HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Standing Committee on Natural Resources

RNNR • NUMBER 026 • 1st SESSION • 42nd PARLIAMENT

EVIDENCE

Tuesday, October 18, 2016

Chair

Mr. James Maloney

Standing Committee on Natural Resources

Tuesday, October 18, 2016

● (0845)

[*English*]

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

Thank you for being here bright and early on a Tuesday morning.

I have a couple of things before we get going.

Two members of our committee were otherwise occupied today, so we've called in reinforcements from northern Ontario and Quebec. Mr. Massé and Mr. Rusnak, thank you very much for joining us today.

We have two one-hour segments today. In the first hour we're joined by the Canadian Mining Innovation Council, Carl Weatherell and Jean Robitaille. Gentlemen, thank you very much for being here this morning. In the second hour we have representatives from the University of Toronto and Unifor.

Without any further ado, I will open the floor to you, gentlemen. You have up to 10 minutes to make a presentation, and then I'll open the floor to questions from the committee members.

Thank you again for being here.

Mr. Carl Weatherell (Executive Director and Chief Executive Officer, Canada Mining Innovation Council): Thank you, Mr. Chair.

First, let me thank you and the committee members for the opportunity to address you today. I'm joined by Jean Robitaille, who's the senior vice-president of business strategy and technical services for Agnico Eagle Mines Limited. Jean is here today as the chair of the Canada Mining Innovation Council.

Our opening comments are going to focus on innovation, what is possible, and what needs to be done to fundamentally transform the minerals industry and the mineral sector in Canada.

Many of your witnesses have been, or are going to be, speaking about research and the need for research in the industry. We need to be very clear that there is a significant difference between research and innovation. Simply stated, research is the creation and dissemination of new knowledge, while innovation is the creation of value. Canada needs to commit to funding both activities, but we need to recognize their differences and not promote one under the semblance of the other.

The mining industry in Canada is foundational to Canada's economy by providing the raw materials that enable other sectors of our economy to flourish, including high-tech, transportation, aerospace, manufacturing, and clean tech. As we move toward a clean economy, the need for raw materials produced by mining will only increase. As an example, it is estimated that Tesla alone will consume 5% of copper production, or 900,000 tonnes of copper, for its electric motors by 2030. This is one example from one company for one technology.

Innovation is not new to the mining industry. Our innovations include highly complex industrial processes that have required billions of dollars of investment to technology incorporated into the lunar lander. Much of the technology development and associated investment occurs in metropolitan centres, such as southwestern Ontario, Vancouver, Saskatoon, Calgary, and Ottawa.

The industry desperately needs innovation, but adoption is hindered by its capital-intensive nature and the current stress related to volatile commodity markets, increased costs, and significant competition from other jurisdictions. For example, in 2015, the global mining industry experienced record impairments of $53 billion, far outstripping similar losses in the oil and gas industry for the same time period.

CMIC was created with the endorsement of the federal, provincial, and territorial ministers of energy and mines to create a long-term vision, strategy, and approach; to encourage the mineral industry to support more focused and coordinated research, development, and innovation; to better use the network of Canadian university and government expertise; and to address the large-scale competitive challenges faced by the industry. Government and industry recognize that CMIC, as an arm's-length, non-profit organization, has greater flexibility in coordinating and implementing this type of change required by the industry, which will maintain and increase its global competitiveness.

CMIC is to mining and minerals what COSIA is to oil and gas and what FPInnovations is to forestry. CMIC has a strategic partnership in place with FPInnovations, and we're discussing opportunities with COSIA. For our partners in the mining industry and the Mining Association of Canada, CMIC created an innovation strategy for the industry called Towards Zero Waste Mining. Towards Zero Waste Mining defines the future of the industry in 10-plus years by focusing on the grand challenges common to the industry related to energy, environment, and productivity.

Towards Zero Waste Mining includes a business case, transformational targets, technology road maps, and projects in various stages of execution. We have a copy of the business case and the integrated Towards Zero Waste Mining technology road map with us today. They can be made available to the clerk for dissemination to the panel. I should mention that this technology road map to the best of our knowledge has never been created for the mining industry in Canada. It's the first of its kind.

CMIC incorporates an open innovation business model that comprises all members of the supply chain, including academia, government and other laboratories, start-ups, small to medium-sized enterprises, Fortune 500 companies, companies operated by indigenous peoples, and mining companies co-operatively focused on solving specific industry-defined challenges. Technologies such as information communication technology, genomics, aerospace, and defence have all been identified as potential solutions.

This highly collaborative innovation model accelerates technology development, deployment, and wide-scale adoption, and reduces the financial risk for all collaborators. For example, one start-up company we're working with currently has developed a genomics-based sensor for water quality monitoring. It is one of six technologies identified globally by our environmental technology group. This same group is meeting next week to finalize a project charter aimed at further developing this technology into a real-time, remote sensor platform and deploying it in the mining sector.

● (0850)

As a second example, the process of crushing and grinding rocks consumes approximately 3% of the world's electricity—enough electricity to power all of Germany—of which 90% to 95% of this energy is lost as waste. Our energy processing technology group, composed of senior volunteers from mining and engineering companies, a federal government laboratory, small to medium-sized enterprise, and original equipment manufacturers, have identified a technology that has the potential to reduce this energy consumption by 50%. We're launching the first phase of a project to move this to a commercial product on November 1.

Our greatest challenge is the immense complexity of the innovation system in Canada. The existing funding mechanisms to support research, development, and innovation—over 7,000—are generally focused on research in academia, restricted to select regions of Canada, and are generally incompatible with the requirements of mining-related innovation projects. As a result, innovation investment and technology development in Canada is significantly impeded. The end result is that a number of Canadian mining companies are placing innovation-related investments in foreign jurisdictions.

As a nation, our international rankings in innovation have been dropping steadily for over a decade. These results clearly show that our traditional approach to funding innovation through this myriad of complex and disconnected programs is broken. Thus, the Government of Canada needs to make strategic and focused investment that is common in other countries, such as Australia.

Our proposal is modest. We are seeking a direct investment from the Government of Canada of $50 million over five years. This investment will result in the development of technologies that will significantly reduce energy consumption, greenhouse gas emissions, tailings discharge, and water use. These new technologies will be deployed in Canadian mines and globally. This will increase foreign direct investment in Canada by international technology companies, make Canada a global centre of mining innovation, and increase Canada's export market share for new and cleaner mining technologies.

The Mining Association of Canada has identified up to $145 billion in potential new mine investment in Canada over the next 10 years. Through the work of CMIC, we can help ensure that this investment represents the most energy-efficient, low-waste mines that the country has ever seen. Zero-emissions, fully electric mines are possible within the next five years, but it will require concerted effort to make it happen.

The Canada Mining Innovation Council has been identified as the umbrella organization to coordinate innovation in the mining industry. We have a proven track record, and we are the ideal arm's-length organization to manage such a direct investment and implement this visionary strategy.

Ladies and gentlemen, Mr. Chair, thank you for your time, and we welcome your questions.

● (0855)

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

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

[*Translation*]

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

I'd like to thank the two witnesses for their presentations.

I'm quite interested in the fact that the Canada Mining Innovation Council wants to put in place a clean mining strategy.

As you said earlier, you submitted an application for financial aid to the federal government worth $50 million over five years. Could you tell me how much the industry is investing in this research and development project?

[*English*]

Mr. Carl Weatherell: This is a difficult question to answer. If you look at the mining industry today, it's been in significant challenges for the last decade, with volatile commodity markets, depressed markets, etc. The cash flows for the mining industry have been very significantly impaired. If you compare it to the oil and gas industry, for example, the margins are very slim. It's been very challenging. That being said, the industry is starting on an upswing. It is just starting to come back.

In our experience with CMIC and existing projects, we start with very small investments, and the industry comes to the table and increases those investments. For example, in our exploration consortium, we started with a matching investment of only $300,000, and that grew to $7 million in a very short period.

Number one, it's a bit of a challenge to say how much exact financial support will be there today. Number two, we have to understand, as well, the value of the collaboration and the input of the mining industry right now, with very senior people, such as Jean Robitaille, his collaborators, his counterparts in other sectors, other industries—chief operating officers, and CEOs even. They are sitting around the table at CMIC defining technology road maps, defining targets, planning projects, and investing their time and energy. We've estimated that that investment is between $5 million and $10 million a year, which is a real value to the activities of CMIC. They simply would not be at the table if this were not of value, if that were not significant.

The industry will match it. We just can't say specifically today how much matching funding we have on the table.

[*Translation*]

Mr. Jean Robitaille (Chair, Canada Mining Innovation Council): The industry participates at two levels: a contribution of money invested directly and in-kind contributions. More often than not, we overlook the latter kind of contribution. When we give presentations on innovation in the industry, we must remember that we need electricity and access to equipment. We also have to disrupt operations during test periods. If we're talking about $50 million for the two levels combined, this in-kind contribution from the industry represents close to $40 million.

As Mr. Weatherell mentioned, efforts are currently being made to draft a roadmap, align all companies to a common goal, rather than let them disperse among the various research levels in Canada and to ensure everyone has the same goals. We expect to have results shortly, and then we will be able to have a contribution. Our premise is that the industry will participate more and more in terms of the contribution, but we must first be sure to get results. That is what we plan to do with the financial assistance of $50 million and the industry's contribution.

In addition, one of the differences is that the industry is involved in the management board and the various technical committees. The industry provides a very strong presence to ensure that the project is really geared to the needs that may have an impact and bring the Canadian mining industry to another level. We have declined in recent years, but we need to get back to it and once again become a leader in the mining industry. We were before and we need to be again.

● (0900)

Mr. Denis Lemieux: Thank you for the clarifications.

In addition to eventual financial assistance from the federal government to the tune of $50 million over five years, what could the federal government do to encourage innovation in technology and mining practices in Canada?

Mr. Jean Robitaille: There are different aspects to consider.

Overall, the council is working with other organizations. We must ensure that different organizations—and you are speaking to me directly about the government—are all aligned in the same direction. In Canada, we have very good research centres and very good groups, including the NRC, CanmetENERGY, COREM and others. It's important to ensure we aim for a common goal to align our efforts in the same direction and not to scatter them. I'm sort of going back to the answer I gave earlier, but it is crucial if we want to bring the industry to a new level. We seriously need it. In the current context, with the decline in metal prices, something really needs to be done. I don't think that this is the government's mandate currently.

Part of the mining industry is in remote areas where there are also indigenous communities. Several deposits are in remote areas, and we are seeing a glaring lack of infrastructure as is the case in some communities. The company I represent is in Nunavut, and the mining industry helps a lot of communities. In relation to the infrastructure, there is a lack in terms of routes and energy. The diesel plants do not meet the new standards related to the carbon tax. Through the mining industry and innovation, there is a way to bring in more green energy and make progress. This is something else we are considering at the Canadian Mining Innovation Council.

Mr. Denis Lemieux: As you and the Mining Association of Canada mentioned, the value of new mining investments in Canada could reach close to $145 billion in the next 10 years. How will the new government policy on carbon tax help or motivate your organization in the pursuit of its objectives?

Mr. Jean Robitaille: Clearly, the Mining Association of Canada is in favour of the carbon tax. In the short term, this tax will certainly not encourage the development of certain projects. However, we do not view this tax with suspicion because it will force the industry to develop new technologies and new ways of operating to reduce the use of vast quantities of fossil fuels.

[*English*]

The Chair: Mr. Robitaille, my apologies, I'm going to have to cut you off there. Maybe you can pick up a bit later on.

Mr. Barlow, go ahead.

Mr. John Barlow (Foothills, CPC): Thank you very much, Mr. Chair.

I'll let Mr. Robitaille continue with that in a second.

I'm going to ask some questions about the carbon tax. Did the federal government, the environment minister, or the industry minister consult with the Canada Mining Innovation Council or any associations or companies that you may be associated with? Was there any consultation with you whatsoever before announcing this carbon tax a couple of weeks ago?

Mr. Carl Weatherell: We are a member of the Mining Association of Canada. The Mining Association of Canada is the one that is typically consulted on policy issues, and they have endorsed a carbon tax policy.

I would like to mention that a lot of the work we are focused on in innovation is targeted directly at reducing energy consumption and eliminating diesel, things that will have implications for the carbon footprints of Canadian mines, for example in underground operations or surface operations.

In our opening statement, I mentioned the processing challenge that would significantly reduce energy consumption. In underground, we are looking at producing smart, continuous, all-electric underground operations in Canada, essentially eliminating diesel and moving the platform from carbon to electricity.

Again, our activities are focused on the innovation side of things, and there is a direct impact.

● (0905)

Mr. John Barlow: I appreciate that. I am looking at your zero waste mining strategy, and it looks very ambitious to have zero waste over the next 10 or 20 years.

I'm going to say that the answer, then, is no, that they didn't consult with you on the $50 per tonne.

I understand that's your goal, and that's outstanding, but they didn't consult with you before coming up with this $50 a tonne or making the announcement a couple of weeks ago.

Mr. Carl Weatherell: Again, as far as we are concerned, they consulted with the Mining Association of Canada, which represents our interests and the interests of its members.

Mr. John Barlow: Thank you.

Mr. Jean Robitaille: We are working closely with the Canadian mining association, and one objective was—again, the same thing—to make sure that we will not have multiple groups in mining doing innovation. We are working very closely with MAC. As Carl mentioned, the tax is not a huge surprise at all for us.

Mr. John Barlow: Thank you.

Well, it's interesting that you are saying it's not a huge surprise, but it is going to hurt in the short term. We'll see how that goes.

To get back to your zero waste mining strategy, I just want to talk a bit about that. I think it's great that you have taken that on as an initiative and a very ambitious goal.

Mr. Robitaille, you said that a lot of the new mines that we are finding are in the territories or remote areas. I'm just wondering if you or Mr. Weatherell can talk about what sort of advancements have been made in terms of getting electricity to some of those more remote locations where you do have to rely on diesel, and how much that's going to impact the goal to get to zero waste over the next decade or two, when many of the new mines are located in remote areas where, as you said, it is very difficult even getting roads, let alone electricity to eliminate diesel.

Mr. Jean Robitaille: Energy is one of the key elements of mining. To be able to operate a mine...it's a substantial consumer.

Diesel is the easy way. It's a proven technology. However, there are other technologies used in other industries that we just have to adapt. This is part of the mandate of innovation.

Liquefied natural gas can be used, and it will reduce carbon emissions. The run-of-river turbine has to be adapted. However, like *centrale*, you don't need to submerge a territory. You can generate electricity, and in excess of this.

There is a project in our company. If this project goes ahead, one day we will probably be able to supply the electricity for all of the region. This is substantial. It is innovation, investment, and development, and it is going to the aboriginal community. I see it as a win-win-win. The carbon tax will push, to some extent, the urgency to create the needs to move forward in that direction, because it will eventually be more costly.

Mr. John Barlow: Would some of the $50 million over five years that you are asking for be allocated to building infrastructure, building power lines to some of these?

To reframe the question, would it be more beneficial, in terms of reaching your zero waste management goals, to invest funds in building infrastructure to some of these remote mines, either roads or, more likely, electric power supply?

Mr. Jean Robitaille: It will not be used for infrastructure. We need to be able to do the demonstration to integrate new technology into the mining space, to make sure we'll have a business case that the different companies can go on. The different mining companies will not be reluctant to invest in projects in which they see a return. Where there's a bit of difficulty presently is joining everyone in while the market is in a downturn. We will be able to make them collaborate, but presently it's really not the time to be injecting a substantial amount of money. We'll see it after we do the demonstration.

To go back to your point, we have to do a demonstration on a small scale and eventually be able to prove that it will be applicable on the large scale, and we will see the different companies, the different members of the organization, the different mining companies in Canada, jumping on board.

● (0910)

Mr. John Barlow: Thank you.

Mr. Carl Weatherell: I would like to add to that. To your question, as Jean alluded to, if you're looking at infrastructure investment for electricity, for example, $50 million is insignificant because the infrastructure requirements are of an order of magnitude at least above that. It's essentially not relevant, and as Jean said, we have no intention of investing in infrastructure like that with $50 million.

Mr. Jean Robitaille: I'd maybe just add that Carl's point is valid. In the scoping study we did, we speak about $1 billion to $1.5 billion investment to be able to generate the electricity at something below five cents per kilowatt. It will be a 3P project potentially if one day we go with this project. However, in the meantime, for some technology, you have to do the demonstration. When the demonstration is done, you will see the partnership going forward.

The Chair: Thank you.

Mr. Cannings, the floor is yours.

Mr. Richard Cannings (South Okanagan—West Kootenay, NDP): Mr. Weatherell, you mentioned a new system that could reduce the amount of energy used for crushing rock by 50%. It sounds pretty exciting and incredible. Could you expand on that? I don't know how much detail you can provide us, but what are the timelines, perhaps, for rolling this out and it being adopted by the industry in general?

Mr. Carl Weatherell: As I mentioned, we're launching phase one in November. Our technology group spent two years basically searching globally for technologies that could potentially reduce energy consumption. In grinding circuits, our target was a 50% reduction. We've identified three possible technologies, and this is the most promising and the one that's most advanced. Phase one that we're about to launch is essentially looking at the fatal flaws. There are some specific technical issues we're trying to identify about the system. That's a joint project with seven mining companies, UBC, and the SME that owns the IP. That's going to be done at the end of June this year.

The second phase of the project would be launched in September 2017. Essentially what we're doing is building a one-metre demonstration grinding circuit and proving it out using aggregate, using material from a mine. That's approximately one year.

The next part of that, which is the most difficult, we're thinking now will probably take two to three years. Again, we haven't done the full engineering yet; that will come after June. That will be a full-scale grinding circuit that's implemented in a pilot system at a mine site.

The total cost estimate of phase one is relatively small; it's about $80,000. Phase two is closer to $1 million. Phase three is going to be $5 million to $10 million.

Does that answer your question?

Mr. Richard Cannings: That's fine. Thanks.

Mr. Robitaille, you mentioned issues around first nations, especially in a lot of the remote communities that mining occurs at or near in Canada. I wonder if there is anything the government could do to encourage partnerships between first nations and the mining industry, such as increasing the capacity of these communities in terms of education from elementary school right on up to post-secondary. Could you comment on where we could help?

Mr. Jean Robitaille: I will try to answer your question directly. I might pass along a few comments at the same time.

Mr. Richard Cannings: That's fine.

Mr. Jean Robitaille: If you look at the development of the resource, for me it's linked with the development of people. I will speak about Nunavut; I know Nunavut well. We have mines operating and we're looking to develop more mines. You cannot have forestry out there. There are no trees. It's cold. There is no energy.

However, with mines you can develop people. We have good truck drivers, they are Inuit. They are not just men, they are men and women. If you look at the apprenticeships, we are working on developing plumbers, electricians, mechanics, carpenters. You give a wish to people, a reason to work. I saw the community of Baker Lake when we started and compared to now. One thing we have to do is continue.

I know over the last seven to 10 years regulations have become a little more difficult. I'm not complaining. I'm saying we have to compress the time. I'm not asking to try to bypass any regulations or to minimize them. We have to accelerate. A good example is the Meadowbank mine where we tried to bridge with another discovery, but the permitting process.... We have good collaboration. I'm not here to complain about collaboration. Through anything you can do at the government level, regardless of your party, you have to find a way to make this more acceptable because there are jobs and people. When we create opportunities for people you cannot let them just drop in their community. This is one point.

Another point is a university in Nunavut. We're pushing and have worked for a university. Innovations have to be linked with this. These people have their tablets, their phones. They are like everyone else. They want the technology. You need to bring fibre optics. Maybe it's through the mining industry.

Natural resources will permit the development of select regions in Canada. Innovation will maintain this because now you will have better operating costs. You will be able to have a reason to say, eventually I will be able to maintain my costs or I will be able to mine more of what is in there. This is something that we can contribute. It's not just valid for Nunavut, the Ring of Fire, and other communities that I don't know. I'm certain that it's definitely a reason.

A last point, just like Agnico, we are investing $5 million per year in Nunavut in training. That's one company. Imagine if you can push and we can have new technology, lower costs, and instead of 35¢ per kilowatt have 5¢ per kilowatt. How many other projects will move forward? There is an incentive to build roads. We go through innovation, we use other technology to build roads. You will develop a territory.

● (0915)

Mr. Richard Cannings: Thanks.

I have a quick question, perhaps to Mr. Weatherell. We've heard in this committee from COSIA, Canada's Oil Sands Innovation Alliance. Is there any idea of building that kind of model out into parts of the mining industry?

Mr. Carl Weatherell: We have to look at the oil and gas and mining industries. They're a little bit different. The COSIA model is fairly centrally located. The processes are fairly homogeneous. In the mining business, the hard rock business, it's significantly different. Even tailings in a mine site is different per mine site. So it's a little difficult to focus on technologies in one space.

In terms of a model, as Jean alluded to earlier, when we took a hard look at CMIC about three years ago, we looked at COSIA as a potential model. We looked at COSIA and international organizations. We also looked at innovation organizations outside of the mining industry in micro-electronics and aerospace, and we adopted a combined model. So in some respects our model is similar to COSIA but it's different in the sense that we're more open. We're using open innovation. The intellectual property is not contained within nine or 13 companies. It's open to whoever was participating.

For example, our first project in exploration was the largest geoscience consortium in North America. There are 54 organizations sharing the intellectual property, from universities all the way through to Fortune 500 companies. So the model is a little bit different. We looked at it. We're rolling out something that we think is better for our industry.

The Chair: Thank you, Mr. Weatherell.

Thanks, Mr. Cannings.

Mr. Massé.

[*Translation*]

Mr. Rémi Massé (Avignon—La Mitis—Matane—Matapédia, Lib.): Thank you, Mr. Chair.

First of all, I would like to thank you, Mr. Weatherell and Mr. Robitaille, for taking part in our committee's work as witnesses. We greatly appreciate it. This is the first opportunity I have had to participate in this committee. I find your comments very interesting. Perhaps I will make sure I attend this committee's meetings more often.

Mr. Weatherell, you piqued my curiosity earlier when you spoke about the complexity of the innovation system in Canada. You said that, in this context, some companies had put all their innovation eggs in a basket abroad. Could you describe this complexity and why these companies have placed their eggs outside Canada?

You also spoke about the Australian model. Could you tell us about the situation there and briefly describe their model?

● (0920)

[*English*]

Mr. Carl Weatherell: That's perfect, thank you for the question. I'm glad you brought that up. If you hadn't, I would have.

As I mentioned at the start, in Canada approximately 7,000 different programs fund research, development, and innovation. It's significant. It's all across the board. There are multiple organizations and new programs come on stream constantly. The programs are not always connected. They're focused only on universities and research. As I mentioned in the opening statement, we have to delineate the two. They are two different activities. They're linked, but we need to fund both. That makes it very difficult for a mining company, for example, to invest in innovation. If you look at the statistics provided by the tri-council, the amount of money invested that is tracked and matched through tri-council programs is insignificant. I think the comparison is the same as dead languages. It's a scattered, large number of programs.

The Australian government chose four strategic areas for the government to invest in, and mining was one. Actually, it wasn't mining, it was METS, which is the mining and the supply chain sector, the whole system. They selected the METS sector as a critical area to invest in, number one. Number two, they made focused, direct investments of larger amounts of money in non-profit organizations, and they were not competitive, when you have to write proposals and compete and build transactional relationships. They were going to invest in the challenge defined by the industry.

For example, in Australia a couple of organizations called CRC ORE just received a new investment of $35 million. About $70 million in CRC ORE is now exclusively focused on processing. That was matched by mining companies, so the government is there with matching money, and mining companies say they can just go right in and throw their money on the table. It's that easy.

They have a similar one called Deep Exploration Technology CRC. The government said that exploration in undercover, etc., was very difficult. They were going to make a significant investment—I don't know the exact numbers, forgive me, I can try to find them—explicitly in exploration run by a third party organization led by industry. The most recent one was approximately 12 months ago. The Government of Australia and the Government of Queensland combined forces. I think the federal government put in $14 million, Queensland $6 million, for a total of $20 million over three years, to start a new organization called METS Ignited, which is doing essentially the same thing we're doing: building technology road maps for the industry, getting the supply chain hooked up, and moving forward to create a more sustainable industry and promote the development of new technologies for sale outside Australia.

It's very focused, run by industry-led organizations, third parties. Universities and others are involved, but they're not running it, so it's focused versus a competitive and a scattered approach.

Does that help?

[*Translation*]

Mr. Rémi Massé: Yes, absolutely. Thank you.

You spoke about the 7,000 different programs available that are not connected. I'm astounded. I have a better understanding of the Australian model.

How could we help the industry move from the existing Canadian model, which includes 7,000 programs, to a model like the one you described, using the Australian model as an example? How could we transition effectively to a more appropriate model?

[*English*]

Mr. Carl Weatherell: I think we need to. If you're looking at research and fundamental discovery, you do need that sort of opportunity where you have numerous programs where people with good ideas can apply, so we do still have to do that. If we want focus, we need to identify the strategic areas of importance to Canada and invest in them at specific levels versus a new program where you apply, and things are relevant. That's one way to do that.

Also, part of this government's innovation agenda is looking for ideas and looking for models. With Towards Zero Waste Mining and CMIC, we're proposing a new model for innovation. This is how we're doing industry-led innovation that reduces the risk. We've already identified; we've got a technology road map telling us where we're going to be in 10-plus years, so try a different model.

We're not the only ones. Others are out there as well, but let's test drive it.

[*Translation*]

Mr. Rémi Massé: That's good. Thank you.

Mr. Jean Robitaille: I would like to add this.

As I have already mentioned, there are currently many programs and organizations. The CMIC's mandate is actually to consider the whole and to try to align the organizations to industry needs. That's the difference we are currently proposing.

Rather than operate like the other groups, which target only the sector in which they specialize, we consider the needs in order to seek the expertise where it really is and adapt it within the industry across Canada. That is the difference. We are talking about an umbrella, an organization that will be able to align mining innovation investments in Canada to ensure results.

No other organizations currently play this role. I think that's an important difference to point out. It takes nothing away from these other organizations, far from it. We are working and will continue to work with them. They have the advantage of being specialized. The idea is that a group can see all the initiatives to be taken.

● (0925)

Mr. Rémi Massé: Thank you, Mr. Robitaille.

Do I have any time left, Mr. Chair?

[*English*]

The Chair: That's seven minutes. I'm sorry.

Thank you very much.

Ms. Stubbs, we go now to you.

Mrs. Shannon Stubbs (Lakeland, CPC): Thank you both for being here today.

I'll just elaborate along the same path of my colleague. I think we're in a really interesting area of the discussion. For us, I think it's important to get a specific sense of the ways in which government could change either fiscal tools or policy frameworks to help unleash innovation.

I would invite you both to elaborate more on two fronts. First, what are your reflections with regard to Canada's position globally and how we measure up against other countries in terms of competitiveness and investment and the deploying of innovation in mining? Thank you, by the way, for the information about the Australian model.

Then, second, if it's applicable, do you have any reflections on differences within Canada from territory to province or differences between jurisdictions? Do you have any comments on either best practices or barriers on this front and any specific recommendations for initiatives that could be undertaken to enhance and improve the development of and the investment in and deployment of innovation in mining?

Mr. Carl Weatherell: That's a great question.

I'm going to take some of it, and Jean and others will jump in as well.

On the competitiveness front, we're actually losing ground for the first time in decades. We rank number two, after Australia, as a place for exploration investment. We're losing ground very quickly. In that sense, we have an opportunity again with what we're trying to do to reclaim that and to turn Canada into a global leader, not only in mining, but also in mining innovation. We have that opportunity. The model we're proposing has never ever been used in natural resources. Since we are driven by being open to innovation, we borrowed the model from other sectors and put together something we think is better.

In terms of global competitiveness, we're falling behind. We have to do something quickly. I already mentioned our innovation rankings. We have to do something on that. Again, as we heard in the opening statements, having a myriad of funding programs shows that it doesn't work to the level we need it to.

With regard to differences in Canada, we work with a number of organizations across Canada. I should mention, as Jean said, that we're the umbrella organization. I chair a group of what we call the leaders of research, development, and innovation organizations. These include organizations across Canada. In Quebec City, there's COREM. There's the Centre for Excellence in Mining Innovation in Sudbury, referred to as CEMI. MIRARCO is another centre in Sudbury. CAMIRO is in Sudbury as well. COSIA is also part of that. C-CORE is in the Atlantic provinces. CanmetMINING is part of that, as is the NRC. We are seeing how we can collaborate and who's doing what, and we are comparing what we're doing and looking at how we can collaborate and adopt best practices. Within our own industry we're trying to get some of that collaboration and some of those best practices going. We and other organizations are looking at some things going on in some areas.

As I alluded to before, we prefer to look outside our industry, because it's very easy to look at what we're doing. We looked at AMIRA in other jurisdictions, in Australia, and we didn't like the model; it wasn't working.

We're borrowing from aerospace and defence and we're borrowing from microelectronics and software engineering. Our business model of an open innovation business ecosystem works exceptionably well in the software business. If you look at your phone, the Android operating system in most of your phones is built on a business ecosystem. Our business model is the same. For best practices, in terms of business model, we're borrowing from somewhere else and putting a spin of mining into it.

I want to come back to a few differences. As I mentioned, the mining industry is a little different from the oil and gas industry; it's not concentrated. We do have regional differences. Saskatchewan is a really good example. I didn't mention the International Minerals Innovation Institute out of Saskatchewan, which we work with very closely as well.

It's looking at what we're doing and seeing what's common to potash and uranium. There are some specific differences that innovation and research and development can address in uranium that are different from what's going to be happening in gold, or in base metals, or in diamonds. There are some regional differences, and that's one good example.

Jean, do you have anything else?

● (0930)

Mr. Jean Robitaille: Maybe. If you look at the competitiveness, you have to look at the industry going into South America, where the manpower is less expensive. We have to innovate; we need to have mines that are more automated. This is one component that will increase competitiveness.

I was on COREM, the Consortium de recherche minérale in Quebec. COREM was by the government at the beginning. It was a way to bring the industry more on board, and the success is substantial. I can tell you that the industry is using the outcomes of COREM, which are positive, and the contribution is substantial. This is not the same model, but it will be something that eventually, in five years, we will do with CMIC, having more of the industry after we make the demonstration.

The Chair: Thank you, Mr. Robitaille.

Thanks, Ms. Stubbs, we're out of time for that question. Maybe we can pick up on that with Mr. Harvey.

Mr. T.J. Harvey (Tobique—Mactaquac, Lib.): We're going to sound like a broken record, but I'm going to follow right along the same line of questioning.

If you want to finish your response, you can, or if you're done, then that's good too.

Mr. Carl Weatherell: Just to bolster what Jean said and to answer your question, the best practices are industry-led. CMIC is industry-led, COREM is industry-led, IMII out of Saskatchewan is industry-led. Those are the best practices, and this is true in Australia as well. Best practices: industry-led.

Mr. T.J. Harvey: First of all, I want to thank you both for coming. This is a really interesting committee, and we get a lot of good witnesses.

I think everybody recognizes that we need continued investment in innovation, no matter whether it's oil and gas, or natural resource development. I want to get your thoughts, both of you, on an idea that I also spoke to COSIA about. I'm going to use this as an example, it's kind of unrelated, but it isn't at the same time. The Atlantic Salmon Conservation Foundation is an organization that does investments. They invest in projects to see renewed vigour in the salmon population in Atlantic Canada, and it was originally funded by a $40-million endowment from the federal government. They can't spend the principal, but they're allowed to invest the proceeds. So the $40 million still belongs to the federal government —they can't touch it—but over the long term it builds.

It started out that they were investing a little bit every year, and now they're doing major investments every year, because they're allowed to reinvest those proceeds. I find with government that when we make investments in these sectors we do them on a very short-term basis. Five years is no time. When we're talking about mining, 10 years is nothing to a mining company. We should be talking about long-term strategic investments in mining and oil and gas.

Do you think that type of model, if it was presented at the right originating amount, would lead to a more stable base of funding over the long term?

Mr. Carl Weatherell: That's a great idea. We actually, with our former chair a couple of years ago, sat down with some high-profile individual investors looking at creating a foundation with their investments, versus those of the federal government, to make CMIC and the mining industry more sustainable.

So yes, we have thought about it. We never thought about going to the government for an endowment. At the time, we didn't think that would be the right way to go. We did not think any government would be interested in that sort of investment. However, we've thought about it, looking at different vehicles to fund it. Would it lead to more sustainability? Absolutely.

● (0935)

Mr. T.J. Harvey: From a government point of view, I agree that we need to see further investment. If the government invests $50 million over five years, we reap the rewards over the long term, but we still essentially gave that money to industry. However, if we give you an endowment of $100 million, or $75 million, whatever it needs to be to get to that level, we still retain that capital as a government, so it's still a long-term investment for us.

Mr. Carl Weatherell: Yes.

Mr. T.J. Harvey: It gives industry some skin in the game.

Mr. Carl Weatherell: Absolutely. That model certainly would work. An example of that being talked about around Ottawa is an infrastructure investment bank, for infrastructure in northern Canada. It's the same sort of idea, with capital put in by the federal government. You don't touch the capital, and you get the massive returns. It's a very interesting model, and it's being pushed heavily. You're talking about doing the same thing in innovation, essentially.

Mr. Jean Robitaille: With regard to your question, this possibility will be well-received. It's different from what we are currently proposing regarding the risk. With regard to innovation, we are presently saying that the risk is substantial compared to the kind of investment that keeps the capital found at the beginning. I see it maybe in a second phase. At this phase, what we need more is to have people on board and to move forward with trials and test development, with collaboration of the industry and the government.

Mr. Carl Weatherell: Leaning on what Jean said, I would like to add how we're approaching with respect to risk. We had a panel of mining CEOs meeting a couple of years ago, and they landed on three things. One of these was that we need to add innovation of the mining industry to the relationship with the Government of Canada. The Government of Canada has an awesome relationship with the mining industry through the Mining Association of Canada; it's incredible. We need to add innovation to that. This is the start of the relationship to get things going, as Jean said. It's low risk; let's prove ourselves. Let's prove that we work very well together as partners, and then perhaps look at Jean's suggestion for phase two.

The Chair: Thank you very much.

Mr. Strahl.

Mr. Mark Strahl (Chilliwack—Hope, CPC): Thank you very much for being here.

I have a quick question. I have an older version. I don't know how much older, but maybe you can tell me. Dr. Peter Kondos is the chairman listed on this version of your "Towards Zero Waste Mining". At the time, you were asking for a five-year $18-million investment. So $32 million is a big jump; it's $64 million if you factor in the industry's portion. Is it strictly because of the change in government that the ask has gone up? What else has changed in that timeframe? That's quite a substantial jump in what you are asking for.

Mr. Carl Weatherell: That's a great question, and I was hoping you would bring it up. There are a couple of things. One, as Jean talked about before, is that we were accelerating in getting more industry involved and getting more projects defined, so the scope of Towards Zero Waste Mining has increased significantly. It's basically around that. Also, when we were talking to government—both sides, both parties—they came back and said that for such a visionary approach it was not enough, we needed to amp it up. We were getting feedback from two different parties that suggested that we needed to go higher.

Mr. Mark Strahl: All right. I could certainly see that from the current government. I'm surprised that ours was saying that. Anyway, to be serious again, I think everyone around the table is positive about the opportunities there for innovation. If I go back to the carbon pricing argument a little bit, innovation is great, and there have been great examples of it, but there are some processes and situations that simply don't allow you to innovate further, as far as I know. We've heard from potash companies about the heating intensity that's required. They electrified their vehicle fleet, they've done a bunch of things to reduce their carbon footprint, but their heating costs are fixed. The same is true for a diamond mine in the Northwest Territories that spends tens of millions of dollars on simply heating the mine shaft and getting fuel in on the ice roads and things like that.

Part one of my question is, what about the parts of this industry that you cannot innovate? Then to go back to your comment that we're losing ground in competitiveness, I guess I'm a little confused about why the Mining Association of Canada, which you said speaks for you on this.... I'm confused because if we're talking about innovation and gaining ground, why would the mining sector be embracing an increase to their pricing inputs through a carbon tax that admittedly would cause, in the words of your presentation, an immediate slowdown at a time when commodity prices are down? Just walk me through how we can help make up the ground that we're losing in competitiveness if we are in a less competitive tax environment.

Another question is, if the carbon pricing is supposed to force sectors to innovate, why should the government then also be providing government support for innovation? Isn't the tax supposed to force industry in that direction?

There are a lot of things there, but I welcome any comments you may have.

● (0940)

Mr. Carl Weatherell: I'll try and answer one or two of your questions.

First of all, you talked about competitiveness, how we've lost ground, and this is in the mining association's annual report. We're now second to Australia with respect to place for investment, so it's clear it's augmented. That's number one.

You asked the question, how far can you go? You used the example of a couple of companies. The approach we're using is not the same as an individual company would take. The challenges we're looking at and what we've scoped out and the road map we have as a result...is by looking at challenges and problems that no single company or organization can handle. It has taken almost three years to get to this point. We use an ideation process. We had senior executives, six CEOs, in a room for two full days, going from no boundaries. In an ideal world, what would your business look like? We started with that and narrowed it right down into defining projects. As I said, we're looking at it differently from a single company saying they're kind of stuck because they're doing things on their own. We can go as far as we want to as an industry, and again, we're looking at it as an industry collectively, large-scale, versus one company or two companies.

Certainly, there are some things that we aren't going to be able to tackle. You still have to process material. You're not going to change that. You're not going to be using *Star Trek* sort of technology to do that, so that is absolutely correct.

The Chair: I'm sorry to have to interrupt you again. It seems that's my job today.

Mr. Strahl, thank you.

Mr. Rusnak, over to you. We have about two minutes left.

Mr. Don Rusnak (Thunder Bay—Rainy River, Lib.): I was going to make a long speech, but I'll keep it short since the Chair has told me I only have two minutes.

Not all new mines are in the far north. I represent the riding of Thunder Bay—Rainy River and we have Canada's newest gold mine, New Gold's Rainy River project. I've been there twice since I've been the member and they have an amazing partnership with indigenous communities. Can you let us know what the Canada Mining Innovation Council does in terms of partnerships with indigenous communities?

Mr. Carl Weatherell: Absolutely. I'll try to answer that very quickly.

At the council level, one of our directors is a member of the Missinabie Cree Nation and the former chief from 2001 to 2010. He's on our board. He's the former president of the Prospectors and Developers Association of Canada and also a board member of the Mining Association of Canada. That's at one level.

At the other level, we work with networks of organizations so we have already sat down with the Canadian Council on Aboriginal Business with this road map and discussed some of the challenges, what indigenous people-run businesses there are that could potentially fit into this.

Another specific example is one of our projects is a knowledge hub for mining environmental data. Next month we're sitting down with indigenous peoples to look at what sort of presentation...how they would want to extract and access this data.

As you can see, their involvement is at the project level all the way up to the board of directors level.

Mr. Don Rusnak: That was going to be my second question, are there any council members who are indigenous?

Mr. Carl Weatherell: Yes.

Mr. Don Rusnak: You talked briefly about your collaboration with FPInnovations. Can you elaborate on that a little bit?

Mr. Carl Weatherell: Again, we're both in natural resources. We're their sister organization and we reach out to each other to see what the common areas are.

Low-grade energy recovery is a significant issue for forestry, for oil and gas as well, and for the mining industry. So our strategic partnership identified a couple of areas. Low-grade energy recovery is one. Transportation is another.

We're having a conference call with them and COSIA this week or next week on the transportation issue itself, related to autonomous vehicles on surface, and water treatment. Some of the products they've produced through their work, potentially their nano-crystalline cellulose plant, may be relevant to water treatment.

● (0945)

The Chair: I have to cut you off there. I apologize again.

Gentlemen, thank you very much for coming today. I do apologize. It goes to show you how important the topic is. We could spend a lot more time than we have today but, unfortunately, with the rules we're bound by, we don't.

Thank you again, on behalf of the committee. We very much appreciate your time.

We'll suspend for two minutes, then we'll pick up on the second hour. Thank you.

Mr. Carl Weatherell: Thank you.

Mr. Jean Robitaille: Thank you.

● (0945)

(Pause)

● (0950)

The Chair: We're going to continue with our second hour. We're now joined by Richard Paquin from Unifor, and Professor Brent Sleep, from the University of Toronto.

Gentlemen, thank you very much for being with us today and taking the time to come to Ottawa. I'm going to open up the floor to each of you. You may present for up to 10 minutes. When you're both done, I'll open the floor to questioning.

Your microphone is on, professor, so I'm going to suggest that you go first.

Professor Brent Sleep (Professor, Department of Civil Engineering, University of Toronto): Thank you very much.

Thank you for the opportunity to speak to this group today. My name is Brent Sleep. I'm the chair of the civil and mineral engineering programs at the University of Toronto, and I'm also the director of the Lassonde Institute of Mining at the University of Toronto.

The University of Toronto has a long history of research and education in mining engineering. Mining engineering was one of the first programs started in the engineering faculty at the University of Toronto. Currently, the University of Toronto hosts the undergraduate Lassonde mineral engineering program and the Lassonde Institute of Mining.

The Lassonde mineral engineering program graduates about 30 mining engineers per year at the undergraduate level. They get a Bachelor of Applied Science in mineral engineering. These students go on to careers ranging from exploration to mine operation to positions on Bay Street in the finance industry.

As everyone is aware, I'm sure, there has been a big change or downturn in the mining industry. In the 2008-09 time period, our students who were graduating were getting multiple job offers at great salaries. Currently, things are a little bit tougher, but our students are still slowly managing to find jobs in the mining industry.

The Lassonde mineral engineering program, as I mentioned, is an undergraduate program. The Lassonde Institute of Mining is a research institute centred at U of T. The researchers in the Lassonde Institute come from across the university, especially from the civil engineering, materials science and engineering, and chemical engineering programs, as well as the earth sciences department at the University of Toronto.

The research ranges from exploration to extraction, mineral progressing, and metallurgy. There are currently 18 professors across those departments at U of T and 69 graduate students who are associated with the Lassonde Institute of Mining. The institute was established in 2000 with financial support from Dr. Pierre Lassonde and is housed in the Goldcorp Mining Innovation Suite at the University of Toronto. For the institute, we have an advisory board of senior leaders from the mining industry in Canada. The vision of the Lassonde Institute of Mining is to develop transformative sustainable solutions for the mining industry. The institute researchers and graduate students work closely with the mining industry to ensure the effective transfer of research to industry.

The research is supported by funding from the mining industry and, typically, matching funding from organizations such as the Natural Sciences and Engineering Research Council. We also recently have had support from Genome Canada. This support is really critical to the researchers and the students who are working in the mining research area at the University of Toronto.

Just to give you a bit of background, I can highlight a few of the recent mining projects that we're involved in at the University of Toronto. These projects are focused on improving the environmental and financial sustainability of mining through a reduction of waste produced, better management of tailings, reduction of energy usage, and optimization of the mining process.

There's a long tradition at the University of Toronto of work in the area of mine safety. We've had a couple of spinoff companies from the department that have developed internationally recognized software for the development of mines, particularly in guiding the excavation processes, and we have also done a lot of research in the areas of improving ground support, such as developing methods to identify where unstable conditions exist in order to reduce the danger of rock bursts, and those sorts of geomechanics-related types of research.

We currently have research programs that are looking into the application of unmanned aerial vehicles, UAVs or drones, in mining. This is a collaboration between researchers in the Lassonde Institute and researchers at the University of Toronto institute for aerospace science, and we're particularly looking at new applications in surface mining.

One of those applications relates to characterization of the rock faces in surface mining to identify unstable conditions and also to guide the development process of a surface mine. The other is to look at fragmentation analysis by flying drones over the rock piles as they're broken down to assess the particle size distribution. This project is currently funded through the University of Toronto Centre for Aerial Robotics Research and Education. We're in discussion with various parties in the mining industry to try to get further funding and support from mining companies both in terms of funding and in terms of access to sites to test out the new technologies.

● (0955)

Another project is focused on improving ore characterization to reduce energy consumption in comminution, which is essentially grinding rocks. It's estimated that about 30% to 40% of energy consumption in the mining industry is for comminution and that about 2% of global electricity consumption may be related to comminution processes. From current estimates in the research, there's a potential for 30% to 40% reductions in that comminution energy with the development of new technologies and the optimization of existing processes.

In particular, there's a great need to optimize the blasting processes. We currently have a project focused on relating the rock geo-metallurgical and mechanical properties to energy needs in comminution. With this better rock characterization, there could be better optimization of the comminution process.

Another overarching research project we're working on is mine-to-mill optimization using new sensors and data analytics to optimize the mining process from the mine to the mill. Mining companies collect large amounts of data, but there's often not great communication between different divisions within the mining company. They're sometimes using different databases and not making the best use of the data to optimize the entire mining chain. We're looking at situations where we can use real-time information on ore characteristics, for example, to feed forward from the mine to the mill to optimize the processes in the mill. We working with a major consulting company in developing these applications of big data and data analytics to the mining process.

We also have people who have been working on cemented paste backfill. This involves backfilling mine slopes with mine waste mixed with cement to produce geotechnical stabilization and also to reduce the amount of waste that has to be disposed of on the surface. This has been a seven- or eight-year project supported by a major mining company. The focus really is on improving the understanding of the properties of the paste backfill.

A senior professor who recently joined our department is a world expert in the area of geomicrobiology. This professor is working on mine tailings management, both in the hardrock mining industry as well as in the oil sands industry, particularly looking at the applications of recent developments in genomics to better characterize the microbial processes in mine tailings, which really drive the whole chemistry of mine tailings.

With respect to the big data applications, on October 27 we're hosting the Southern Ontario Smart Computing Innovation Platform. They're holding a forum on smart computing for mining, which will have about 50 participants, half from industry and half from academia.

Government support of research, innovation, and development of more sustainable mining techniques is critical for the university and for the academic profession. Government programs support not only fundamental and applied research but also the training of the next generation of leaders in the Canadian mining industry.

Thank you for the opportunity to speak to you today.

● (1000)

The Chair: Thank you very much, Professor Sleep.

Mr. Paquin, over to you.

Mr. Richard Paquin (Mining Director, Unifor): My name is Richard Paquin, and I'm representing Unifor. Jerry Dias, our national president, asked me to come and speak on his behalf, since he's busy bargaining with Ford now. We'll see how that goes.

I'm the recently appointed new director of mining for Unifor. We represent roughly 11,000 members across the country, most of them in B.C. and Quebec, which represent roughly 20% of our membership of 310,000 members in this particular natural resources department.

Most of our members are from Rio Tinto, Glencore, and Mosaic, which is the big potash mine in Saskatchewan. We are the second-largest union in the country representing natural resources, after the steelworkers. We also represent many members on IndustriALL, which is the biggest global union in the world, representing roughly 50 million workers in a hundred different countries. Mining is a big forte of that area, and we participate in the system in as many areas as we can.

With regard to a bit of history about us, the former CAW was heavily involved in mining also, and in 2010 we introduced a resolution that was put up by former MP Claude Gravelle. We asked him to introduce it in the House of Commons, and it was done and acknowledged by the Speaker.

In order for us to best express our views on how to best protect this great natural resource of ours, Unifor has created a specific national industry council called the Mining, Metals and Minerals Industry Council, or MMM for short, that oversees this important industry across Canada. This council also recently adopted the same resolution, and I'll pass it on after.

What it allows us to do is to have great discussions with all of our members in the country in order for us to best protect and diversify this economy that is created by this natural resource. Former Prime Minister Harper famously referred to Canada as a super-energy superpower. Now if you combine that with the actual value of all of our natural resources, he was right. We are a force to be reckoned with.

Canada has an abundant supply of natural resources that fuel global capitalism and furnish Canadians with the many objects that make all of our lives more comfortable. Aside from being an energy superpower, Canada is one of the largest mining, metal, and mineral producers in the world. We rank eighth worldwide, after China, the United States, and mainly Russia.

As always, this sector has seen many roller coaster rides. Many of the communities where we have members are affected by the market, which changes very rapidly. During the 2009 recession, approximately 10,000 new Canadian workers who were employed in this industry were laid off. Fortunately, because the market picked up in early 2010, 2011, and 2012, 10,000 unit jobs were created within our membership across the country and it assisted the industry to flourish.

Wages are also very high in this industry. In 2013, wages across the country averaged $36 an hour, which is roughly 60% higher than the industrial average. Mining and smelting also make a very important contribution to Canada's overall balance, because we export all of those products. In 2013, it was over $72 billion worth of exports. This reflected high commodity prices as well, and also the growing volume for some of the mineral exports. The resulting trade surplus of all this was worth $20 billion that year, which helped Canada partly offset the enormous trade deficit that was created by manufacturing and other sectors.

Because of the big and often money-making industry that it is, firms spent more than $12 billion on fixed assets in 2013, which is many times the levels spent a decade ago. Because of this product, our GDP was almost $25 billion.

● (1005)

There is a big drawback with this. Because we are so high in natural resources, the market is really open to the global world, and many Canadian operations got bought out in the 2006-08 era by big, global corporations like Rio Tinto and Glencore, which at that time was Xstrata. Alcan got bought up by Rio Tinto. Vale also purchased Inco, which used to be one of the biggest Canadian mining companies in the world. They were all global industries now owned by global players, not Canadian anymore. The reason for that is the profitability in this sector is extremely high when the prices are right.

Because of this industry, we are mandated, under the Constitution document of the British North America Act of 1867, that every province has to be assigned the responsibility of overseeing non-renewable natural resources development. This means that each of our provinces and territories has the duty to draft the legislation and erect the regulatory bodies that oversee the mineral and resource development in its borders.

I'll just name a few. I'll concentrate on Ontario because that's where I'm from. A lot of those industries, like the Mining Act itself, oversee the prospecting, the staking, the exploration, the development of all these natural resources:

> ...in a manner consistent with the recognition and affirmation of existing Aboriginal and treaty rights in Section 35 of the Constitution Act, 1982, including the duty to consult, and to minimize the impact of these activities on public health and safety and the environment.

Many of other provinces also have similar acts. We also have the Ministry of Northern Development and Mines that actually administers the Mining Act and all the regulations related to it. We also have the Ministry of Labour that does the regulation and plays a very important role in this sector.

We have the Mining Legislative Review Committee, or MLRC for short. This is an advisory committee to the Government of Ontario representing labour, management, and the Ministry of Labour. There is a body of legislation that pertains to the health and safety of all of our workers in all of the mines in Ontario and in all of the mining plants. We also have the Mining Tripartite Committee, which is a committee that deals specifically with what the proper training should be for all of our workers to make sure they return home each and every day.

In order to deal with the new exploration that is feasible in Ontario and other provinces, the Minister's Mining Act Advisory Committee, MMAAC, was formed years ago. It deals specifically with the exploration and development of new mining permits in smelting. It currently oversees the development of the Ring of Fire, which we all know is a growing opportunity in northern Ontario.

The federal government also established a council a while back called the Mining Industry Human Resources Council, or MiHR for short. I'm on that committee also. It's a federal government committee whose purpose is to train our miners to make sure their skills are transferable across provinces. The unfortunate part of this committee is that everything is voluntary, so workers and employers, in order to participate, need to agree to do that. It's not mandated.

Our civilization, and increasingly an emerging global civilization, is built from the ground up using the mining sector and its associated industries, which are partially responsible for the astonishing increase in the diversity and quality of our human life over the past century.

Unifor is guided by the belief that Canada can responsibly develop its natural resources while respecting aboriginal treaty rights including, and importantly, consultation and full social economic participation. We cannot do this under the presumption that the status quo will automatically achieve these goals.

Natural resources are increasingly central to Canada's economic trajectory. Our challenge is to maximize the positive spin-offs of resource development while minimizing the economic and environmental costs.

I'll just make it brief. It's a little longer than 10 minutes.

● (1010)

The Chair: Okay, we're approaching the 10-minute mark now.

Mr. Richard Paquin: There are four issues I would like the committee to concentrate on, and they are four issues that Unifor feels are important in order for this sector to survive and flourish.

We need to establish a foreign ownership policy or define what net benefit really means. The test itself is very vague, and it needs to be amplified. It needs to concentrate on investments, research and development, spending, and crucially employment and the guarantee of employment.

Foreign takeovers should be screened and have a clear and ambitious net benefit test that aims to develop the sector for the benefit of all Canadians. We also have to look at our hydroelectricity costs. That is a big burden for employers. Another thing we need to look at is the royalties being given to all levels of governments. We have our municipal, provincial, and federal governments, and some of the royalties aren't, in our assessment, fair with some of the players.

We need to develop a national strategy around mining. It will draw the best practices of all other mining jurisdictions, including the measures around conservation and efficiency, public ownership, regulatory oversights, public consultation, and the security of supply. More importantly, it will build maximum benefits for all Canadians.

We must find creative ways to attract as many community benefits from mining resources as possible.

Thank you.

The Chair: Thank you very much, sir.

Mr. Tan, you're first on the list.

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

Thanks, gentlemen, for being with us today.

I have a number of questions for Dr. Sleep. I know you are the chair of the Department of Civil Engineering at U of T. My notes say that you are appearing here as an individual. I'm very curious about that. Does that mean that what you have said to the committee does not reflect the view of your department or U of T?

Prof. Brent Sleep: No. I am not sure where I indicated I was appearing as an individual. I'm appearing here as the chair of the Department of Civil Engineering.

Mr. Geng Tan: Okay, thanks.

I'm sure that your department and the Institute of Mining are doing a great job in your leading-edge research. As you mentioned, your department and the institute maintain very close links with industry. I guess, from the time that you have invited industry experts it'll come to the university to give lectures and share with us the lead of industry for innovation.

As mentioned by the previous witness, research and innovation are similar, but they are different concepts. Can you share with us a few successful examples about transferring your research or development into the innovation and making use of it in the industry?

Prof. Brent Sleep: Sure, I could mention a couple of companies that have spun out of the department. One of them is Rock Science, which is a company that develops software that is sold worldwide. I think they have about a million dollar a year market in software for mine development. We have a recent company, Geomechanica, that has developed software tools for looking at rock fracturing processes. Those are a couple of applications. The work that I mentioned, the research related to mine tailings management, is research that's supported by a number of companies, and that research is being done on site at the companies to improve the understanding of the various processes in the mine tailings, which will lead to new ways to manage those tailings.

● (1015)

Mr. Geng Tan: Okay. I still remember the mining building on College Street.

Prof. Brent Sleep: Yes.

Mr. Geng Tan: I started at the Wallberg building, coming to the department for six years and for even more time for my post-graduate degrees.

I'm sure U of T is not the only university that has a mining program or research. Is there coordination among the universities or the research institutes in Canada to make the best use of the expertise?

Prof. Brent Sleep: There is certainly collaboration on a researcher-to-researcher basis so that a person who works in the mine tailings area, like Professor Lesley Warren, works with people at the University of British Columbia, and she also works with people internationally at Berkeley and also in Australia.

I have two programs in groundwater remediation that are both multi-institutional programs. One of them is an NSERC create program that has collaborators from Toronto, Western, Queen's, and Waterloo. I have a second Ontario research fund program with researchers from Western and Queen's. There are lots of examples of collaboration between universities where people get together to work on collaborative projects, which is, of course, highly encouraged by the granting agencies and leads to much better productivity and collaboration.

Mr. Geng Tan: I graduated from chemical engineering and applied chemistry. Are there many environmental protection or chemistry programs involved in the research in your department or in the institute?

Prof. Brent Sleep: Sure. My undergraduate degree is in chemical engineering but not from Toronto. Personally I collaborate a lot in chemical engineering with Elizabeth Edwards, who is the director of BioZone. And there are a couple of people in chemical engineering who were heavily involved in the mining area and in the Lassonde Institute, including Professor Vladimiros Papangelakis, who works in the hydrometallurgy area; and also Professor Mansoor Barati, who's in materials science and engineering, who teaches mineral processing to our undergraduate students.

Mr. Geng Tan: Okay. I have a final quick one.

So far in this mining sector we have invited some witnesses but most of the witnesses are from the industry, either in associations or the companies. Normally they give us a very different perspective or vision about their company, about their industry. I find some of them are over-optimistic while the others emphasized too much the difficulties in the industry. So you're from university. We say you are doing the pure research, you're an academic and you're the third party. From your perspective as a chair of a civil engineering department, give us a few quick words about the future of the innovation in the mining sector.

Prof. Brent Sleep: I've gone to many conferences where leaders from the mining industry have spoken about the need for innovation in mining, and I'm sure Carl Weatherell would have also emphasized that. We actually hosted a CMIC event on innovation in mining and also a second CMIC event in innovations in comminution. So there are opportunities for improving the productivity of the mining industry and reducing the environmental impacts of the mining industry. Corporate social responsibility, of course, is also an important aspect that we make sure our students are also trained in.

The Chair: Thank you. That's right on time.

Mr. Strahl.

Mr. Mark Strahl: Mr. Paquin, I appreciated your testimony and I know you got rushed there at the end. I really appreciated your comments on Prime Minister Harper having it right; there are certainly no arguments from this end of this side of the table.

One of the things you really didn't have time to expand on was your concern about hydroelectricity cost. We talked earlier in the first hour about carbon pricing, which will put additional costs on top of really high electricity costs in Ontario especially. Perhaps you could expand on your concerns or your recommendations on government action to deal with hydroelectricity costs and whether your predicted price on carbon will address that concern or make it worse.

● (1020)

Mr. Richard Paquin: High electrical costs are some of the highest costs for employers in the mining industry. The only two provinces that really flourish in that area currently are British Columbia and Quebec. One of the reasons is because both of those provinces generate their own power. They have the ability to tap into the rivers that are nearby and they create their own energy. For them it's a win-win situation, but it's not the same everywhere, unfortunately. In a lot of our areas where the mining sector is growing, there is very little opportunity for them to have access to the natural resource that gives them that ability. Therefore, it's important for them to have the ability to somehow be subsidized or be given some ability to recover some of those costs because it is very expensive for a lot of them.

If we're going to take the Ring of Fire, which is the next biggest development in Canada that we foresee, there is no infrastructure whatsoever in that area to allow that to happen. Without electricity, unless technology really changes in the next few years, it's going to be very expensive for somebody to go up there and do the actual mining. Prospecting and developing is a different area, but once you get into the production phase, this is where electricity really comes into play.

To answer your question on carbon pricing, it may assist. It may force employers to look at different ways of getting electricity up to those areas, but at this point in time it's hard to say if it will really help or not because we're not there yet.

Mr. Mark Strahl: Another issue that certainly flared up a couple of years ago was the issue of temporary foreign workers in the mining sector. At HD Mining, in British Columbia, there was a proposal for an entire workforce to be sourced from outside of the country, essentially. Certainly, the Conservative government took decisive action to change that program as a result of stories like that.

There's been some talk about going back on that tightening of the rules. What is the current situation, as far as Unifor is concerned, with labour in the mining sector? Do you have any concerns with the direction, or the pivot, perhaps, that the new government has taken in terms of the temporary foreign worker program?

Mr. Richard Paquin: That program, in our mind, was put in place to deal with a specific situation at that one point in time. It doesn't really exist anywhere else in the mining industry except for that incident in B.C. itself. I've been in the mining industry for 35 years now. I've worked in uranium mines, nickel mines. I've worked in all kinds of mines over my career. I can recall the early days in our school system. The reason we look at those workers is because we don't have the ability in Canada itself to get the specialty skills that we need. They're not currently available. They're very rare, I should say.

We all know that the skilled trades will be 80,000 workers short within the next five years. There are stats all over the place that show that. Our current school system, including high schools, does not have the same ability it used to have 25 years ago, when we had shops in the high schools and all this stuff that would really promote students to follow that path. That's gone away now for some reason. It has to come back. We have to make sure that comes back.

The other issue is that, even in our universities or colleges, a lot of focus was put on getting diplomas—not as much in colleges, but universities—in administrative skills versus the actual skilled labour. We need to get around that.

Also, we used to have lots of subsidies for employers to offer apprenticeships, a lot more than we do today. That has to come back, otherwise it's hard to get regular Canadians to get the right skills they need to be employed by those mining companies.

Mr. Mark Strahl: You'll get no disagreement from me about the need to promote skilled trades and to promote them as a great family-supporting career that isn't a lesser path for individuals. I think governments at all levels need to wrap their heads around ways to promote those kids who have an interest in having a well-paid, family-supporting job, encouraging them that they're not somehow inferior for not pursuing perhaps a university education or further studies that way.

The other thing you talked about, which you didn't get a chance to expand on, are the royalty regime and foreign ownership policy. Perhaps in that order, if you can just expand on what your concerns are with the royalty regime, specifically if there's a federal component to that, and then if there's any time left, if you could discuss the foreign ownership policy.

● (1025)

Mr. Richard Paquin: To my knowledge, the issue with that area is that the monies collected from mining firms based on royalties are not equivalent to the actual product being pulled out of the ground. We all know these are non-renewable products. Once you move that rock, it ain't coming back for millions and millions of years—probably never.

It's not like a renewable source, where it will grow and eventually benefit the communities again. It doesn't do that once it's gone, so there has to be some type of compensation for municipal governments, because the roads are destroyed by the big trucks and everything, and also for provincial governments, because they give permits to allow that activity, under the mandate of the Constitution.

We have to make sure these big corporations now coming into Canada pay the government to provide for you, the federal government and the big infrastructure needed for those areas to flourish. Without that money being available, it's hard to do.

We all know that companies profit largely from mining resources. When the price is high, their profits go beyond the scope of imagination. Very few of them stay within Canada, because they're all global corporations. A lot of the time the profits end up in other countries instead of our communities. That has to be changed. The only way to do that, as we see it, is to establish a national strategy that forces those big corporations to do all these steps in order for them to do business in Canada.

The Chair: I'm going to have to interrupt you there. Thank you.

Mr. Cannings.

Mr. Richard Cannings: Thank you, and my thanks you both for being here today.

I'd like to start with Dr. Sleep. I know part of your expertise is in the remediation of groundwater, which is a very important part of the mining process. Certainly I hear a lot about that from my constituents. I wonder if you could expand on what the current state of groundwater remediation or reclamation is in Canada.

Prof. Brent Sleep: The areas I work in are primarily brownfields and remediation related to organic contaminants. The state in Canada, and around the world for that matter, is that there are easy sites to clean up, and those easy sites have been cleaned up. These are sites with contaminants near the ground's surface in nice, permeable, sandy soils. There are a number of different technologies available to clean up those kinds of sites.

At the other end of the spectrum, you get into contaminants in fractured rock at great depths, and you have contaminants like PCBs or heavy metals that are very difficult to remove. That's still a challenging area for remediation scientists.

Mr. Richard Cannings: Turning to the innovation theme, are there any innovations you can talk about that would help us in that regard, with respect to the role the federal government could play in incentivizing innovation? We're talking a lot here about making mining more innovative, cleaner, and that sort of thing. Is there anything we could do to spur that on?

Prof. Brent Sleep: Research funding is the key. We have to pay research costs and support students, and so any programs that provide funding for environmental research are a great help to enhancing or advancing the remediation expertise in Canada.

Mr. Richard Cannings: I know you come at it from the research end, but I wonder if you could comment on the legal or more technical side of what companies are required to do right now, and how that could be changed or advanced.

● (1030)

Prof. Brent Sleep: A lot of the remediation is driven by land transfers. When a property is being transferred from one owner to another there's often a requirement to clean up that property. I think this drives a lot of remediation.

Certainly, legislation is in many cases what drives a company to seek solutions to clean up a contaminated property. Strong legislation provides a stimulus to the remediation industry.

Mr. Richard Cannings: Mr. Paquin, at the end of your talk, you mentioned, very briefly, a national strategy for mining, and I wondered if I could give you the opportunity to say a bit more on that. It sounds like a big subject.

Mr. Richard Paquin: It is, and because they are non-renewable resources, we have to be sure that the product that we draw from the ground is allowed to be fully processed in Canada before it gets to the point of sale. Currently, we have many industries where the rock is mined in Canada and milled here but sent across the sea to Norway like Glencore, for example. All their material is sent to Norway to be refined rather than having the refiners in Canada. That would benefit all our workers here in Canada up to the point of sale.

Mr. Richard Cannings: I appreciate that because I have a large smelter in my riding, in Trail, which does the opposite.

We get ores from all over the world.

Is the strategy just around making that value chain more robust in Canada?

Mr. Richard Paquin: It's one of the issues. The other issue is to make sure that when a big foreign company comes into Canada, it guarantees jobs for a certain amount of time.

I'll give you an example. We had the big layoff in 2009 in Sudbury, Ontario, where at that time Xstrata had just signed a deal to purchase Falconbridge. Part of that deal to the net benefit process was that there should be no layoffs for two years to guarantee employment for at least that period of time. Unfortunately, they met with government and because of the situation were given permission to lay off almost 60% of their members before the two years were up.

Part of the condition was that they had to reinvest another $200-some million. That never occurred but people still got laid off. Something needs to be done to make sure that what I call a loophole is blocked to guarantee the maximum amount of employment for our workers in Canada.

Mr. Richard Cannings: You mentioned some issues around first nations and the duty to consult but you also talked about education. I was just wondering if you had any comments on a further role the federal government could play in the education of first nations in communities, at all levels from elementary to post-secondary.

Mr. Richard Paquin: I've got some good news. I'm part of the MiHR. One of our new mandates now as a council is to ensure that aboriginal people are part of the training where their skills will be transferable from province to province if they move on. We just started that concept. I presume the government will continue funding that to make sure that happens; that everyone is given the same opportunity as everyone else.

The Chair: Mr. Rusnak, we'll move over to you.

Mr. Don Rusnak: The 2015 report of the Mining Industry Human Resources Council identified a number of labour challenges over the coming decade that could impinge on the sector's health, such as impending retirements and mismatches between skills and potential workers. The committee has heard that historically, Canada's mining sector workforce has been primarily male. Moreover in 2015, a report by the Native Women's Association of Canada identified barriers for indigenous women participating in the mining workforce.

What risks do labour challenges pose to the health and safety of the mining industry?

● (1035)

Mr. Richard Paquin: The risk is the lack of training, more than anything. I'll give you another observation. You return home every day. If you're not properly trained, then the risks are a lot higher than for someone who's given the job and told to do it and learn as they go. First of all, have policies in place to make sure the proper training is there before they can commence any type of work in the mining industry.

Mr. Don Rusnak: What can the unions or the companies do to increase the participation of women or indigenous people in the workforce? We know that in my area of the country, first nations are increasing greatly. They're participating more in the workforce. How can we get them interested in mining? What has Unifor done or what do you know the companies have done to increase that participation?

Mr. Richard Paquin: I know probably in the last 10 years, more emphasis than before has been given to female employees. Years ago, that wasn't the case. There were very few. But the good news is that industry has seen that female operators are more dependable and more able to take care of the machines than male operators. That may be because of who they are, which is great.

I think a lot more emphasis needs to be put on trades. A lot of women are able to have the great skills to be able to do the work, and I think we should concentrate more to give them the ability to get those trades. There are no gender differences in that area.

Mr. Don Rusnak: I have a question for Professor Sleep.

You mentioned there was collaboration with U of T, but is there collaboration with colleges or on-the-ground trades training or people in the industry? You talked about a lot of collaboration with other universities or academic institutions, but I often hear when I travel to the mine site in my district that the skills of the engineers coming out of the schools—and I don't know if they are coming out of U of T—sometimes don't match what they need on the ground. So is U of T actively training its students who are involved in the industry with an eye to the skills that the industry needs on the ground?

Prof. Brent Sleep: The University of Toronto Engineering faculty has a program called the professional experience year. We place students from our mineral engineering program in mining industries for either summer internships or 12- to 16-month internships. Through that process, they get very good on-the-ground training. Some of our students' courses are taught by people from industry, so that really gives them a good appreciation of what the industry is all about and what skills are needed for the industry. Of course, they are fresh graduates when they get out to the mines, so there's always a period of adjustment and learning.

Mr. Don Rusnak: What are your numbers right now at U of T with regard to women, indigenous people, and under-represented groups in your programs?

Prof. Brent Sleep: For the mineral engineering program, the first year intake this year is 40% women. Ten out of 22 are women. I do not believe we have any indigenous students in the program. We have certainly identified that as a shortcoming not just in the mineral engineering program but across the Engineering faculty.

Mr. Don Rusnak: Do you know what the University of Toronto is doing to engage or recruit in first nations areas? I know Richard talked about the Ring of Fire having huge potential for Ontario and perhaps being the next big mining district in the country. That area is occupied primarily by the Matawa first nations or first nations represented by the Nishnawbe Aski Nation. Has U of T been engaging with any of those communities to get people trained through its programs?

Prof. Brent Sleep: The University of Toronto Engineering program is investigating the potential for starting transitional programs. I don't know if you're aware of the ENGAP program at the University of Manitoba. We recently had the director of that program visit us and talk about their successes, and we are investigating other examples like that across the country.

Mr. Don Rusnak: I have a question for Richard. What can be done to increase the participation of women and the indigenous people in the mining industry, and what exactly has Unifor been doing?

● (1040)

Mr. Richard Paquin: In some of our collective agreements, we've actually put in provisions such that we will request that a certain percentage of employees be aboriginal people or women, that's part of the quota. In order to get that, we have to get a collective agreement in place. Unless they see them in the workplace, that's hard to get.

Mr. Don Rusnak: Has Unifor been doing outreach in the under-represented communities?

Mr. Richard Paquin: We have. We have also been helping those communities by repairing their homes and all that stuff. So, we're doing our fair share to promote ourselves within those communities, and maybe in time we'll be a bigger player.

Mr. Don Rusnak: I have what I hope will be a quick question for both of you.

What can the federal government do to assist in getting the proper people and under-represented groups into both the university and the workforce?

Mr. Richard Paquin: I would say the best way to do it is to make sure that workers are involved in all negotiations, when you get permits in place and all that stuff, in those areas, and also to make sure that we have the ability to promote that concept as it should be promoted.

Prof. Brent Sleep: I'm aware of a program that a professor, who just joined our department from McMaster, ran with funding from the RBC Blue Water Project, which is called green mining. That brought students into the university from remote communities to spend two weeks learning about the science associated with mining. It also brought the teachers in, and it was a great experience.

The Chair: Thank you very much.

Mr. Barlow, we have about two minutes left.

Mr. John Barlow: Thank you, Mr. Chair. I have just a couple of questions.

Professor, I was interested to hear you say that some of your students may be taking a little bit longer to find jobs but they are finding jobs. I was at a professionals' employment summit in Calgary a couple of weeks ago. It was more geared toward the oil and gas sector. There were petroleum engineers, geoscientists, and geologists. Many of them haven't had jobs in two years. For them, they don't see a light at the end of the tunnel. In the commodities, oil and gas and mining, we've gone through these ups and downs over the years, but this is the first time many of them are saying that they don't see an exit and that this is the worst they've ever seen it. There are just so many things going against them. So to your students, I hope things work out well.

My question, just really quickly, is on water. I see that your expertise is on the water side, and that's something we have to focus on a great deal. What would be the water consumption innovations, I guess, to minimize water impact in mining as compared with, let's say, coal, nuclear, or oil and gas? In the oil sands, we got rid of tailing ponds for the most part. What are the innovations and advancements for water conservation in the mining sector?

Prof. Brent Sleep: I mentioned Professor Papangelakis in chemical engineering. He's working a lot on closed-loop systems for mineral processing. A closed-loop system is about salts removal and the removal of contaminants to recycle water. Anything that reduces the amount of ore that goes to processing will reduce the amount of mine tailings, the amount of waste that's produced, and the impact on water.

Those are a couple of examples.

Mr. John Barlow: Could you talk about the Milestone potash mine in Saskatchewan? Do you know that one at all? It will be the first mine in Canada to use treated waste water in its facility, in this case from the city of Regina. Have you any thoughts on that and on maybe what direction that will be going in?

Prof. Brent Sleep: I'm not aware of that project, but certainly the reuse of treated waste water is a big topic, and not just for the mining industry. People are looking at the reuse of waste water for domestic consumption as well, especially in drought-stricken areas like California.

Mr. John Barlow: Thank you.

The Chair: Thank you very much, gentlemen, for joining us today. Unfortunately, we've hit the hour mark. We're out of time. We greatly appreciate your making the effort to be here today.

Mr. Richard Paquin: Thank you.

Prof. Brent Sleep: Thank you.

The Chair: I will see the rest of you on Thursday.

We're adjourned.