administrative burdens on indigenous communities and northern governments, and have deterred or prevented young graduate-level researchers from pursuing their interest in Arctic studies because the process is too difficult and lengthy.

There is a balance to be found between exploiting and disregarding northern communities on the one hand and on the other imposing hurdles on research that are so high we simply conduct less important research. I'm not convinced we have found the right balance.

I'm grateful you're taking the time to study this important topic and ensure that the efforts we put into Arctic research provide the greatest possible benefits to Canadians, in particular to those who live in the region. Often a lot of attention is paid to methodology but too little to impact.

● (1105)

Thank you for your attention. I look forward to questions.

The Chair: Thank you very much.

We'll now turn to Professor Chircop for an opening statement of five minutes.

Professor Aldo Chircop (Professor of Maritime Law and Policy, As an Individual): Thank you, Madam Chair. I thank the standing committee for inviting me to appear before you today.

I appear in my personal capacity as professor of maritime law and policy, with a specialty in the regulation of polar shipping. I am based at Dalhousie University.

My statement today concerns research needs for the governance of Arctic shipping at a time of change in Inuit Nunangat, which is the Inuktitut term for Canadian Arctic waters.

The increasing accessibility of Arctic waters navigation because of climate change and consequential progressive sea ice loss means more ships and more diverse regional shipping. The growth of shipping will have positive and negative consequences. The ability to maximize the potential benefits of shipping while mitigating or even preventing adverse consequences demands robust governance of shipping. I submit that aspects of both the international and domestic governance of polar shipping are not sufficient to protect the unique and most sensitive Arctic marine environment.

Despite celebrating 10 years in existence, the International Maritime Organization's polar code is a first-generation instrument. It was the product of consensus, based on the lowest common denominator—that is, what IMO member states were able to agree to. Hence, despite proposals to address broader environmental concerns with respect to shipping, it focused only on oily waste and noxious liquid substances in bulk sewage and garbage, but it did not regulate air pollution, including black carbon, ballast water management, grey water, underwater noise or other environmental risks in the polar context. Even on maritime safety, some of the polar code standards are insufficient, such as the one on safety equipment to enable survivability until rescue.

Recently Canada succeeded in persuading the IMO to designate Canadian Arctic waters as an emission control area for sulphur oxides, nitrogen oxides and particulate matter under the International Convention for the Prevention of Pollution from Ships. This will be formally adopted in October of this year. To comply with the emission control standards, a ship will either have to use low-sulphur-content fuel or install a scrubber, which is a machine on board the ship to remove the sulphur and thereby allow the ship to still be able to use heavy fuel oil. In particular, open-loop scrubbers produce highly acidic wash water containing harmful substances that pollute the marine environment.

It might be argued that the IMO ban on the use and carriage for use of heavy fuel oil in Arctic waters, which becomes effective on July 1 of this year, may mitigate the pollution risks. However, for some ships that meet a particular construction standard, the regulation takes effect only on July 1, 2029. Also, Arctic coastal states, including Canada, may waive the ban for their ships until July 1, 2029. The effect is to prolong the risk of heavy fuel oil in the Arctic marine environment until 2029.

Indeed there is great need for more research to help better understand safety and environmental regulatory weaknesses in polar shipping and thereby to help integrate and update international standards. There is a further dimension to all of this, and that is that a robust governance system needs regulatory equity. Inuit organizations were not involved in the development of the IMO polar code. Their voices and knowledge could have significantly aided regulatory development but were not considered. It was only recently that the Inuit Circumpolar Council was granted provisional consultative status at the IMO so that Inuit voices could be heard and could inform regulatory development.

While there is extensive scholarly research on Arctic shipping generally, there is relatively little research on the interface between maritime regulation—how we regulate ships, in other words—and indigenous rights generally, and especially Inuit rights, Inuit traditional knowledge—known as IQ—and Inuit law. As an aside, the Qanittaq clean Arctic shipping initiative, which is a new research project recently funded through the Canada first research excellence fund and co-led by Memorial University of Newfoundland and the ICC, is leading a consortium of universities, including my university, to commence this type of research.

Madam Chair, I conclude my statement with two matters.

First, there is a need to review the adequacy and robustness of international polar shipping standards and their implementation in Canada and Inuit Nunangat, how gaps can be addressed and how environmental and safety standards can be strengthened in an integrated manner.

● (1110)

Second, there is a need to support capacity building for Inuit organizations to enable meaningful engagement in the complexities of the governance of polar shipping.

Thank you. *Merci*. *Nakurmiik*.

The Chair: Thank you very much for your opening statement.

We'll now follow up with questions from the floor. Please be sure to indicate to whom your questions are directed.

We'll start a question round for six minutes with MP Rempel Garner.

Hon. Michelle Rempel Garner (Calgary Nose Hill, CPC): Thank you, Chair.

I'll direct my questions to Dr. Exner-Pirot. It's always nice to address another Calgarian, even if it's virtually.

We've heard a lot of testimony at the committee about the importance of having a national Arctic research strategy that could link some of the objectives of Canada's Arctic strategy as well as some of our defence strategies. Is this something you would recommend?

Dr. Heather Exner-Pirot: That's a great question.

I have been involved with the Inuit Development Corporation Association on some elements of northern modernization. I have written on particular innovations that would be useful, not only for communities and for mining development but also for defence, specifically with regard to transportation, energy and communications. The special little innovative technologies that I like and think should be tested more greatly in the Arctic are things like microreactors. We are seeing—

● (1115)

Hon. Michelle Rempel Garner: I only have six minutes, so I'm going to try to get through as many questions—

Dr. Heather Exner-Pirot: The answer is yes. There are many things that we should be applying.

Hon. Michelle Rempel Garner: Okay. I think you're pre-empting some of my next questions, which is great.

What should the content of that report or that strategy focus on? You've presented some non-obvious, non-partisan observations to the committee that really haven't been brought up by any other experts in committee testimony—specifically, that Canada's Arctic research strategy should include economic analysis and foreign policy posture recommendations.

Could you go through specific bullet point examples or recommendations of areas that should be included in an Arctic research strategy that really we don't have a focus on right now, and why those would be important?

Dr. Heather Exner-Pirot: Number one for me is economic development. That's what I focus on. However, I think there is a bias towards looking at resource development and economic development as normatively bad, maybe as capitalism or exploitation—yet when you talk to people in the territories or indigenous communities, they would like to see development. They would just like to have some control and ownership and partnership in it.

I don't think that's represented in academia.

Hon. Michelle Rempel Garner: On that point, in some testimony we have heard.... Certainly, in Canada's Arctic strategy right now, there are one or two throwaway lines saying that communities wanted natural resource developments and that they were consulted. However, that is not reflected in the body of the overall Arctic strategy.

What recommendations could the committee make to ensure that an Arctic research strategy looks at resource development in a more neutral way than perhaps has been presented by the government in the past?

Dr. Heather Exner-Pirot: Exactly.

It could be funding. Again, I think we need some graduate students. As I say, there are no economists I know of who look at the Arctic. There are very few political scientists, like me, who look at the political economy. We need to build some of that capacity, even statistical analysis—things that are left to the territories themselves right now.

I would also say engineering. Again, it gets very little. I don't think there are lots of engineers who have been to the Canadian Arctic. I find that the ability to develop new technologies that serve the very distinct needs of remote communities are not going to be developed by people who have never been there. We need to bring together that collaboration of the communities and the engineers to figure out what actually works in those communities and what technical challenges they have. I think we are still doing 20th-century technologies, poorly, in the Arctic.

That's economic development and engineering. I had a third one in mind.

You mentioned foreign policy. We tend to focus on defence. We focus on legal aspects, I think, but our foreign policy has been getting weaker. For the Arctic region as a whole, there is less attention paid to foreign policy.

Hon. Michelle Rempel Garner: The last thing that I found really important in your remarks was the fact that the interaction with first nations and indigenous persons in the Arctic seems to be a one-way street. That underscores the fact that the conversation on resource development as well seems to be very ideologically rigid in terms of it being “bad”.

What recommendation would you make for an Arctic research strategy that would alleviate what I think is an entrenched, rigid ideology that is rarely challenged in Canadian academia or in federal funding structures?

Dr. Heather Exner-Pirot: I say this as someone who's worked in universities and who now works in think tanks—maybe for a reason.

Everyone I know who's in Arctic research is a good person and doing their best, so I don't mean to diminish anyone, but of course the backgrounds of people who are interested in Arctic studies, who like to go out and work on the land and do field research and who work in a university are a particular subset of person. They tend to have the same values. I think a lot of things get missed because there isn't a lot of intellectual diversity and maybe professional diversity—

Hon. Michelle Rempel Garner: In the last seconds I have here, you're recommending that a Canadian Arctic research strategy have an actual stated value of intellectual diversity as something we should be striving for on policy in Arctic research.

● (1120)

Dr. Heather Exner-Pirot: I would think so. Maybe even list the different sections or the different disciplines for which you would hope to fund research, so they don't all funnel into the same silo.

Hon. Michelle Rempel Garner: Thank you.

The Chair: Thank you very much.

We will now turn to MP Diab for six minutes.

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

Welcome to both of our witnesses this morning.

I'll direct my questions to Dr. Chircop.

It's always nice to see an Atlantic Canadian, particularly a Haligonian, and a professor of maritime law from Dalhousie.

Dr. Chircop, there are two things I'd like to ask you about, and I'm going to give you time to actually respond.

Let me just ask the questions first.

You talked about two important things—probably more, but two. One was that greater research is needed on safety and environmental aspects. Then you also stressed the importance of Inuit participation in maritime regulation and shipping.

With regard to the second point, how might we follow up with the United Nations Declaration on the Rights of Indigenous Peoples Act with regard to the shipping in the Arctic?

I'm going to give you all the time you need.

Prof. Aldo Chircop: Thank you very much.

I realize that the time is probably limited to the six minutes that you have. They're excellent questions, and I thank you very much for those.

Certainly, on the safety side, because of the remoteness of the region and the lack of infrastructure, we know that we have some real challenges if we have a need for humanitarian assistance for users of the marine environment in remote areas. Our capacity to intervene, the farther north we go, is significantly limited. There is safety from the angle of search and rescue and also safety for those who provide search and rescue services. There is also the dimension of safety for those on board ships.

We're beginning to see more and more interest from cruise ships and also small pleasure craft. What we have to consider here is that we do have international standards for equipment to enable survival until rescue services reach those in distress. What we know now through research is that those standards are insufficient. They are essentially aimed at ensuring survivability for up to five days, in terms of clothing, supplies and so on. However, because of remoteness, we might need more than five days to reach somebody in distress. In the meantime, their equipment and the levels of nutrition they need would not be sufficient to enable them to survive.

With the current standards that we have, there is a real danger that we could have—God forbid—a situation with major casualties. We could be looking at very serious risks to human life. Clearly, we need safety on board ships—safety standards for surviving, but also safety for those who work on board ships.

With respect to the second question—in particular, with respect to the United Nations Declaration on the Rights of Indigenous Peoples Act—the committee will recall that this important piece of federal legislation has committed Canada to implement UNDRIP and essentially to review federal legislation to enable its implementation.

Essentially, the commitment there is generic, basically, to any legislation that is relevant. I would argue that this would include maritime legislation. Indeed, that includes the legal frameworks we have for the regulation of shipping right across the country, including, of course—because we have an interest in the Arctic—in the north.

That would mean, for instance, that we would need to take another look at the Canada Shipping Act, 2001; the Arctic Waters Pollution Prevention Act; and a range of other statutes. Indeed, we have a long list of statutes and maritime law that apply in the north, and we need to see how UNDRIP can be implemented through these statutes.

I'll give you an example of the relevance of UNDRIP here for informing federal legislation. There is a duty in UNDRIP for states to protect the environment in a manner to enable indigenous peoples to exercise their rights. We have to be particularly cognizant here of the range of risks to the environment we are seeing from potential industrialization in the north, which may therefore adversely affect the interests of indigenous peoples. More ships, for example, will mean more noise. More noise will have impacts on a range of species and ecosystems. Plus, of course, more ships may require more icebreaking for the shoulder seasons and so on, which means there's the potential of disrupting Inuit ice routes, the movement of animals on ice and so on.

There is a range of potential environmental impacts here that we can anticipate. Therefore, it would be important for us to have the legal framework that anticipates these potential risks.

I hope I've answered your questions.

● (1125)

Ms. Lena Metlege Diab: You have. Thank you.

We've heard previous testimony on the increased frequency of wildfires and flooding. Based on your studies, how can we help to better protect infrastructure for climate change resilience? Are you able to offer any advice on that?

Prof. Aldo Chircop: Unfortunately, my background has not enabled me to address other aspects of infrastructure, other than infrastructure to support shipping. Of course, the major concern we do have in the north is the relative lack of infrastructure.

There has been progress in terms of undertaking hydrographic surveys and thinking perhaps of developing and strengthening port facilities in the north, of which we have very few, and potentially also navigation aids and so on. The concern for shipping is not so much the wildfires and so on in northern regions, but perhaps more what climate change might mean to the little infrastructure we have there—for instance, infrastructure that may rely on permafrost for its stability. The loss of permafrost would of course be a threat to infrastructure.

Ms. Lena Metlege Diab: Thank you. I think we're at this point.

Thank you very much, Madam Chair, and thank you, Dr. Chircop, for appearing this morning.

The Chair: Thank you.

We'll now turn to MP Blanchette-Joncas for six minutes.

[*Translation*]

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

Welcome, witnesses. Thank you for being with us today.

Dr. Exner-Pirot, in your opening remarks, you mentioned that scientific research in the north is limited because of a lack of funding. I find that very worrisome. Moreover, the type of research being done changes depending on the government. When we had a Conservative government, scientific research was much more focused on defence. Currently, research focuses on other areas, such as the environment and indigenous communities.

What are your thoughts on the need for sustainable, but also diversified, funding to support research in more fields?

[*English*]

Dr. Heather Exner-Pirot: Thank you very much for the question.

I think government changes in policy, going from black to white and white to black, are a challenge for many people. In the research that I do, which is more focused on political science and social science, there could be a greater overlap with defence, with indigenous communities and with Arctic research. Think of it more holistically and about how all these different pockets of funding can reinforce and leverage each other instead of being applied, for example, to a particular university, a particular program and a particular set number of graduate students and post-doctoral fellows.

I know this is tricky, but in funding outcomes instead of processes, maybe there's something worth rebalancing there.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Would you say that social sciences and humanities funding for northern research is disproportionate?

[*English*]

Dr. Heather Exner-Pirot: There's clear evidence. You'd say objectively and quantitatively that it's very disproportionate.

I appreciate how expensive it is to do natural science research in the Arctic. I don't even know if I'd say there's enough natural science research in the Canadian Arctic either, considering how much territory we have. I think Norway spends more on Arctic research than Canada does right now, which is a bit embarrassing, so we could have more of everything. It wouldn't take a lot more money to get a lot more value out of social science research, especially from political science and economics.

It doesn't always have to be on the land. It's more about just going to communities, which is expensive. I think we could be getting more value out of the money we have. It wouldn't take a lot more money to get a lot more impact.

[*Translation*]

Mr. Maxime Blanchette-Joncas: I agree that engineering and natural resource science is much more expensive, but, as you also know, it's the higher-ups who set the tone. This government's biggest infrastructure project in Canadian history involves transporting oil for export, and I think you can see that this is also reflected in public policies.

We have a brief from Joël Bêty and Dominique Berteaux, the Canada research chair in northern biodiversity at the Université du Québec à Rimouski. They told us that the majority of research funding programs support short-term projects that focus on novelty, which limits opportunities to implement new long-term follow-up programs. I'd like to hear your thoughts on that.

● (1130)

[*English*]

Dr. Heather Exner-Pirot: I agree. If you look at the Canadian research system and the environment, how much money is put into actual proposals and to getting the funding? It's kind of a waste of human resources, and we're all fighting over the same small pie. You're not getting more value from more people competing for that same small pie.

In some sense, having longer-term funding allows people to answer research questions in a more comprehensive way and not have to focus their efforts on always trying to get more funding. I think our best and brightest research chairs are chasing funding. It's probably the major part of their job, which is probably not where we want them to direct their efforts.

In general, yes, I would agree with that.

[*Translation*]

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

Many witnesses have told us about the value and the necessity of developing a strategy to coordinate the work of different researchers in different fields. We know that the government currently has a number of entities, including the National Research Council of Canada, the Arctic and Northern Policy Framework, ArcticNet and a number of other organizations under federal jurisdiction that are doing various things, but there's no structured overall vision. What are your thoughts on this lack of vision and the immediate consequences of that for the northern research community?

[*English*]

Dr. Heather Exner-Pirot: I mentioned that I worked at the University of the Arctic. I still participate in this university, which is a consortium; it's not an actual university.

I think probably the best and smartest thing it's done is what is called thematic networks: It brings together Arctic research across the eight Arctic countries and elsewhere to focus on a particular issue or a particular theme. It has produced very good results, I would say.

It's perhaps organizing around particular outcomes and particular needs of society and having some deliverables and goals for answering some of those, not just producing publications. That's where the system, I think, lets us down. Getting funding and producing publications are what's valued most, but in Arctic research, there's much more need for practical solutions and outcomes.

[*Translation*]

Mr. Maxime Blanchette-Joncas: From your expert point of view, if you had to define major objectives for northern research in the humanities and social sciences, what would those objectives be?

[*English*]

Dr. Heather Exner-Pirot: Some of it is environmental for sure, and understanding it.

I also want to point out that understanding climate change in the Arctic isn't mitigating climate change. You still need to reduce carbon emissions and greenhouse gas emissions. Understanding how it's affecting the Arctic doesn't do anything to mitigate it. There are some things, like reducing black carbon and reducing diesel generation, that actually mitigate climate change.

Community health is obviously a big one. It is reasonably well funded, I think, but that tends to be a priority of communities.

Infrastructure is underfunded. Getting the brightest and smartest people to think about infrastructure with the challenges in the Arctic I don't think happens often—

The Chair: That's well over our time. I'm sorry.

Dr. Heather Exner-Pirot: Okay.

Economics would be the last one.

The Chair: Now we'll turn to MP Cannings for our final round of six minutes.

Mr. Richard Cannings (South Okanagan—West Kootenay, NDP): Thank you to both witnesses for being here. I'm going to start with Dr. Chircop.

You talked about the challenges that climate change is bringing to the Arctic, the opportunities with increased shipping, especially in your field of study, and the need to involve communities and use the United Nations Declaration on the Rights of Indigenous People to inform that. I'm wondering if you could clarify where we are now compared with other countries and other areas.

How do our safety standards for shipping in the Canadian Arctic stack up to safety standards elsewhere in the world, whether it's the Mediterranean or other quite different areas?

Prof. Aldo Chircop: Thank you for that important question.

Of course, the Arctic is its own context. It's very different from other regions where the infrastructure is much more well developed. The Mediterranean, for instance, has a very long history, with a very extensive port system. Essentially, there are platforms to provide services at sea throughout the region. That is not the case in the Arctic, especially in our part of the Arctic, where the infrastructure certainly leaves much to be desired.

In terms of standards, we are comparable to the other Arctic states. We compare with like states—with, let's say, the other four central Arctic Ocean states—because we are all parties to the IMO conventions. We've all implemented the polar code, which has safety and pollution prevention standards. Essentially, on the books, the laws and regulations are comparable to a great extent.

There are some important differences, however. For us, there is actually something we have more than the other Arctic states. We now have a designated emission control area, which will be formally adopted later on this year. That will be actually a step ahead of the other Arctic states.

In terms of capabilities for search and rescue and so on, if we compare ourselves to the Norwegians, the Norwegians perhaps are farther ahead of us, but they're looking at much smaller areas than the Canadian Arctic.

If we're looking at the environmental standards, we could improve on certain things. For instance, we could perhaps be more precautionary with respect to the amount of noise that is being generated by more ships in the region. We could perhaps take a harder stance on the discharge of grey water from ships, especially passenger vessels. I would suggest we maybe take a harder stance on heavy fuel oil, because we have positioned ourselves, in a way, to grant certain exemptions for vessels to continue to use heavy fuel oil when we know that this poses certain risks.

We're ahead of others in some respects. In other respects, we're perhaps not necessarily ahead.

● (1135)

Mr. Richard Cannings: To focus on the particular concerns in the Arctic, climate change is affecting the Arctic much faster than it is affecting us down here. Also in the Arctic, communities are much more dependent on the land and sea for food. The Inuit require the ice for seal fishing and whaling and to get out on the land to hunt caribou.

Would you say there is perhaps an even higher priority to maintain the environment and to mitigate pollution—air pollution, water pollution and noise pollution?

Prof. Aldo Chircop: Absolutely.

What we also have to consider is that a major difference between the interests of shipping and Inuit interests is that shipping needs to have clear open water. In areas where there are Inuit ice routes and Inuit hunting and subsistence and perhaps temporary camps on ice, the ice is needed for safety. There have been concerns, for instance, that when icebreakers are basically breaking apart the ice, the way the ice reforms potentially poses a barrier for hunters to return safely to their homes.

I would say that we probably have a higher responsibility than the other Arctic states because of the particular geography, the particular demographics in the region and the social and cultural importance of the region. Don't forget too that this is the homeland of Inuit. This is not just a superhighway for ships ready to be opened; this is essentially a space that is important for subsistence, culture, identity and so on, so we do have a higher responsibility, I would argue.

Mr. Richard Cannings: I would ask you this, then. We've heard testimony about new research policies and programs that are specifically coordinated with communities and developed right from the start within communities throughout the Arctic. Do you think that is the model that Arctic research should try to follow?

● (1140)

Prof. Aldo Chircop: I'm involved in one of those. In fact, I mentioned Qanittak. Qanittak is an Inuktitut word that means “freshly fallen snow”, which is a metaphor for a fresh beginning, and it focuses on shipping. Can we think about shipping differently?

This project is co-led by Memorial University of Newfoundland and the Inuit Circumpolar Council. This is the first-ever research excellence fund that is being co-led by an organization that is not a university.

The Chair: Thank you very much.

We'll now start our second round of questioning for this panel. We'll begin with MP Tochor for five minutes.

Mr. Corey Tochor (Saskatoon—University, CPC): Thank you so much.

Thank you to our witnesses.

My first questions will be for Ms. Exner-Pirot.

I found your article on May 16 in the Financial Post riveting. You discussed rare earth mining in the territories and the state of it. It says: “In many ways, we are playing right into their hands,” which means the PRC. Could you elaborate on how Canada's critical minerals policies are playing into the hands of the PRC?

Dr. Heather Exner-Pirot: It is our approach of shifting energy systems to things that are critical minerals-intensive, rather than things that we have in Canada, which are uranium and nuclear power that doesn't require enrichment, and fossil fuels, for which you could use carbon capture to make them carbon neutral.

Making our energy systems dependent on what we know are Chinese supply chains—we've seen our American neighbours to the south imposing very heavy tariffs to avoid this problem—is what I was getting at.

Mr. Corey Tochor: It does play into foreign countries' interests and the current policy that they're utilizing.

To go back to some of your analysis and research on infrastructure in the north, can you elaborate a little bit more on communities that have natural resource projects, such as a mine? What is the infrastructure like around those communities? Is that infrastructure built to withstand climate change better than, say, other communities that have zero economic activity?

Dr. Heather Exner-Pirot: That's a great question.

The reason I'm not too worried about too much shipping is that it is still so expensive to get metals and minerals out of the Arctic. There aren't the discovered deposits. There aren't the projects that would indicate that we're going to see, for example, another Mary River iron mine or another Raglan Mine in the Canadian Arctic anytime soon.

The biggest constraint, again, is the price of the commodity and the cost of the infrastructure. Where we have real growth is in diamonds, gold and silver, because you can fly those out, and they don't require a lot of infrastructure. To get more copper or nickel, you would need to have a railroad or some kind of road. The only reason we have that great iron mine in Nunavut is that it's very close to tidewater, so you have a short way to get it to ships, and it usually goes east, not west to the Northwest Passage. The lack of infrastructure is a huge bottleneck to our producing those critical minerals in the Arctic.

Mr. Corey Tochor: An important strategy for helping the Arctic is helping the territories. We know that under this government, the regulations have changed on natural resource projects. There are no new projects being proposed for the mines, or mines being built, as we speak.

How much of a negative impact has this had on the territories—the change in regulation on natural resources?

Dr. Heather Exner-Pirot: The biggest economic driver in the territories is actually public sector funding from government and federal transfers. That creates dependence.

Mr. Corey Tochor: That might be the problem across Canada as well.

Dr. Heather Exner-Pirot: That's a problem. It creates dependence. It creates, I would say, a Dutch disease. The public sector is absorbing all the talent and money, rather than the private sector.

The other bright spot would be mining. For example, that one iron mine is 25% of Nunavut's GDP. The diamond sector in the Northwest Territories is 25% of its GDP, and we know the diamond sector is closing. It's reaching the end of its lifespan. By 2030, probably, there will be no more diamond mining, and we need to start thinking about how we are going to replace it.

I'll tie it back to my original statement: It is consultants who are doing some of the work on this. I don't know of any other academic who has thought about the GDP of these territories and how you would get more mining out, and what the policies and regulations would be. There is no academic attention paid to this fundamental problem for the territories.

Mr. Corey Tochor: You talked about some of the research. They had hazy outcomes and very few practical solutions. We're looking for simple common-sense solutions. Regarding the research happening right now, what are your thoughts about adding a requirement that at least makes them identify practical solutions coming out of the research versus just research to do more research in the north?

● (1145)

Dr. Heather Exner-Pirot: I think that's the solution: Weigh more heavily on the outcomes in the proposals and funding allocations.

Again, research proposals I have evaluated are very focused on the methodology. You have to say, “Give me two pages on your methodology.” We've become obsessed with the methodology. It's always, “Well, we are working with indigenous communities”, but what is the outcome for those communities?

I think weighing that aspect more heavily would be a big help.

Mr. Corey Tochor: I will quickly thank you for the important public service work you do with the research.

The Chair: Thank you.

Now we'll turn to MP Longfield for five minutes.

Mr. Lloyd Longfield (Guelph, Lib.): Thank you, Chair.

Thank you to our witnesses.

I'm going to start my questions with Dr. Chircop.

On May 9, we had a witness at our committee, Jackie Dawson, who is the Canada research chair in the human and policy dimensions of climate change at the University of Ottawa. She's also the scientific director of ArcticNet. She told us that disruption of shipping traffic in the Panama Canal and the Suez Canal, combined with melting sea ice in the Canadian Arctic, could result in increased marine traffic in Arctic shipping lanes, including the Northwest Passage. You reflected some of that in your testimony as well.

Do we have enough scientific data to measure the changes that could be affecting traffic and marine life?

Prof. Aldo Chircop: Thank you for that question.

There's a colleague of ours, Frédéric Lasserre, who has done some very interesting work looking at the extent to which industry is actually interested in using the Northwest Passage. In fact, if he appeared here, he would probably be an excellent witness for this standing committee.

Basically, the point he underscored in his work is that shipowners are not rushing to build world-class vessels yet. There may be a number of factors there, at least for the Canadian Arctic. The Russian Arctic is a totally different story. Of course, there is the potential for paradigm shifts. What Professor Dawson was referring to is, potentially, one of those: What if you have a major disruption to the established maritime routes? Will there be more pressure on the northern routes? In theory, it is possible, but what we have to bear in mind too is that shipping in the north is seasonal, whereas shipping through the Panama Canal relies on accessibility all year round.

Then there's the issue of lack of predictability on how open the season is going to be—the navigation season in the Arctic, the shoulder season and so on. This could be a real disincentive to move shipping through northern waters.

Then, of course, there is also the question of infrastructure—

Mr. Lloyd Longfield: Thank you.

You mentioned quite a few variables there, and things are changing. The shoulder season is becoming broader, and there may be a time when that really doesn't exist if we continue on current trends.

How are we monitoring things like sound? I know on the east coast we've been protecting the right whale population since 2017, when we took some action on shipping traffic in the Gulf of St. Lawrence. Is there data on what is acceptable in terms of noise?

Prof. Aldo Chircop: That's an excellent question too.

There's a good deal of uncertainty. We know that noise does have adverse impacts on ecosystems, on species, and potentially also, it seems, on some commercial species, from what I understand from the literature. There's a potential range of impacts. However, of course, in the north we're especially concerned about those animals upon which Inuit depend.

There is a fair bit of research now looking at underwater noise. I have a colleague at Dalhousie University who has been looking at some of this. His name is David Barclay. I understand that DRDC, Defence Research Development Canada, has been collecting data. On whether enough has been done to establish a threshold so that we can say we can base a regulation on it, we're not quite there yet. In fact—

Mr. Lloyd Longfield: That's where I was going. Thank you for that.

I'm sorry to interrupt, but the third part of this question is on our goal as a government of protecting 30% of Canada's oceans by 2030, 25% by 2025. We have some aggressive goals on protecting oceans.

When it comes to regulations, should that include things like noise or some of the social impacts on Inuit?

● (1150)

Prof. Aldo Chircop: Absolutely, yes. I would argue that there's a strong argument here for adopting a precautionary approach. Even though we are perhaps not able to establish a scientific standard yet upon which to base a regulation, we should be able to provide advice or at least guidance, essentially, to try to minimize ships operating in certain areas and their ability to generate underwater noise. There are some things that we could do.

Mr. Lloyd Longfield: All of this requires money, and strategies are very expensive. We need to look at how we fund all this.

Prof. Aldo Chircop: However, I would argue that we need more than money. We need, for this, also some real commitment at the IMO, because the industry here will take the position, “We don't have enough science here to be able to base the standard. What are we aiming at? This is going to cost us”, and so on.

However, of course the whole point of precaution is because of the scientific uncertainty. We need to take certain steps and we need to beef up those standards, which at the moment are purely voluntary at the IMO.

The Chair: Thank you very much.

I'm afraid that's the end of our time. If you want to expand on that, you can send a written submission to our clerk. That would be welcomed.

We will now turn for two and a half minutes to MP Blanchette-Joncas.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Dr. Chircop, it's a pleasure to welcome you to the committee. You're the Canada research chair in maritime law and policy at Dalhousie University. You're no doubt aware that the Université du Québec à Rimouski does a lot of work with Dalhousie University in marine research, including in the ocean oxygen research project. I am therefore honoured to be able to ask you questions and draw on your expertise today.

One of the things you've been able to look at is disruptions caused by marine traffic. What are the observed and expected consequences of climate change on navigation, particularly in the Arctic archipelago and the Northwest Passage?

[*English*]

Prof. Aldo Chircop: Thank you very much for that very good question, and I may not be able to answer it in its entirety.

I can certainly say that there is a real socio-cultural concern. Inuit communities are really concerned about the increased shipping, especially if shipping and its governance are such that they are not able to participate effectively in it. Basically, as I understand from the positions that I've heard, they would certainly like to hear more. They would like their voices to be heard.

For example, through the initiative for the establishment of low-impact shipping corridors, they want to be able to present their concerns and indeed maybe even inform and provide, through their knowledge, another form of knowledge to complement the science that is going into the designation of the corridors. I would say, first and foremost, the principal concern is human.

[*Translation*]

Mr. Maxime Blanchette-Joncas: Concretely, in terms of marine policy and northern research, what should the federal government change or add to ensure the well-being of both the environment and communities?

[*English*]

Prof. Aldo Chircop: I think it's for voices to be heard, I would suggest.

Traditionally, shipping been managed through a system of central administration. I would argue that we need to move from the notion of administration to governance—basically, to open up and have more equitable participation, especially in employing area-based management approaches to shipping. Whenever we are designating spaces, I think it's very important not to forget that these spaces, these routes for ships, are actually through someone else's homeland.

● (1155)

The Chair: I added more time, so you have 10 seconds.

Thank you very much. Thank you for your testimony.

We'll now turn to MP Cannings for two and a half minutes.

Mr. Richard Cannings: Thank you. I would like to follow on with that conversation.

We heard some concerns from Dr. Exner-Pirot about how a lot of the research in the Arctic is aimed at studying the environment. It's aimed on studying the accumulating effects of climate change, for instance, and not enough on economics.

On your concerns about having Inuit voices heard in directing where research funds might go, I'm wondering if you could expand on your previous remarks. What models are out there for research funding, for programs that would listen to those voices and create research that would benefit Arctic communities?

Prof. Aldo Chircop: Thank you very much for that excellent question.

I would add, of course, that in addition to not enough economics, I would say also that there is not enough legal research looking in particular at the relationship between how we're regulating these various industrial activities and their relation to indigenous rights.

I would say also that it's specifically with respect to how we're regulating shipping. I find that we have a fair bit of research publications on the Law of the Sea aspects, but not so much on maritime law, and maritime law is more about how we regulate ships.

In terms of how we could move toward a different model, we could have more research that is not simply involving indigenous partners but is indeed co-led with indigenous organizations. I think this is a step forward in moving from partnerships to actually co-leading—in other words, creating a better sense of social licence for that research, in that this research is being more responsive to the concerns that are being advanced by the indigenous organizations themselves, rather than being interpreted by researchers south of 60.

The Chair: You have six seconds.

Mr. Richard Cannings: Thank you.

The Chair: Thank you very much to our witnesses on this first panel. We really appreciate your testimony.

If you have anything supplemental that you would like to add, you may submit that to the clerk.

We'll suspend briefly to allow the witnesses to leave, and then we'll resume with the second panel of witnesses.

Members attending via Zoom, please stay connected to this session.

● (1155)

_____(Pause)_____

● (1200)

The Chair: Welcome back.

I would like to say a few comments for the benefit of the new witnesses.

Please wait until I recognize you by name before speaking.

For those of you appearing by video conference, click on the microphone icon to activate your mic, and please mute yourself when you are not speaking.

There is interpretation for those on Zoom. You have the choice at the bottom of your screen of floor, English or French. Those in the room can use the earpiece and select the desired channel.

It's now my pleasure to welcome, as an individual, Dr. Nicolas Brunet, associate professor. From Arctic360, we have Dr. Jessica Shadian, president and chief executive officer.

We'll give you up to five minutes for opening remarks, after which we will proceed with rounds of questions.

Dr. Brunet, I invite you to make an opening statement of up to five minutes.

Mr. Nicolas Brunet (Associate Professor, As an Individual): Thank you for this opportunity to speak on this topic.

I'm an associate professor and an accredited professional planner in the School of Environmental Design and Rural Development at the University of Guelph. I'm an interdisciplinary scholar working on the human dimensions of environmental change and research governance. I've been working closely with Inuit and first nations partners in Arctic and sub-Arctic regions of Canada in various capacities including consultant, student and faculty since 2006.

Much of what I'm going to discuss today relates to work in Nunavut. I'll be focusing on two points, the first of which is whether Arctic and northern populations have the research infrastructure, tools and funds to participate in research.

In my opinion, some research grants are catching up with the need and providing new, more accessible opportunities for northern populations and Inuit specifically, some of which are federal. My experience in getting northern partners to apply for these funds would suggest that some tri-council portals and application requirements are somewhat maladapted to variability in computer literacy and access to reliable Internet in some communities. One has to wonder if those opportunities are reaching everyone equitably. As a result, most opportunities still require some measure of southern-based leadership, although I do see promising signs in the creation of degree-granting colleges and universities in the Arctic, such as Yukon University, for instance, that build tremendous capacity in the north for the north.

This being said, physical community research space is lacking. We often forget that much of research practice has nothing to do with collecting information in the field or on the land. Most is spent in front of a screen, applying for funds, analyzing and interpreting samples and data and writing about the work. An ongoing study co-led with Inuit group Ikaarvik in Pond Inlet, Nunavut, and one of my graduate students, Sarah-Anne Thompson, suggests that community research still occurs in people's homes. This may seem fine from a southern perspective, but it ignores the extent to which Nunavut and other jurisdictions are facing housing crises and a lack of safe, healthy indoor space to live and gather.

The use of research stations for community research is a grey area that I've also been reflecting on for a few years. There are a good number of federal, territorial and university-owned research stations in the Arctic, serving communities in a variety of ways. I've been working closely with Environment and Climate Change Canada in Pond Inlet, Nunavut, and have made use of the research station there for years now. My colleagues at ECCC have been very interested in supporting community science, but there seem to be a number of barriers to allowing local use of these facilities. However, this is beyond the scope of my work for now.

In my view, this is not the solution, though. If Arctic peoples want to participate actively in science undertaken on their traditional territories, they need physical spaces to do so and need to lead in their creation.

My second point is whether Arctic science and research collaboration is meaningfully conducted with local and indigenous people. Inuit knowledge, or Inuit Qauijimajatuqangit, including land-based skills, has been essential to researchers and science in the region for almost 100 years. This relationship has evolved substantially, with various technological and transportation advances, but it remains important.

I'll focus here on the word “meaningful”, which, in my view, warrants much more reflection. The meaningfulness of the collaboration or partnership is directly tied to the level of Inuit community influence and, ultimately, control over the research agenda in their homeland. Communities will probably never be able to lead the vast majority of research that takes place on their territory because research in the Arctic is vast, diverse and requires tremendous resources. Nonetheless, I think self-determination should be central within a negotiated Arctic research policy.

Pulling from recent quantitative systematic reviews of the literature that I led on the evolution, degree and nature of community engagement in Arctic research, here are a few highlights to consider.

Local engagement in Arctic research has only increased slightly since 1965, with a few important nuances that I don't have time to discuss right now.

Arctic author-led studies are negligible, making up less than 1% from 1965 to 2020. We did find that 10% of studies in the last 10 years have had local or community-based authors, which is really promising.

Finally, the focus on climate change and global change could be one of the most important and significant drivers in promoting community engagement in Arctic science presently, which points to a real and genuine interest in engaging in that sort of science.

Thank you very much.

● (1205)

The Chair: Thank you very much for that opening statement. I'll ask you to move your boom up a bit higher, just for the interpreters.

We will now turn to Dr. Shadian for her opening statement of five minutes.

Dr. Jessica M. Shadian (President and Chief Executive Officer, Arctic360): Thank you, and thank you for this invitation.

My comments today come from my own experiences of living and working as an academic and a researcher in the Arctic on Arctic issues for more than two decades. My Ph.D. is in international relations. I lived and worked in Iceland, north Norway, Lapland, Finland, Sweden, Denmark, the U.K. and the U.S. before living in Canada and becoming the CEO of Arctic360.

Among its activities, Arctic360 focuses on Arctic research to help translate primary research into knowledge for the general public. It's part of two international research projects related to that. For today's discussion, I'll focus on science policy and strategy related to innovation coming out of the Arctic.

Climate change is real. It's impacting the whole of the Arctic region. In Canada, it affects indigenous peoples' and all northerners' security and well-being, and Canada's national security and prosperity.

Canada's climate change research is focused on understanding both climate change and its impacts—not least its impacts on northern communities—and adaptation. However, our approach to adaptation has, in my mind, been limited because, I feel, we undervalue academia's potential and because we lack an Arctic strategy.

I'll explain. Our Arctic neighbours are using the challenges posed by climate change to innovate, prosper, secure and strengthen their own Arctic communities and national security.

Sweden's Arctic strategy, for instance, focuses on the opportunity its Arctic climate creates, enabling innovation to scale for global export. It explains that at Sweden's world-leading Arctic innovation clusters, “Knowledge is transformed into new products and services” through collaboration between business, academia and the public sector, and by small enterprises in subsupplier chains. It goes on to say that “Arctic conditions like a cold climate and sparsely populated areas make it possible to provide test and demonstration environments” for aviation, automotive and space industries.

Norway's own Arctic strategy states, “Further developing North Norway as a strong, dynamic and highly competent region is the best way to safeguard Norwegian interests in the Arctic.” The government will support “innovation, entrepreneurship and start-ups in the north, and specifically northern ocean-based industries, the maritime sector, petroleum, green power-intensive manufacturing, mineral extraction, agriculture, tourism and space infrastructure”. Norway's Arctic cluster team's mission, for instance, is to build expertise, develop innovation and contribute to the commercialization and scaling of solutions for new green value chains, digital transformation and infrastructure for innovative development.

Finland, home to the Arctic VTT Technical Research Centre turned a section of the Norwegian-Finnish E8 interstate Arctic highway into a testing track for EVs precisely because the road is snowy, icy, dark and windy, with extreme weather. The road includes built-in sensors to measure vibration, weight, pressure, acceleration, surface slipperiness, etc.

Longyearbyen, Svalbard, had its own housing pilot project, consisting of three building blocks' worth of new apartments. We can use housing in the north. The project installed sensors into the ground to measure the impacts of steel construction on the changing state of permafrost, and that knowledge will be used to build more climate-resilient infrastructure going forward.

Meanwhile, in Canada, Iqaluit’s 94-room hotel and conference centre, built in 2019, used modular hotel rooms fabricated in and imported from China. The whole of Nunavut does not have its own university.

Initiatives such as the northern transportation adaptation initiative, which was mentioned in previous sessions, are important. This project included co-operation with industry. The focus was on adaptation, but not innovation. For instance, the project employs thermal siphon foundation systems to address permafrost melt. However, the technology itself is patented in and imported from the United States.

This gets to the bigger strategic shortcomings when it comes to Canada's Arctic research. ISED, for example, is missing in the north. Despite there being an office in Newfoundland and Labrador, Saskatchewan is responsible for the whole of the Northwest Territories, Montreal is responsible for all of Nunavut and B.C. is responsible for the Yukon. Though 75% of Canada's coastline is its Arctic, there's not an Arctic-based—literally based—supercluster project there.

These shortcomings, though, are part of a much bigger conversation about the overall value, potential and role of the north in Canada's consciousness. We often see challenges, crises and impossibility. Our neighbours see opportunity for research and innovation. They know that strong northern regions are the key to being strong Arctic nations, and they make the necessary strategic investments.

● (1210)

When have the many conversations Canada has about R and D, innovation, start-ups, and venture capital and pension fund investments focused on innovating out of the north? This requires a national vision, leadership and strategic thinking, all really realized through an Arctic strategy. It needs to connect the dots between science—including indigenous knowledge—innovation, defence, capital investments, and building northern capacity and infrastructure to address the needs of northerners, build new knowledge and foster an innovation ecosystem in the north that will enable a sustainable, secure and prosperous north and advance Canada's Arctic leadership.

The Chair: Thank you. That's our time.

We'll start with our first round of questioning.

MP Tochor, you have six minutes.

Mr. Corey Tochor: Thank you, Madam Chair.

Thank you to our witnesses for their testimony here today.

Dr. Shadian, I very much enjoyed your testimony and your common-sense approach to things.

Going back into some of your past work, in your 2018 brief to the Standing Committee on Foreign Affairs and International Development, you argued that the surest way to protect Canadian sovereignty is to fix the infrastructure gap in the north. It is now six years since that statement. Have we fixed the infrastructure gap in the north?

● (1215)

Dr. Jessica M. Shadian: No. Possibly it's become much worse.

This comes back to the piece on Arctic science and innovation. The fact that we have such an infrastructure gap is a huge opportunity if we look at it that way, because we could be world leaders in trying to determine infrastructure for the second half of the 21st century that can survive and thrive in the north, in the Arctic, in cold and extreme weathers, and with permafrost melt. These technologies and innovations can then scale, and they can scale not just beyond Canada and throughout the Arctic but also throughout other parts of the world.

I will say that, and I'll leave it there.

Mr. Corey Tochor: On that, how can we ensure that there is more investment in the north, then, and not just public government dollars?

Dr. Jessica M. Shadian: Well, that's where I've taken a lot of insight from some of our Nordic neighbours. They seem to have a nice.... They're strategic, but they have pretty strong partnerships that involve academia and also private companies that then also attract that type of start-up venture capital, intertwined with policies.

You have academia. You have new innovations coming out of that through start-ups, and then you have private capital. You also have public funding, because I think public funding is absolutely essential and is the nucleus around which all of this needs to happen.

Mr. Corey Tochor: Speaking on some of the solutions from research that is being conducted in the north, earlier today we heard about requiring some of the research to include measurable outcomes and, hopefully, solutions. We keep studying the same problem over and over again, but we are not coming up, in my mind, with actual solutions. Mitigation is important, and adaptation is crucial, in my view, in the north.

What would your comments be on that?

Dr. Jessica M. Shadian: This is where I think that new knowledge, primary knowledge and applied science intersect. If we think about things that we need to still continue to do, we are missing a lot of baseline studies. We need to do much better monitoring, but this also can be connected to.... We need to have more sophisticated technologies. We should be able to utilize sensors to be able to help collect real-time data at the same time.

Again, this goes back to having a better strategy. What do we want to do? What do we, as an Arctic nation, want our north and our Arctic to look like? What does it mean in terms of everything from economic development to defence? I'm thinking about the DIANA program through NATO. As NATO now is increasingly focused on the Arctic, obviously some of these innovation pieces are going to be focusing on cold-weather technologies, so is there a space there?

Mr. Corey Tochor: I have limited time. Thank you so much.

I'm just going to switch gears a little bit and go to energy security in the north. I think it's horrendous how much diesel we ship up there and burn for electrical needs. There has been some work that you, the Arctic360 group, have done on SMRs.

What could it mean for a northern community if there was an SMR or a microreactor located there?

Dr. Jessica M. Shadian: I think it's community-dependent. This goes back to some of the earlier discussion that we had in the past session. We need to be doing more economic assessments, financial assessments, energy economic assessments in the north, but we also need to be thinking strategically.

I think SMRs hopefully are going to be something that we can utilize in various communities, but it also needs to be attached to something that's much bigger. What is the energy plan for the north? What is going to be the sustainable energy infrastructure that we're using? What do we do in the interim? How are we connecting this? How are we making things multi-purpose, multi-user?

We need energy not just for heating. We need it if we're going to have more Internet. We need more Internet. We need energy systems for a whole host of things, for defence. How do we think more strategically?

Mr. Corey Tochor: I always thought that if a community was welcoming toward nuclear, to have a military base of some sort in the north, close to a natural resource project, would help the community if they're welcoming of technology such as SMRs or microreactors.

How would that work its way through the community?

● (1220)

Dr. Jessica M. Shadian: I would say that communities in the north, while there are a lot of differences, in many ways are like communities in other parts of Canada. They are filled with all types of people and personalities who have different ideas about what they would like to see for their own future and their own communities. It's not like everyone thinks the same across the board.

I'd also say that from all of my experiences with everybody I know in the north, people want solutions. They want things to be better. As I always hear and as it's always said, they don't want to just survive; they want to thrive. It's that mentality. The status quo is not okay, and they're looking for ways to work with others moving forward.

The Chair: Thank you so much. That's our time.

We'll now turn to MP Longfield for six minutes.

Mr. Lloyd Longfield: Thank you, Chair, and thank you to the witnesses who are calling in from various places, including closets. Places that we work from sometimes aren't ideal, but thank you for taking the time.

Welcome home to Dr. Brunet. I'm also calling in from Guelph, and it is muggy here.

Could you tell us a little bit about the conference that you just returned from? Is there an output that could be used in the study that we're doing?

Mr. Nicolas Brunet: Are we talking about the Arctic Congress right now?

Mr. Lloyd Longfield: Yes.

Mr. Nicolas Brunet: I hadn't prepared for that one.

Mr. Lloyd Longfield: If not, that's okay. I'll rephrase it.

We're doing a study on Arctic science, and if there's anything from that conference, which obviously is going to be very current, that could help us with our study, maybe you could send it to our clerk.

Mr. Nicolas Brunet: Sure.

Mr. Lloyd Longfield: That would be wonderful.

Mr. Nicolas Brunet: Absolutely.

Mr. Lloyd Longfield: The University of Guelph has been spending a lot of time in the Arctic, and what you're doing is great. I also know that Dr. Shoshanah Jacobs has been up there in Cambridge Bay. We've had some work done on mesh technology for Internet connections, something I think you may be working alongside.

Could you talk about how southern solutions could possibly help with some of the new technologies for communications in the north?

Mr. Nicolas Brunet: I don't really know much about the mesh technologies. I did work a bit with a researcher you may want to speak with, a colleague of mine that you may know in my department. I'm sorry, but her name is escaping me right now.

Yes, we do a bit of work on communications. I'd say that in the last five years, I've gone from barely even being able to make phone calls with colleagues up there to having Zoom meetings. There has been a tremendous change very quickly. Is it reliable and affordable? No. The strategy that I have adopted in a lot of my work with colleagues is that we actually embed budgets within our research budgets to cover community costs and connecting to Starlink and these types of strategies, which is what's being done right now.

In terms of upcoming technologies, I'm not super-familiar with what's happening in that area.

Her name is Helen Hambly, and she's working a lot on that.

Mr. Lloyd Longfield: Of course.

Mr. Nicolas Brunet: She's been working a bit with me. We published a paper a few years ago on that topic. She's the expert in that.

Mr. Lloyd Longfield: She's done incredible work to get rural Ontario up to speed with broadband, especially locally. I guess her work is reaching farther than I realized.

Mr. Nicolas Brunet: I roped her into the project.

Mr. Lloyd Longfield: As you know, there's a lot of federal money going into broadband and into communication networks. I'm glad to hear that she's also working with you through some of the funds that she's received from the federal government.

The social development piece was also mentioned in our last panel, and how we need to think of more than just the environmental impacts. Can you expand any more on the idea of how we need to look at a more holistic approach to supporting research in the Arctic?

Mr. Nicolas Brunet: I actually focus mostly on the human, social and cultural outputs of research as the core of what I do. I look a lot at the various elements of what we call “capacity”, which I'm sure is a word you've heard ad nauseam at this stage. I do try to break down this word “capacity” and what it means in this context.

It's a tough thing to correlate more research with more northern capacity building. It is kind of what I study. Has it evolved substantially? Yes. The problem I'm seeing right now is that the usual suspects, the people who have tremendous capacity, are being burnt out by our southern demands on them.

We need to broaden the number of people who can respond to those demands. That will happen by having institutions up there, as I talked about earlier, like Yukon University. We need to have a university in Iqaluit. It is happening slowly. There are wheels turning there. I think that will change everything.

● (1225)

Mr. Lloyd Longfield: We just approved scholarships and fellowships, which actually made their way into the budget—something the Conservatives voted against. Scholarships and fellowships are a big part of improving capacity.

Mr. Nicolas Brunet: Do you mean those are for northerners?

Mr. Lloyd Longfield: Yes.

Mr. Nicolas Brunet: Absolutely.

I think just having that institutional presence is a game-changer. I'd say to look at other territories. I'm speaking mostly about Nunavut right now. I used to work a lot in Yukon. I'd say that in the next few years we're going to see Yukon University playing a central role in northern research, just because it's a degree-granting place. It's drawing in tremendous talent. It's bringing capacity back from the south and northerners back to the north. That is just amazing to see. I really believe in that strategy.

Mr. Lloyd Longfield: That's tremendous.

I'm getting close to the end of my time, but I just want to say that getting solutions for the north in the north is going to be a very important step that we make as a government going forward.

Thank you both. I'm sorry I didn't get to you, Ms. Shadian, but I know someone else will want to ask questions to you.

It's back to you, Chair. Thank you.

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

We will now turn to MP Blanchette-Joncas for six minutes.

[*Translation*]

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

I would like to welcome the witnesses who have joined us for the second hour of our study.

My first questions are for Professor Brunet, a Franco-Ontarian who works at the University of Guelph.

Welcome, Dr. Brunet.

Mr. Nicolas Brunet: I'm a Quebecker, actually. I'm from Montreal.

Mr. Maxime Blanchette-Joncas: In that case, let's speak French. We can understand each other.

Professor Brunet, I looked at your CV and the various research projects you've worked on. I saw that you did research up north, in Nunavik, to be precise. I'd like to know what you saw there, in terms of the impact the lack of scientific data has in relation to climate change.

At a broad level, what can the federal government do to support the acquisition and collection of climate change data, and a better data structure?

Mr. Nicolas Brunet: The mistake we make as scientists is basing our research policies on funding and capacity building in southern Canada. We've talked about that today. We are well aware of how difficult it is for us to develop meaningful strategies in northern Canada, because we tend to apply southern solutions to the north. That's our default. The committee has heard that said a number of times. That's how we approach things.

The purpose of my research is to develop expertise in the study of climate change and to leverage the expertise that already exists in the north, so we can come up with effective strategies. At the last meeting, I believe there was a lot of focus on co-leading the development of strategies. Many of my more recent publications—in the last five or six years, perhaps—focus on the importance of working together. That's especially true of my work in Nunavik. Coming up with solutions and policies that can be applied in a very practical way hinges on the ability to bring together indigenous, northern and other knowledge.

These can be things that certain people don't really understand, so it's important to find ways to put a value on knowledge that would otherwise be disregarded. I think you talked about that with Alain Cuerrier. It's a tough issue to address, but we really have to try to come up with a number system of sorts. We need to do what we can to value northerners and their contribution, and partner with them to identify strategies that work for everyone.

● (1230)

Mr. Maxime Blanchette-Joncas: Thank you, Professor Brunet.

I'm going to come back to the crux of your work. You talked about co-development. The people at the Centre for Northern Studies, based at Université Laval in Quebec City, have 60 years of expertise under their belts. That's nothing to sneeze at. They spoke about the need for co-development.

My next question is much more practical. You talked about the experience and knowledge that indigenous people have in relation to their own land. Let's say those looking through the lens of science and those looking through the lens of indigenous experience don't see the same thing. Which view should take precedence? We are in the policy-making business here, so we need to know who is telling things as they are and who may be saying something else. You're an expert, so how should we handle a situation like that?

Mr. Nicolas Brunet: I would say that's a very rare occurrence, because we're usually looking at the same problem in a completely different way. It may seem as though we are saying different things, but I would say that the views are complementary in many cases.

Keep in mind that indigenous knowledge isn't limited to data or information. It's a way of doing things. We need to develop knowledge together, establish professional working relationships and figure out how to do our work as scientists. We can't forget that, because it's a road map of sorts for working together.

Nevertheless, when problems do arise, I think it's necessary to refocus on the governance and the purpose of the project, in order to determine what's important. When that question is put to the team of locals, indigenous people and other stakeholders around the table, they are able to work through it. They break down the differences and, in many cases, realize that the positions aren't as different as previously thought. I can't give you a specific example right now, but I can tell you that situations where this really creates a conflict are rare.

Mr. Maxime Blanchette-Joncas: Okay. I see.

You mentioned a sort of road map for working together. The road map that scientists follow is the scientific method, scientific assessment.

As a lawmaker, I need to know whose advice to rely on. When indigenous communities say one thing and the scientific community says another, who should I listen to?

Mr. Nicolas Brunet: I would say it depends. It's a great question, one I often wonder about.

Science tends to take a more pulled back view, if you will. I worked in Nunavut alongside people who do polar bear work. I was able to see the differences in perception between those who do polar bear counts by helicopter or airplane, covering vast distances, and local people who observe behavioural changes in the animals, including whether more of them are heading towards cities or fewer. I would say both sides are probably right. It's also important to understand that science and the scientific method of conducting counts—

[*English*]

The Chair: That's our time, Dr. Brunet. You can send additional comments to the clerk, or perhaps we can resume this in the second round.

Mr. Nicolas Brunet: Sure.

The Chair: We will now turn to MP Cannings for his six-minute round.

Mr. Richard Cannings: Thank you to both witnesses.

I'm going to continue with Dr. Brunet.

You talked about capacity in the north and a situation that we see throughout a lot of rural Canada—not just in the north, but it's especially acute in the north—in the capacity do work, especially science and research.

This committee did a study a few months ago on citizen science, which uses the talents, enthusiasm and, in some cases, the direction of local people who are not trained scientists but are doing projects that were scientifically designed by trained scientists. The data was gathered in a proper way and analyzed.

I'm wondering if that model could be used, combined with having small institutes across the Arctic that could be service centres for this, which would help us get around that capacity issue.

What are your thoughts on that?

● (1235)

Mr. Nicolas Brunet: The concept of citizen science is one that's definitely not easily applicable in the Arctic. Even the term “citizen” is a bit fraught in these contexts.

The problem with the model of citizen science.... Citizen science goes from folks like myself, who might be looking at blue jays in the backyard and not knowing anything about ornithology, to people who could be experts in that area.

Within the indigenous context, it sort of undervalues the idea of indigenous knowledge and that level of expertise, which is multigenerational. I'm sure you've heard of indigenous knowledge over the last few weeks. It tends to have some form of resistance.

I would say that within indigenous communities, there are people who are known experts who have the knowledge, can contribute to these types of projects and are already engaged in science tremendously. In fact, those are some of the people who are kind of burning out because of our demands on their time—our increasing demands on their time—because we're talking about these things now and they are important, so we are drawing on those experts.

I work with youth a lot—Inuit youth—and we are trying to develop these types of programs. We're trying to value their knowledge. There's the fact that they have a foot in a more Western perspective. They use cellphones and they're very tech savvy.

We're trying to find ways to apply that sort of model. We tend to call it community-led monitoring or community-based monitoring programs. I do work a lot with DFO and ECCC to establish that capacity from the ground up, mostly with youth.

Yes, it's good model, but maybe it could be a different name within this context.

Mr. Richard Cannings: I totally appreciate that slant. It's an important one. Thank you for bringing that up.

I'm wondering how we can build up that capacity without burning out the few people who have that capacity right now.

It's an issue I encountered—

Mr. Nicolas Brunet: I agree. It's a big one.

Mr. Richard Cannings: I spent my previous life working with indigenous communities in the south. I've encountered that same exact issue.

How do we support those communities and carry out the research that they want to see carried out and that's important to them and their lives without overtaxing them? How can the federal government help?

Mr. Nicolas Brunet: I think it comes back what the other witness said here, that communities are heterogeneous. The wants and desires of communities, quote-unquote, are difficult to understand. I tend to work with certain leadership groups to understand that. I tend to talk to people. That's kind of what I do, right? I talk to people about what they want in research. These are exactly the kinds of things I do.

Once you have established that, you have a whole bunch of different things, as I'm doing right now, around what you need to do good research in town. I have an active research project right now around research infrastructure in communities and what that means. One of them, as I said earlier, is community space. There's nowhere to do anything. I work in Pond Inlet, for instance, which is a relatively big hamlet in Nunavut. There's an Environment Canada research station that's pretty small, and there's no real physical space for community research to happen.

That's the point I was trying to drive home earlier. We tend to think of Arctic research as being outside, on the land, but what about writing grants? What about analyzing data? What about lab space for communities?

Some are doing it. They are partnering with Université Laval, for instance, and we talked earlier about the Centre d'études nordiques. These are places that are building research stations actively and trying to establish good partnerships in designing those. I do think that will really help.

As I said earlier, I think the idea would be to have something more than Arctic College. It's wonderful, but there are not very many people there in Iqaluit. Having a degree-granting university in Nunavut would be tremendous, because people could train there instead of coming south. I have had a few students and colleagues in Nunavut try to come south to do a degree, and it often didn't lead to any good outcome for them.

● (1240)

The Chair: Thank you, Dr. Brunet.

Mr. Nicolas Brunet: I will stop there.

The Chair: I'm afraid that's our time. Thank you.

Now we will turn to our second round of questions. Kicking that off will be MP Lobb, for five minutes.

Mr. Ben Lobb (Huron—Bruce, CPC): Thanks very much, Madam Chair.

I appreciate the comments from both our witnesses who are here this hour.

Professor Shadian, I noticed in your bio that you state that you spent 20 years living and working throughout the Nordic and North American Arctic as a researcher, professor and consultant. I don't mean any offence to any of the other witnesses who have appeared through all of the very many meetings we've had on this topic, but few can say that they have lived and worked and researched in the area for 20 years.

Do you have any thoughts on the advantage that gives? Also, is that something that we should be looking at more? Is it feasible?

Dr. Jessica M. Shadian: I want to clarify. I have been doing Arctic research, and as an Arctic researcher for 20 years, I have lived in the Arctic for six of those, let's say. I wanted to be clear on that, because I don't live in the north right now.

I think that spending time in the north is absolutely necessary to have any sort of perception, understanding, context or appreciation. If you want to do research there or focus on there, let's say in Canada, Canadians should go to our own north. For me personally, though, living in the north in Norway gave me so much of a contrast between living at 72° north there and what our 72° north looks like in terms of prosperity, economic development and people's quality of life. That has given me a lot of insight. Why is it we think that everything's so impossible here, that it's just too cold, and we can't do anything? I think there's a problem with a national will and these ideas about the north. When I lived there, I had amazing Internet connectivity. I could be in a tunnel or over a bridge, and it didn't matter; I was still talking on the phone.

If you want to be doing research in the north, absolutely, you need to spend time there, and not just two weeks—fly in, fly out, and that type of thing—and on the ground.

I also think we need more opportunities. This goes back to having institutions, full academic institutions, in the north. We need more opportunities for people who do research of all sorts to go and want to do research in the north and be able to stay there and live there.

I was approached by a professor of mechanical engineering at U of T, who wanted to be part of this last call with this NordForsk-led international joint initiative for sustainable development of the Arctic. He's part of this advanced coating technology centre. He approached me and said that he knew that we do innovation in and out of the Arctic and that our executive team is 54% indigenous. He wanted to know if we'd be interested. I said, “This is interesting”. He thought they had this technology that could work for the north, even though his partners are in Norway and in Finland. I said, “Well, I don't know. We don't know. Let's make a research project around learning what's needed in the north.” It's about infrastructure and this cold-weather technology that could be applied to infrastructure.

I thought we would partner with an indigenous group in the north, Sahtu Secretariat Incorporated, because they're trying to build a road. I thought that this would be a nice merger of the two, because they can learn from one another about what kind of technologies and road infrastructure needs there are, and what their technology does. Who knows what the outcome of that collaboration would be? For some reason, Sahtu Secretariat Incorporated was not eligible for the co-PI, the co-principal investigator, on this partnership, so we didn't. There was no application put forward.

Yes, you have to be in the north, you have to go to the north, and you have to spend time, but it shouldn't be like going to the moon. We should be able to go to the north, do research and be an academic there.

Mr. Ben Lobb: Do I have any time left here?

The Chair: You have 30 seconds.

Mr. Ben Lobb: Just to build on that, where I am in southwestern Ontario, I think sometimes people from Toronto think it's like going to the moon where I am. The point is that Bruce Power nuclear plant is a nuclear plant in my riding. The CEO, Mike Rencheck, mandated that anybody who wanted to do business with Bruce Power for their multi-billion-dollar refurbishment project had to set up an office in Bruce, Grey or Huron counties and establish a workforce there if they wanted to do business.

During the last meeting, we had Warwick Vincent talking about 40 different organizations doing research in the Arctic. It's a problem, but we have to have these organizations setting up and making commitments in infrastructure and human resources to continue on with this, because there is a gap here.

Thank you.

● (1245)

The Chair: Thank you very much.

We'll now turn to MP Chen for five minutes.

Mr. Shaun Chen (Scarborough North, Lib.): Thank you, Madam Chair.

Thank you to the witnesses for appearing before the committee today.

To Mr. Brunet, it sounds very promising that infrastructure is improving in the north. You mentioned now being able to get on a Zoom call, whereas having a phone connection in the past was challenging.

With respect to big research, which requires not only infrastructure and meaningful Inuit collaboration but also time, you've led multi-year projects in the north. How did the pandemic impact the progress of multi-year research?

Mr. Nicolas Brunet: That's a wonderful question.

I actually received a grant a couple of years ago to study how the pandemic influenced research and research innovation in the north during the pandemic, because we couldn't go any more. It's been a really interesting adventure, I'd say, in research, because we have this bizarre natural experiment that happened where suddenly.... I know that my federal colleagues, for instance, flat out couldn't go for almost a year and a half or so. At one point, I had a colleague at Environment Canada. I went to the research station because he hadn't been there in so long—and he was running it—and I had a bit more flexibility to go up.

I'd say that, regrettably, I didn't find that a lot of these multi-year research programs were able to keep going as normal while the southern folks were not there. I do think, though—and this comes back to leadership in the north—that some programs were able to keep going. I think this comes back to what Dr. Shadian said earlier around having the remote sensing type of equipment. Some of this equipment kept running and data could be collected. The ones that were the most successful had people actually collecting and looking at data locally as well. They were trained and had that capacity within towns.

I'm thinking that I'm going to talk about one that you may have heard about, which is called SmartICE. SmartICE has become a kind of a social enterprise now. They've got operators in a bunch of different.... I don't know the number, but I'd say that in Inuit Nunangat as a whole and in I think Nunatsiavut and Nunavut at least, in the eastern Canadian Arctic and moving west, those programs did fine. They didn't need us to come up north any more.

That's sort of my endgame, perhaps: to research myself out of a job and to really to build that. It took many years to build those partnerships and build in that training element to have that level of independence.

There are shining examples of this that we can look at for solutions.

Mr. Shaun Chen: Speaking of building partnerships, you said in your testimony earlier that local engagement has increased only slightly and that there are few—or negligible—Arctic-led studies. In coming out of the pandemic, I suspect that it would be an opportunity to further the goals of enabling Inuit self-determination, which you have talked about, and incorporating indigenous knowledge in the work that researchers do, as well as building capacity within Inuit communities to lead or govern northern research.

Has there been progress made, in coming out of a situation of multi-year projects being impacted, to re-envision how work is done up in the north?

● (1250)

Mr. Nicolas Brunet: I think the quick answer is that I don't know yet what the output of the pandemic specifically has been.

The work I've done was to use published outputs, which may seem funny; obviously, it's a flawed tool, but it's a tool to try to measure that level of engagement and how meaningful it has been. The rationale was to look at various different factors in research articles to understand how engagement has changed since the sixties. I could send you this instead of talking about it, but...that work up to 2020 ended. I haven't really looked at what the implications will be or are of the last four or five years or so, since the pandemic started, on those trends.

I'd say that the type of huge increase that we think we're going to see in engagement is a reflection of the fact that Arctic science is huge. It's vast. There's so much work being done. We tend to hear a lot about the work that's amazing, that's community led, community engaged—whatever—and we like to talk about it as academics, so sometimes we forget that about 99% of the research doesn't do that, and that's a lot of what this work tried to shine a light on.

I'll stop there.

The Chair: Thank you. If you do want to send that additional information you referred to, we would appreciate it.

Mr. Nicolas Brunet: I will, absolutely.

The Chair: That would be great.

Now we're going to turn to MP Blanchette-Joncas for two and a half minutes.

[*Translation*]

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

Ms. Shadian, I really appreciated your opening remarks, which were quite informative. Thanks to your global expertise, we can compare ourselves to other countries and see how we can improve northern research in Canada. In her most recent report, Canada's chief science adviser reviewed the polar continental shelf program and said that Canada was not a leader in northern research. However, given that 40% of Canada's landmass is considered Arctic, Canada should aspire to be a leader.

In practical terms, what are other countries doing better? How can Canada learn from them?

[*English*]

Dr. Jessica M. Shadian: I think it comes back to our need to have an Arctic strategy. Within that is where the science component comes in.

I think I've listened to every session for this study. We have amazing researchers in this country. I've learned so much just by listening. They've made massive contributions.

However, what I've also heard—and it's what I absolutely believe—is that while all of these people are doing all this amazing stuff, it's all over the place. We're not ever saying, “Here are the four goals we are going to do as Canada, and we'll be the best in the world at that” so that everything somehow feeds into that. The research, then, could be realized and acknowledged. It would come together and have strategic purpose. That's what I was saying. It's the intersection between new knowledge and applied science. We have the ability to take in all of what's going on and gear it towards a purpose. It's in the applied research that you have very obvious outcomes.

I think the bigger issue—

[*Translation*]

Mr. Maxime Blanchette-Joncas: Sorry to interrupt, Ms. Shadian, but I have to—

[*English*]

Dr. Jessica M. Shadian: —I would say, is that we have a lot going on, but we have no way to figure out what we have and what we're doing, in order to make it actually purposeful.

[*Translation*]

Mr. Maxime Blanchette-Joncas: That's great.

I'd like to hear your thoughts on a quote from the chief science adviser's report. Here it is: “For Canada to reach its potential, there is a need for better coordination among all the component organizations that support or participate in northern research and a need for greater involvement by local Indigenous populations in the North.”

As far as you know, did the government respond to that? Did it develop a national strategy?

[*English*]

Dr. Jessica M. Shadian: Absolutely. If you've been in the Arctic space as an academic researcher, you co-develop. I mean, you just do. You have to. That's where the good science and production of knowledge come about. There's so much collaboration.

Nicholas, you were talking about indigenous knowledge and western science. You know, when you ask the right research questions together, they complement one another. I think we do really well at that. We have new knowledge, but it needs to be strategic. That new knowledge is producing information for the more applied sciences. Those applied sciences are—should be, absolutely have to be and will be—co-produced with.... This is for housing technologies, infrastructure technologies and energy technologies. These are things we could be leading the world on, and they're things northerners want and need.

There's every reason this should be collaborative. Therefore, we need more partnerships in engineering, architecture, economics and business finance—the whole gamut that was discussed earlier. I don't understand why we don't have more indigenous people in the north who have finance degrees or start-up companies of their own. Is it because we don't have the universities?

It goes back and forth. It's all over the place.

● (1255)

The Chair: That's our time. Thank you so much.

For the final question, we turn to MP Cannings for two and a half minutes.

Mr. Richard Cannings: Thank you.

I'm going to continue with Dr. Shadian.

I want to start off with a little reality check in terms of comparing the Canadian Arctic with the rest of the Arctic, especially in Europe. I appreciate your experience in northern Norway. Yes, Tromsø is on the same latitude as Tuktoyaktuk, but that township has a population of over 60,000. That's twice the size of all of Nunavut in one town, and 20 times the size of Inuvik. It's also much warmer. It has a climate more like Prince Rupert. I'm putting a pin on comparing them. The challenges we have in the Canadian Arctic, I think, are much bigger and vaster. Why would we test EVs in Inuvik when we could do it in Edmonton or Saskatoon in the same conditions?

I really appreciate your mention of housing, because I think that's a critical part of the challenges we have in the Arctic and where we could be leaders. I'm wondering if you could spend the rest of this time on housing—what we should be doing to research housing and build it in the north.

Dr. Jessica M. Shadian: Again, it's a bigger holistic picture.

Well, first of all, we don't have a lot of people living in the north, because we can't even house the people who do live there now. We need new technologies for housing, and this goes back to bringing the best and brightest people together—which includes northerners, of course—and figuring out what an appropriate house is, how it should be built and how we are building to ensure that it is resilient to permafrost and cold weather. These technologies should then be scaled out, because climate change is going on everywhere, and there's cold weather in other places besides the Arctic.

I have to ask, though, because our north is so big, why isn't that also an opportunity? We have a massive coastline. We have opportunities to be taking advantage of and making the best out of our north. Our northerners want to have secure, safe, happy and successful lives there.

Over 40% of our landmass is our north, so I have a hard time with writing it off as different, hard and difficult. I feel there's a lot of opportunity, and people in the north want those opportunities. We just need to have some sort of national will, and we have to start somewhere. We need houses, but how are we going to have more houses if we don't have energy or water? So—

The Chair: Thank you. That is our time. I'm sorry. There's never enough time.

I do want to thank both of the witnesses, Dr. Brunet and Dr. Shadian, for their testimonies and participation in the committee's study of science and research in Canada's Arctic in relation to climate change. If you do have any additional comments or documents you want to submit, please feel free to submit that to the clerk.

Is it the will of the committee to adjourn our meeting today?

Some hon. members: Agreed.

The Chair: Thank you for your hard work today. We are adjourned.