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Chair

Mr. James Maloney

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● (1615)

[*English*]

The Chair (Mr. James Maloney (Etobicoke—Lakeshore, Lib.)): Thank you to our two witnesses for joining us. We're starting a bit early, so thanks for being here ahead of schedule.

For the record, from the Department of Natural Resources, we have with us Frank Des Rosiers, assistant deputy minister, innovation and energy technology, and Julie Sunday, director general, policy and planning branch, innovation and energy technology.

Thank you very much for joining us today. You are starting us off on our new study on clean technology in Canada's natural resource sectors. You are going to set the tone for us as we get started—no pressure.

Ordinarily, people presenting have up to 10 minutes. That's for the two of you. We have a bit of extra time, so if you need more than 10 minutes, by all means feel free to take it.

Welcome, and thank you.

Mr. Frank Des Rosiers (Assistant Deputy Minister, Innovation and Energy Technology, Department of Natural Resources): Thank you so much, Mr. Chair. It's a pleasure to be here to kick-start this study on a topic that's important for the government and the country.

Julie and I have talked about using our deck to help frame some of your early consideration of this issue. If that's okay, I'll use the 10 or so minutes to guide you through our deck, after which we would be more than happy to entertain any questions, comments, or insights that you may wish to share on this matter.

[*Translation*]

I will assume everyone has an English or a French copy handy.

[*English*]

The first part lays out the broad vision and ambition the government has laid out in this regard, as we heard from the Prime Minister and cabinet members, including Minister Jim Carr, to have a dynamic and growing economy on the one hand and, on the other hand, to make sure we are able to make progress in terms of environmental outcomes.

That will be achieved in part thanks to investments in innovation and clean tech, which we see as an important contributor. That is why it featured so prominently in the context of the pan-Canadian framework discussions with our provinces over the past year, but will again, on a go-forward way basis through this particular set of initiatives.

[*Translation*]

In particular, I would like to draw your attention to the initiative announced by the Prime Minister along with 23 other world leaders.

[*English*]

It's called “Mission Innovation”. Many of you will be familiar with this, but just to make sure that we all have the same starting point in terms of our understanding of it, I will note that it has three main components.

The first one is the commitment from all of the signatory countries to double their level of investment in energy research and development over the next five years. Canada made that commitment as well.

The second is to attract a greater degree of private sector investment in this space. There, it is worth noting that the Gates foundation, along with a group of 28 large investors, committed to the Breakthrough Energy Coalition to again invest in that space. A billion-dollar fund was announced very recently. Canada is actively looking to attract those investments to Canada.

The third and all-important dimension is to look at ways to collaborate across the world to try to address some of those issues together. We have had a history of collaboration with the U.S., and the U.S. DOE in particular, but we'd like to expand this horizon of collaboration with other Mission Innovation countries. Canada, I would say, is quite active in bringing those parties together towards those common research areas.

The following slides summarize something that you as committee members will be all too familiar with, and that is the sheer importance of natural resource sectors in two regards.

The first is environmental performance. If we look at GHG emissions alone, the production and use of natural resources—from energy, forestry, and minerals and metals to agriculture and fisheries and oceans—accounts for the vast majority of our greenhouse gas emissions in our country. Whether we succeed or don't in this particular space matters a whole lot in terms of our accomplishing our climate change objectives, but it's also meaningful in terms of other environmental objectives.

[*Translation*]

First, it is crucial that we do our part to reduce negative impacts on the environment, be it water, air, or land. Second, it is important that we pay special attention to the natural resources sector because it is a key economic driver.

[*English*]

It accounts for roughly a fifth of Canada's GDP and is a very significant contributor to wealth in your respective ridings, right across both the urban and the rural areas of Canada.

On the next slide, we have a bit of a snapshot of those other important impacts in terms of jobs, but also in terms of public confidence. We all know that this is an area of concern for many of our citizens and for our clients abroad. Making sure that we really get ahead in environmental performance to gain that trust, that confidence, from our citizens and clients, we feel is really important.

Again, we feel that bringing about improved performance in terms of environmental outcomes is really important in that space. Obviously, it also drives a significant amount of revenues, both federally and provincially, as well as exports and investment. It's a big growth driver. That's the reason why, in budget 2016, the government announced a commitment to invest over a billion dollars to accelerate the pace of activity in the clean-tech sector.

● (1620)

[*Translation*]

Slide 5 provides an overview of the situation.

Over the years, we have seen a trend towards under-investing in R and D across the entire economy, but even more so in the resource sector.

[*English*]

That trend continued in the past year, and is certainly something we've been pausing on, given the sheer scale of the challenges we face.

Another dimension that was all too evident was the relatively low level of adoption of some of those technologies across the natural resources sectors. Again, that's something that we were not quite seized with.

Over the course of the past year, Minister Carr, along with officials and some of his cabinet colleagues, were quite active in soliciting people's ideas, views, and insights on this important set of activities that we're looking to do. Minister Carr held 11 ministerial round tables—the parliamentary secretary was active throughout those—with provinces and territories, with academic institutions, with industry, and also with indigenous leaders, who were quite active throughout those discussions.

At the officials level, we have engaged with over 350 stakeholders, both domestically and internationally, to try to identify issues but also good ideas and solutions. We also reached out to Canadians who felt passionately about this topic, both youth and people who were already engaged in the sector, to solicit their views. We launched LetsTalkCleanResources.ca, a website with very neat interactive features. It permitted Canadians to ask questions and volunteer views. It had a large amount of traffic.

Finally, we did what good public servants should be doing, namely, namely, we did a careful analysis and review of data and evidence to enrich our understanding of what's happening in Canada and also what's happening globally.

Sometimes when you engage and consult, you hear everything to the opposite, and it's kind of hard to make sense of it. Other times you actually have a clear consensus emerging. This has clearly been in the case in our engagement over the past months. I will strive to summarize it for you, so perhaps you will allow me to pause on each slide to give you a bit of an insight in terms of what people were telling us.

The first message, which we heard at every one of those round tables, was about the need for a country of our size, as a mid-sized country but a significant player in terms of natural resources, to make sure that we have clarity in terms of the vision and in terms of ensuring an alignment of efforts within the federal government but also among provinces, universities, and firms. That way we will have a clear understanding of what it is we're aiming for in terms of goals, targets, and efforts. That theme came through very clearly from all of the partners.

The second message was that Canada needs to be a bit more bold in its research portfolio. The sentiment is that we're doing a good job in making marginal improvements across multiple industries and sectors, but we are perhaps not pushing enough the solutions that are more transformative in nature. For instance, in terms of GHG impact, we're looking at not just a reduction 1%, 2%, 3%, or 4% here and there. We're looking at sharp and dramatic reductions in the order of 50%, 60%, or 70% so that eventually we can meet those medium- to longer-term targets that Canada and the rest of the world are striving for. Trying to stretch our legs, so to speak, to go toward more transformative technologies, was certainly something we heard, and we took good note of that. Higher-risk, higher-impact measures were viewed as important.

The third message, which echoes what I was referencing earlier, was the importance of teaming up with some of our international partners. This is in many ways not just a challenge for Canada; it's a global challenge that we're trying to tackle. We might as well team up with the Americans, with the Europeans, the Chinese, and other partners who are willing and able to help us meet the ambitions we set for ourselves.

The fourth message, which is one that I'm sure committee members have heard before and will undoubtedly hear throughout the course of the deliberations, was the need to have proper support throughout the so-called valley of death. In many cases we've seen great ideas that have not gotten the proper level of support and funding—for demonstration projects, for instance. We know that large companies will never endeavour to do a large-scale project until it has been tested at a large enough scale that they can be reassured that this thing will work. Similarly, having the proper level of risk capital, before the venture capitalist and traditional financing industry is able to pick it up, is a source of worry for many of our firms involved, especially the smaller firms.

● (1625)

The fifth message we heard, particularly from our small and medium-sized enterprises, is that they're at times a bit confused of whom to interact with within the federal government in particular. When they hear about the work that is done by the various departments and BDC, EDC, and SDTC, for them it's all alphabet soup, and they're getting a bit lost in terms of who does what. They expressed the desire to have a single window, a single point of contact, where an inventor or an established firm looking for assistance to get some money for R and D work, or looking for funding for a demonstration project, or looking for help to export their product or services around the world could find out whom to talk to or who could help them.

The last point was that Canada is an important market, but it's just too small for them to sustain themselves, let alone prosper. They have to export their products and services across the continent and around the world.

These, I would say, were the key risks or concerns that were expressed throughout those discussions.

I understand that the committee also expressed an interest in what policy instruments we're considering to address the risks I described. On slide 8 you see the key steps in the spectrum, in terms of innovation, from basic research all the way to applied research, demos, market development and broader adoption. How can we make sure that along the entire innovation spectrum we're doing what's right to help advance those technologies? There, to put things simply, we're looking at the dual sets of instruments, the so-called technology-push measures and the market-pull instruments. The basic message or the sentiment there is that a single measure won't do. We have to look at a panoply or a multiplicity of measures to really have a chance of succeeding in that complex base.

Very briefly, on the technology-push side there is direct funding for R and D. Every OECD country has some kind of element of support. Why? Because there's clear market failure in this case, in which a small firm would not be able to capture all of the gains or benefits of a given technology. Unless there's some kind of public support, there's a disincentive for them to invest, and the risks are quite significant. If you strike out on it, you go bankrupt. So it's pretty hard for them to shoulder that risk entirely on their own.

Our research facilities, whether they're university research facilities or national labs, are a key competitive asset. As a country, we're fortunate to have those, but let's make sure that we make full use of those assets to help firms and the country overall to make progress. In many of those domains—I'm thinking of energy in particular—it's very expensive to have this kind of pilot plant apparatus and expertise to run those pieces of equipment, and unless they have access to those multi-million dollar facilities.... They won't be able to do that in their garage.

Support for breakthroughs, which I spoke to earlier, and both domestic and global codes and standards can also be very powerful drivers for adoption. There the message was that they felt that Canada is sometimes too nice. Sometimes we have to lift our shoulders and make sure that we defend our firms' interests and our country's interests a bit more forcefully.

In terms of market-pull instruments, obviously the government has made a very clear commitment with regard to carbon pricing, and that certainly is a helpful driver for adoption. When we're talking about regulations, methane, for instance, is a good example. Greening of government operations is an important one, and we heard quite a bit about that during our consultations, especially with regard to the tools around government procurement. The government procures a lot of stuff each and every year, and using that very tool was seen as an important signal and driver for early adoption. There are also tax incentives. For the green infrastructure program, as you know, there's a $20 billion envelope, which can again have a significant impact. Providing support for access to markets and capital is also seen as important.

I won't go through slide 9 in detail, but I mentioned some of our unique lab infrastructure in our national labs. We have those four CanmetMATERIALS labs and energy labs. I understand that the committee is considering regional visits, and we'd be more than happy to welcome you to see what's out there and the kinds of scientific expertise available to support our firms and universities and to carry out the work.

With that, Mr. Chair, I will pause here. Thank you.

● (1630)

The Chair: Thank you both very much. I'll open the floor to questions.

The first segment goes to you, Mr. Tan.

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

Thank you, Mr. ADM and Madam Director General, for being here with us today.

I read the material prepared by the Library of Parliament regarding NRCan's policy and experience. I found outlined some unique characteristics of each sector in the natural resources industry. For example, for the energy sector it says there is a need for enhanced coordination of federal levels. For our mining sector, there is a lack of coordination among innovators and adapters. For the forestry sector, a national strategy is considered a solution to mitigate those innovation barriers.

What actions has the federal government taken to support the Canadian technology and to provide the coordination that the industry is looking for?

Mr. Frank Des Rosiers: The committee member is quite right to point out that all of those sectors are different. We talk about clean tech as if it were one thing. The five natural resource sectors, three of which have just been referenced here, have very different levels of maturity when it comes to their ability to innovate.

In the case of energy and forestry, we certainly have a fairly mature set of innovators and players. For mining, there is clearly much less so. We're very much at a nascent stage of trying to develop an ecosystem that would help to bring those companies and solutions to the marketplace. Right now, they're not very active at it.

As you probably heard from the Prime Minister and the Finance Minister, budget 2017 is expected to have a particular focus on innovation. The clean-tech component of it will most certainly be referenced there. It is expected that some measures in that regard will be announced very shortly. We've been working quite closely with each of those sets of players, including industry associations and large investors, to come up with some measures, some of which were announced in budget 2016.

We had $200 million worth of announcements, mostly focused on the energy sector. There was a $50-million oil and gas demonstration fund, which was seen as an early, must-do investment given the sheer scale of the challenge involved in transforming the sector and lowering its environmental impact. There was also a $62-million investment for electric vehicles. The transportation area was clearly seen as a key priority area for both the federal and provincial governments. We heard that again throughout the course of the past year in pan-Canadian forums and discussions with provinces, in which many of them listed it as a top priority for them. We also committed some $80 million for energy R and D funding in that duration.

In parallel to this, the committee members referenced forestry. The IFIT program is also carrying out its good work of infusing demonstration projects right across the country, many of which were announced very recently. On the mining side, there is less activity thus far. We're hoping that the next tranche of investments will get to it.

Mr. Geng Tan: Thank you for your long answer. Half of my time is gone.

From the report published by NRCan in December 2016, the federal government could support clean technology in natural resources by providing facilities and services to test and de-risk clean technology.

Can you elaborate on that a bit and give us some more details about it providing the facilities and services?

Mr. Frank Des Rosiers: I happen to be the assistant deputy minister responsible for those national energy labs, so I can speak to this with some confidence.

Pretty much every single project that we carry out in those national facilities is done in partnership with companies and universities. Why? It's not just because we want to have friends along the way; we're looking for impact. That's really the measure of success for us. For us, being able to work on things that matter and that will eventually be adopted is the best measure of success. It's one thing to develop great ideas, but if they don't go anywhere, we're not having much of an impact on the country and the country's performance. So we will really make it a necessary condition that we have an industry partner or a university partner in order to advance those projects.

Going forward we aim to make those facilities even more available, especially for smaller firms that don't have the facilities or the capital to have this kind of fancy equipment, and to have the expertise along the way to manage those. You need highly trained technicians. Some of those pieces of equipment could be dangerous if mismanaged or operated. We need to train engineers who can assist those small firms in perfecting the technology. Then they will be able to sell it both domestically and abroad.

Using this as a model, we've seen it happening in our own facilities. Also in the U.S. they've been experimenting with this to a greater degree. We think it has a lot of merit. Obviously, the small firms would be delighted to benefit from such expertise. We think it's something that should be pursued on a priority basis.

● (1635)

Mr. Geng Tan: I have to go to my last question. I have only one minute.

Canada's clean technology industry has more than 800 companies right now. From this report that was published by NRCan, over 87% of those firms are exporters. Why is that? Is that because there is more competition in the domestic market or maybe our domestic market is not big enough to make good use of or to digest the new technologies? How do you address that?

Mr. Frank Des Rosiers: First, I'd like to point out that we're not starting from scratch. As the committee member has mentioned, with 800 firms, over 50,000 jobs in Canada and the sector still growing quite rapidly, Canada is actually in a position of strength in terms of our base. We are widely recognized around the world as being a leader in that domain.

Why is such a large proportion exported? I guess it's for two reasons. Canada is roughly 2% of the global market, so by definition if you're really trying to address global problems, you'll find a demand out there. Whether it's in Europe, China or the U.S., they're very keen to get our solutions for water technologies or for emissions reductions for methane. They are struggling with the same issues we're struggling with, so they're very keen to benefit from Canada's technology, and I would say that globally we have a very good brand. We're seen as a serious player and a credible player in this space.

I would add, though, more critically, because we're among Canadians here, that we have to reflect on how we can better our gains. We heard throughout our consultations that among our adopters there is certainly a propensity to be risk-averse. The data I referenced earlier in the deck does signal that, especially among our large, established players, who tell us that they are concerned that would disrupt their production or their activities.

Culturally, there may also be a bit of a propensity, historically, if I may reference some players in the minerals and metals sector, for instance, to use established processes and maybe not to push the envelope quite as much as we would like to. But that transformation happens. In the forestry sector, if we had had a similar discussion 15 years ago, we'd probably have echoed the same concerns, and look at the amount of progress we've made. The same thing applies in the energy sector. We've made great strides, if I can use the example of oil and gas, in adopting advanced technologies to reduce emissions. Is there scope to do more? Absolutely, there is, but we've seen movement. Our propensity to take risks or to adopt new technologies is certainly an area in which we could certainly do better.

The Chair: Thank you.

Mr. Barlow.

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

Mr. Des Rosiers, it's great to have you back and good to see you again. I appreciate your great presentation and the good information you've provided. There's one thing you said that I just have to point out. I was really happy to hear you say that sometimes we have to put our shoulder into it and defend our own country's accomplishments. That is great to hear. I think you even used the word "forcefully". Maybe don't get the military out if there's a protest, but I hope that's something you can do moving forward.

This isn't necessarily a question, but I really appreciate that attitude and the fact that through this study, which I'm really excited about, we're going to hear about some of the incredible accomplishments and technological advancements that have happened here in Canada. Obviously, in my neck of the woods, in the oil and gas sector, and even in coal, for whatever reason and maybe globally, that message is clear. But it certainly doesn't seem to be the case in our own backyard where a great number of Canadians just don't see that, for whatever reason, and we still have that moniker, which is unfortunately put out there sometimes even by our own government, of Alberta's dirty oil. We have to do a much better job. For whatever reason, we don't talk about the successes we have had, about the things that we are the best in the world at, whether it's forestry, oil and gas, or nuclear. I hope that as a government department you will be able to champion that and bring that message forward.

Now to my question, I did see in your deck that in budget 2016 there was a billion dollars over four years to support clean technology. I remember looking through the budget, and I didn't see anything specifically about clean technology. Can you describe or does the department have a specific definition of clean technology, and how do you evaluate which tax dollars are being used to invest in clean technology? Do you understand what I'm saying? What sectors have you determined are clean technology and what would qualify for support in the clean technology sector?

● (1640)

Mr. Frank Des Rosiers: That's a good question to ask us. When you look at practices around the world, you see there's no clear, set definition.

We've been working with Statistics Canada over the past year to make sure that we have a better grip on the data. There was a targeted investment made towards this. We wanted to make sure that the definition was well established so that we could have clarity in the national accounts in terms of what we are, and are not, counting.

There's a longer version of the definition that we now use, but perhaps for the benefit of the committee I will use the short one. Clean technology is any process, product, or service that reduces environmental impacts. It does capture quite a bit in terms of activities.

To your question about what was announced in terms of specific measures in budget 2016, I mentioned earlier the $200 million worth of measures.

Mr. John Barlow: Yes.

Mr. Frank Des Rosiers: The balance is committed and is firmly set in the fiscal framework. Announcements will be coming over the next months on those additional measures to make up for the rest of those investments, but you can be sure that there will certainly be more to come on this.

How do we go about selecting priority expenditures in this area? Again, informed by all the discussion and consultation Minister Carr and his officials carried out with a number of departments and agencies—the innovation, science, and economic development department, Global Affairs Canada, Agriculture Canada, DFO, and other partners were very involved in those discussions—we're looking to come up with a program suite. It won't be a one-trick pony here. In line with what I was describing before in terms of technology push and market pull, we'll be looking at a number of initiatives to get to the end goal. We're certainly looking at a particular emphasis on those five natural resource sectors I described before, the target areas of energy, mines, forestry, agriculture, and fish.

One thing I would emphasize, and it surprised even us in our own discussions, is that there were a lot of commonalities among those sectors—more than we thought. The more we had those discussions, the more participants told us that water was a key priority for them. Extraction methods were important, and tailing ponds from mining. Energy was critical.

A lot of technologies apply to more than one sector, which is great, because you're having even more impact. Typically those industries and sectors tend to operate more in isolation. Now that we've opened up that dialogue, that discussion, they say, "You know what? I'd love to be able to use this apparatus for my activities." I think there's quite a bit of scope in R and D and in the adoption of technologies where we could work across sectors.

Mr. John Barlow: Great.

You talked about the valley of death. We heard a lot about that in our other studies. What kind of follow-up process is there once a company or an SME receives some funding or some assistance? Is there a rubric or a metric in place that these companies have to reach, a certain bit of advancement or success? I think what we see too often in the private sector, and obviously sometimes in the public sector, is just, "Here's your funding. Now go out and do it." Then we kind of forget about it.

I really hope there is some follow-up, and again, with what you're talking about, maybe some opportunity to share best practices with other companies. Could you touch on that and tell us about the process there?

● (1645)

Mr. Frank Des Rosiers: Yes. I very much appreciate the question, because it gives me a chance to speak about the different approach that we're embarking on. We're very much looking at a whole-of-government solution.

I don't want to be critical of my predecessors, but historically we have tended to look at it at each stage. As you correctly pointed out, however, it's the same companies that have to carry on all the way to the finished product. We think that having a sense of accompaniment with them, so that they can move from R and D to a demo, to proper financing, and to eventually getting a product to the marketplace is really important. We're looking to act very much in the spirit of that single window, with whole-of-government support wherein we have multiple agencies co-located in a given spot, so that we can help firms move along the way.

We recognize that not all of those great ideas will end up being adopted. Here I think we have to be straight with ourselves and have a bit of a stricter gating process so that if an idea, especially on the breakthrough side, doesn't pan out or work out, we have the guts to pull the plug on it so that we don't commit more taxpayer dollars to something that won't achieve its stated goal. For those ideas that have legs, we have to assist and support them along the way. Finding the sweet spot between the two is what we're striving for.

The Chair: Thank you.

Mr. Cannings.

Mr. Richard Cannings (South Okanagan—West Kootenay, NDP): Thanks to both of you for being here. It's great to have you kick off this clean-tech study. It's one that I'm really looking forward to in terms of seeing what we can learn over the next few months.

To start, I've talked to a lot of people in clean tech over the last year—people doing clean tech and people thinking about it—and one theme that keeps coming up is electrification and how we have to increase the electrification of our industry and our transportation if we're going to reduce greenhouse gases in a meaningful way. I'm wondering what specific strategies the government has for building the grid in Canada.

We've heard testimony from the mining sector about how the grid is either not there or not strong enough in many places in the country. This is about making the grid smarter and more efficient. If we're going to have industries and homes feeding into the grid, how can we make the grid more responsive to those dispersed energy producers that we're going to see in the future?

Mr. Frank Des Rosiers: That is a complex set of issues, which I could see you dipping into even more in your follow-up conversation. You're very right when you say that electrification is a major topic of focus, not just in Canada, but around the world. Maybe I could attempt to give you some nuggets of answers, and then you can tell me if I did a good enough job.

Starting in the area of transportation and the government and country as a whole, we have strong support from the Provinces of Quebec, Ontario, and B.C. Many provinces are seeing the importance of looking at electrification of transportation as a key area of focus, whether it's for buses or vehicles or in having the proper infrastructure in place, the charging infrastructure, which we've invested in over the past year, as have the provinces.

We think it's really important to address the issue around range anxiety, which is one of the key elements why consumers are a bit hesitant to pull the trigger in buying those vehicles. Also, it's about developing the proper technologies to manage potentially hundreds of thousands of vehicles on the grid. That's a big draw on the power systems. The utilities are scratching their heads in trying to figure out how they will respond to this. We've been working with them to develop software solutions and practical solutions to do it progressively but to be ready to respond.

You mentioned other domains. I would mention mining. We have electrically powered mining equipment underground. It's one area that some leading companies are looking to actively pursue, including here in Ontario. That did raise interesting issues, as we found out in our discussions, around some regulations that actually make it basically impossible to do that, unless they're changed. They are not federal regs, but it doesn't matter from the firm's perspective. Someone has to help them address those; otherwise, they won't be picked up. The manufacturers are prepared to play ball and the companies are prepared to play ball, but now we have to make sure the regs catch up to that industry development. That's one domain that we've been pursuing actively.

More generally, as we move toward adopting more and more renewable power in our grid—and Canada is fortunate to have quite a bit of it—especially those sources of energy that are intermittent, such as wind or solar, we note that the energy output fluctuates based on the time of day or the amount of wind. When you have 5% to 10% of that in your energy grid, it's probably manageable, but as you increase such percentages into the teens or twenties, or even higher, it does create added challenges for the operators. We've been working quite actively on forecasting techniques and on how we can manage bigger areas of production so as to deal with this.

One very promising area that Canada and the world are investing a lot in is energy storage. Again, this is to make sure that the source of energy is more stable. That's true for overall networks, but it's also true especially for smaller or more remote communities. Whether they're first nations, remote communities, or off-the-grid systems, having renewable solutions, along with energy storage, is really important. In our view, it's one of the early opportunities, as was referenced in the PCF, on which the federal and provincial governments want to place a particular emphasis, because those communities pay a lot for their energy. In those communities, 50¢ to 60¢ per kilowatt is fairly commonplace. We think there are solutions that could be implemented in short order.

That's a longish answer, but....

● (1650)

Mr. Richard Cannings: That's okay.

I'd like to move on to forestry. I think you described it as one of the industries that had a mature clean-tech culture, yet as shown on your graphs, adoption rates are very low. I want to know how that squares.

Also, again, I'm wondering what programs you're funding, through IFIT or whatever, that will help forestry companies. When we talk about building large wooden buildings, that's one of the things. We have a large plant in my riding, Structurlam, that does this. I'm wondering if you're promoting those technologies.

Mr. Frank Des Rosiers: "More mature" might have been a better description of it. Is it picture-perfect? Surely not, but they've made tremendous strides. I think, if we look at it from the perspective of a global lens, with traditional operators now being really being savvy in developing new materials and new products and exporting them exporting around the world, they've certainly made great strides. The industry was seized with the need to transform itself.

Both federal and provincial governments have stepped up in a significant way over the past 15 years across different governments in power and clearly recognized that it was imperative to assist them. So the IFIT program has been a flagship program in that regard. Through successive rounds of funding over the past years, we've been able to support their transformation, especially for demonstration plants that are so costly for the firms, and we've seen projects right across the country, so that's certainly been a great success.

Mr. Richard Cannings: Okay.

The Chair: You have 30 seconds.

Mr. Richard Cannings: Where do you think the low-hanging fruit is for greenhouse gas reductions from a federal government point of view? Where can we be bold and get some significant reductions quickly?

Mr. Frank Des Rosiers: Methane is probably one where we could have the biggest impact, given that the sheer impact of every methane emission, by a factor of 28 compared to CO2s, and we're still a large and significant emitter. The government has made significant commitments to reduce it, and we feel that quite a few of the technologies available out there could be applied right now. We've clearly put this as a top priority, and the provinces are working with us and the industry, recognizing that this is something we could do in fairly short order that would have significant impact at a macro level.

Mr. Richard Cannings: Okay, thanks.

The Chair: Mr. Harvey.

Mr. T.J. Harvey (Tobique—Mactaquac, Lib.): Thank you, Mr. Des Rosiers, for being here.

I want to focus my area of questions on the valley of death, I guess you'd call it. I'm going to draw my remarks to agriculture just because that's the industry I know quite well. But I think the same premise could be applied to the forestry sector, mining, or oil and gas across the country. The concerns that I hear from contractors or farmers is how does government do a good job in ensuring that a billion dollars of investment in clean technology doesn't just go to the secondary processor or end-user, so that the adaptation of that technology and the funding possibilities going along with it actually trickle down to the primary producer or the source producer if it's in a different commodity?

I'll give two examples. Richard mentioned forestry. The new Ponsse processor would be half a million dollars. Say a forestry producer, a source producer, purchased a new processor two years ago. They're expected to try to adapt that new technology and take that on in order to better their operation. How does that producer reap those benefits as opposed to somebody in the manufacturing business who's taking that wood and turning it into lumber and adding value to it? They can adopt technology a lot more easily because the revenue that's attached to secondary production a lot of times is a lot greater than the revenue attached to the source production.

It's the same in agriculture. When you look at the emissions around agriculture, the majority of the emissions are from the primary production. If John Deere comes out with a new electric tractor—they announced one three or four months ago—it will be $300,000 for a 180-horsepower tractor equivalent. If a producer buys that tractor, how do we ensure that the producer sees some of the benefit from that? If he just adapts the new technology at a higher cost and doesn't see an end benefit from it, then he's at a competitive disadvantage. So how does government help facilitate that and ensure that they're not disadvantaged by the technology, that, in fact, they're able to embrace that new technology and receive their fair share of the positive benefits that come from it?

● (1655)

Ms. Julie Sunday (Director General, Policy and Planning Branch, Innovation and Energy Technology, Department of Natural Resources): One of the things that came out very clearly in our consultation process was the particularities around the sectors that are dominated by smaller operators, or SMEs. In agriculture there were some examples of that, and in fisheries as well. In these sectors, there's an increased need for measures to support adoption of new technologies because of the prohibitive cost at times of implementing them and the risks associated with that. We saw a broad risk across all resource sectors in terms of adoption, particularly in their first commercial use, and a role for government in helping to mitigate that risk. Certainly that cut across all resource sectors, but in the sectors where smaller operators dominated, there was certainly attention given to the particular needs.

Also in terms of the broad clean-tech producer space, we noted a considerable need to better link the end users with the clean-tech producer space. Oftentimes we heard from resource sector companies that the clean-tech producers weren't actually developing solutions that worked in their particular sectors. So government's convening of conversations between the producers of the clean technologies and the larger industrial players was also a gap that we noted, and one that could certainly be bridged.

The final thing I would say, in terms of clean tech across the resource sectors, is that we looked a lot at outcome-oriented approaches. What are the big outcomes in each of those sectors that we as a country would want to see achieved, and then how do we, without predetermining technical pathways, figure out how best to get there? That also creates a broader dialogue across the clean-tech producer space, because, while there are particularities to each of these sectors, there were also a number of opportunities for applications in, say, energy to be applied to mining, as Frank noted. They weren't necessarily technological advances, but rather sort of redeployment in different sectors, and then there are some issues that are common across all sectors around energy use and different areas. It's not a one-size-fits-all approach, but there's also a lot of potential for sharing best practices across each of the sectors to fuel greater adoption across the sector, which has been a challenge.

● (1700)

Mr. T.J. Harvey: Mr. Serré has a question that he wants to ask, so I'm going to turn over the rest of my time to him.

I thank you for that answer.

The Chair: You have about a minute and a half.

Mr. Marc Serré (Nickel Belt, Lib.): Thank you, Mr. Harvey.

[*Translation*]

I would like to raise two points.

First of all, Mr. Des Rosiers, your report mentions five natural resource sectors in Canada. Could you put together a table that shows Canada's relationship with the U.S., in terms of jobs and revenues, in the five sectors? It would be useful to see the interdependencies between Canada and the U.S. in the sectors. We would very much appreciate it if you could provide the committee with that information.

Second, we'd also like to know the status of clean technology in the five sectors as regards Canada's relationship with the U.S. We are looking for more information on our connection to the U.S. as far as clean technology in those five natural resource sectors is concerned. Would it be possible to get us that information?

Mr. Frank Des Rosiers: We would certainly be pleased to provide that to the committee. The only concern I have is that the data are still flawed, and we recognize that from the outset. We are working with Statistics Canada to improve the data on the sector. Nevertheless, we can definitely share what we have with the committee.

Mr. Marc Serré: That's great.

I have one last question for you. I don't know what the term is in French, but I am referring to

[*English*]

mining tailing ponds

[*Translation*]

The Vale Living with Lakes Centre at Laurentian University and private sector companies have approached me on the issue, because it would seem that solutions do exist. It's a major problem. British Columbia has experienced leaks, as have northern Ontario and other parts of the country. Who in your department is the point person for these types of problems? Can you send us more information on R and D in the area?

Mr. Frank Des Rosiers: Absolutely. We will see to it that the committee receives all the information on tailing ponds.

Mr. Marc Serré: Wonderful. Thank you.

[*English*]

The Chair: Thank you.

Ms. Stubbs.

Mrs. Shannon Stubbs (Lakeland, CPC): Thank you, Mr. Chair.

Thanks to both of you for being here. We appreciate having your testimony as we kick off this study.

Both my colleagues across the table and to you, I want to start by commending the work that the government's doing on the one-window approach. As a person who worked in the oil sands business unit in the Government of Alberta years ago, and then later for a polytechnic institute in Alberta, concerns around a one-window approach, both on the regulatory side as well as in terms of fiscal partnerships with government, are heard across sectors. In a show of co-operation and non-partisanship, I want to acknowledge the work you're doing on that. I think it is an important priority.

My questions are around Canada's role in the world on a couple of fronts, and maybe either or both of you could speak to them as you can.

My colleague mentioned your comments on around this issue of codes and standards and defending Canada's best interests, and the sense that maybe we've been too nice in the past. I wonder if you could elaborate on what you mean specifically, or any highlights you want to give on that issue, and then also around bridging the valley of death in the commercialization and deployment of clean technologies.

Could you elaborate on any specific policy directions you think will help? Could you also highlight the countries with the best practices and policy frameworks, and where Canada fits into that whole picture?

Mr. Frank Des Rosiers: Maybe I'll start with the codes and standards issue. It sounds like a pretty technical and not so sexy topic, but it's mighty important. We've seen and heard countless stories about some of our competitors—who will remain nameless—who very deliberately made sure that their heat pump standards were mimicking the global standards. This makes it rather difficult for our local manufacturers to penetrate those markets.

Again, it's a global game. Those partners are very deliberate, and we have to make sure that we are equally forceful, not just looking at our own codes and standards in Canada, but also playing a more active role in the global arena to make sure that we help define those global codes so that, at the very least, our firms can sell their gear and are not excluded right off the bat before they can even get to the marketplace.

It really calls for us to work between our manufacturers and our codes and standards colleagues to make sure that we are there to defend more actively, in various global forums.... Some of those discussions are very technical, and you have to dispatch engineers to go through these, but unless you're willing to invest that time and effort, you're going to be shut out from those markets.

Once the codes and standards are established, it's pretty hard to change them. They're typically there for years, if not decades, and then the market is just taken away from those firms. So being attentive to this, I think certainly deserves clearer attention.

On your question regarding the valley of death and what to do on that, the two things I can probably focus most attention on are around demonstration projects. We heard from our consultation in the pan-Canadian framework that this is a clear area where there is a lack of funds. Those things cost a pretty penny.

You mentioned your involvement in the oil and gas sector, Mr. Chair. Having a demonstration project in that space typically costs $20 million, $50 million, $75 million, or $100 million a pop. There are many technologies there that need to be demonstrated, so it is a significant commitment on the part of the firms sponsoring this and the potential adopters. Often they're reluctant to jump in unless governments are willing to shoulder the cost, especially for the first of a kind, because the technology risks are significant and delays are often occurring, so nobody wants to be first and everybody is waiting for one another. At the end of the day, our industry is not well served. That's certainly a priority area.

The other one I would flag is around risk capital for that kind of pre-commercial stage, where, again, financial institutions don't want to go there because there is still some hesitation about a new product or a new service. This is where they are looking for government assistance, and we do have some funding programs in this regard from SDTC, which has had a record of support in this area. It helps fill that void before a venture capitalist picks it up.

We don't have very deep capital markets for venture capital in Canada. It's just a fact. Our firms end up relying on other sources of funding, or they have to go to the U.S. to seek that capital. I was in San Francisco for a clean-tech event with Julie, and we saw a lot of our Canadian companies knocking on the doors of U.S. institutions and banks to fund them. It's the same in New York or Boston. Some might argue that it's not necessarily a bad thing, but it would be nice if the financial sector in Canada was able to stretch its funding envelope to help some of our firms here.

● (1705)

The Chair: Thank you.

Mr. McLeod, go ahead.

Mr. Michael McLeod (Northwest Territories, Lib.): Thank you for your presentation.

Clean technology is about remediating or preventing environmental damage, or reducing the amount of pollution. It is not clear to me what by “de-risking” the adoption of clean technology means. Maybe you could answer that and expand it to what you think the federal government and industry's roles are.

Mr. Frank Des Rosiers: That's a very good question, because a billion dollars sounds like a lot of money, but there are a lot of firms and a lot of needs out there and we certainly don't want to spread ourselves so darned thin that we're not accomplishing the impact that we want. And we certainly don't want to substitute ourselves for what private firms ought to be doing.

I will look a bit at the risks that we're trying to address and try to summarize them in maybe four buckets. The first is technology risk. This is where firms should be driving this effort, but it's where market failure tends to occur, as I referenced earlier. Every government on this planet is providing some assistance to R and D, whether it's through tax measures or direct support, in conjunction with what the firms are trying to advance.

Then there is a second risk around business risk. As the name suggests, it's what a company would tend to bear in terms of whether or not the product is deemed to be safe or accomplishing the mission it is meant to do. There, one would expect that the companies would own much of that risk of whether the particular product would meet the marketplace's needs.

The third risk, which is not insignificant in this case, is the policy risk. It is both a positive and a negative risk. I can use the example of climate change. Over the course of the past year, and a bit in Canada and globally, there certainly has been a change in the policy landscape that has made the adoption of these clean technologies easier, whether through regulations, carbon pricing, or other measures that we are currently discussing. In this case, the policy environment became more supportive. But we could imagine circumstances whereby that policy risk would change toward the negative and make it less attractive or less easy for companies to advance their technology.

I don't know if this describes it in a useful, clear enough fashion, but that's how we tend to frame, at the macro level, the risks out there and who would tend to bear them.

● (1710)

Mr. Michael McLeod: Mr. Chairman, I'm curious, then. If the government should backstop the risk, does that mean we should also share potential revenues if there is a breakthrough in technology? Perhaps we invest in mechanical batteries or something and that really takes off and the government had backstopped it. I don't know if that's the way the industry looks at it, but certainly from a business perspective, I would think that would be the case.

I find it interesting that we're encouraging a lot of industry to do many different things for us, and the government has put some money towards it. In the north I watch communities really struggling to move away from diesel generation power. For example, we've had a community go to co-generation, using solar and diesel. They put in a new diesel system backed up by solar. But the reality is that if that weren't subsidized by the government or hadn't been paid for by the government, there is no way they could afford it. The cost, they tell me, is amortized over 10 years, but in 10 years everything has to be replaced.

I'm just wondering if we're seeing anything on that front of storage. Storage is the big issue. I like the whole concept of mechanical batteries. Is that being tested anywhere? Is there any new clean technology that's being de-risked for the north?

Mr. Frank Des Rosiers: I'd say two things. First, the cost of renewable power has certainly decreased significantly. Whether it's wind or solar, we've seen a very steady decline in costs over the past years, which makes those solutions for those communities more attractive.

On the battery or storage side, there are many storage technologies out there. You referenced flywheels, I imagine, when you talked about mechanical storage. There are heat exchangers that can also be used. Hydrogen could also be a mode, and batteries, obviously, and there are many pathways of research.

Are we there yet? No, but there certainly have been significant advances in recent years in Canada and globally, and we've been able to do a number of demonstration projects across communities to do a combination of those. You mentioned solar diesel.

Another one we're actively looking at is bioenergy, because many of those communities have plentiful resources nearby. It could also be a source of employment for those communities involved. It's a very steady, safe source of energy for them that could be combined with, say, solar or wind if it's appropriate.

There is not going to be one solution for it. It's typically a combination of technologies, and they have to be adapted to the needs of that community.

Maybe the last point I would convey, Mr. Chair, is around cost, yes, but also simplicity of operation and the robustness of it. It's not so easy to call the repairman or the engineer if you're living hours away from any close locations where you have such service, so we have to really make them robust and relatively simple to operate and fixable on the spot by local—

Mr. Michael McLeod: Mr. Chairman, our biggest costs in the north for any type of industry are the power supply, and bringing in any kind of food, products, or people to the site. For us, the biggest polluters are the aircraft, the huge jets that coming into the mine sites and the oil fields.

If we really wanted to reduce pollution in the north, we would just build more roads or expand the grid, because all these mine sites and communities are still generating power through diesel.

I wanted to quickly ask a question on the role of aboriginal people. You did mention aboriginal people.

What kind of opportunities are there for aboriginal people and how are you engaging them? You mentioned that you collaborate all over the world. Does that include indigenous engagement? As part of your mandate letter, are you required to do this? I'm interested to see how you're doing that.

● (1715)

Mr. Frank Des Rosiers: As the parliamentary secretary knows all too well, Minister Carr, the government overall, and the Prime Minister have certainly made it very clear throughout this past 15 months that there's a very strong commitment on that front.

We had very engaged partners right across the country when we had those discussions. From west to east, and everything in-between, they felt this was an area where they had a clear common interest. The remote communities topic was clearly the dominant one, but I would say that forestry and mining, where we have large employment of aboriginal people across the country, was also of keen interest.

The message conveyed was—and the committee members would know a lot more about this, so I have to be humble as I describe it—that they clearly saw a strong, collective or joint interest in advancing this. The message they conveyed to us was simply that they wanted to be part of that solution together. They want to work it out together.

Another reality that was certainly also conveyed was the need to have some support in terms of capacity, and to identify those opportunities in their communities. That's something we've been discussing with aboriginal organizations to see how we can use the existing capacity while trying to reach out to those communities, which are spread out around the country, so they are aware of what can be done in terms of solutions to lower their cost of energy, for instance.

The Chair: Thank you.

We have three segments left, two more of five minutes and one of three minutes. We've gone a little over an hour now. I was going to suggest that maybe we do three minutes each and then wrap it up. Does anybody object to that?

No? Okay, so we'll have Mr. Barlow, followed by Mr. Serré, and then Mr. Cannings.

Mr. John Barlow: Thank you, Mr. Chair.

You were talking, Mr. Des Rosiers, about both wind and solar energy. I know that we get painted with a different brush in Alberta sometimes, but in my riding I have one of the largest wind farms in the country. I have Canada's only solar powered community, Drake Landing in Okotoks. These have been great successes, to a point. Drake Landing has not been copied anywhere across Canada, and it's almost 15 years old now.

Mrs. Shannon Stubbs: Are you ahead of the country?

Mr. John Barlow: We're ahead of the country. I know. We should do a better job of talking about that.

I just checked on Gridwatch.ca and right now, wind and solar are less than 8% of the power supply of Ontario. In Alberta, despite having wind farms and these other things, it's less than 10%, usually.

My concern—and I think it might be a perception, which I would just like you to clarify—is that the vast majority of funding is going to technologies like wind and solar, whereas our more traditional energy sources, such as oil, gas, hydro, and nuclear energy are still far ahead.

I think there's an opportunity for them to stay ahead and become cleaner and more energy efficient. Are those opportunities still there?

Oil and gas is one of the most exposed sectors to competitive forces, whether it's low commodity prices or, now, carbon pricing. Are there still opportunities for those more traditional energy sources to be accessing NRCan grants? What are some of the initiatives you're putting in place to ensure that in this new low-carbon economy, these traditional sources that are supplying the vast majority of our energy are still able to be competitive?

Mr. Frank Des Rosiers: The short answer is absolutely. The Prime Minister and the minister have been on record again and again in public forums to say that it's not a choice between greening the fossil fuel sector and trying to grow the renewable sector. It's trying to do both. Those contributions in terms of reduced emissions from the oil and gas sector are quite significant, as that sector is a major source of emissions for the country.

We've been leading the charge in innovating to get to where we are. From an innovation perspective, we should be quite proud of what has been accomplished, but there certainly is scope to do a lot more. The industry is seized with this, and are the Province of Alberta in particular, and the Government of Canada, which has been there to step it up.

I've mentioned that $50 million oil and gas demonstration fund, for which we have received high-quality submissions from those many recipients to do a variety of projects. Those should be announced in fairly short order. I'm glad to report that the Province of Alberta was also very much involved in it. They kindly volunteered some experts and scientists to help in the selection of those projects, and they are very supportive of what the federal government is doing. We see a potential to do a lot more of that for sure, going forward.

● (1720)

Mr. John Barlow: That's great. Thank you.

The Chair: Thank you.

Mr. Serré, you're next.

Mr. Frank Des Rosiers: If I may make a plug here, Chair.

Drake Landing was mentioned. It's a quite innovative seasonal storage project that has filled 100% of the heating needs of that community this past season. Yes, we do have a strongly increased interest in replication...on a large scale, perhaps in Canada or abroad.

Mr. John Barlow: That's great news. Thank you.

Mr. Frank Des Rosiers: There's more to come.

Mr. John Barlow: That's excellent.

Mr. Marc Serré: Thank you, Mr. Chair.

I have two points.

The first one is on IP, intellectual property. When we talk about a billion dollars in R and D investment, NRCan, and risk and the private sector, what is the department's position on intellectual property when you link to the private sector, university, and government-funded...?

Mr. Frank Des Rosiers: Maybe I could have the first crack and Julie could supplement this.

In terms of programming, some of the elements we are putting an extra emphasis on are twofold. First is the pathway to market overall. We want to make sure there are more compelling cases around it.

The second is around IP. We're looking to make sure that the companies have a more deliberate game plan when it comes to managing their IP, because in many cases if you're a clean-tech company, it's not so much your physical assets you own, but the knowledge you have created. This is really the value you have. Whether you're in a waste-to-energy business or in the bioenergy business, it's mostly that IP.

Right, Julie?

Ms. Julie Sunday: Yes, certainly in our funding, the IP is owned by the companies if it's a government-funded program, where there is collaboration with our national laboratories—which there can be. IP that's generated by the labs is owned by the crown, but different arrangements can be implemented to license and enable that IP to be used commercially.

We're looking at how we ensure that the IP generated is supporting Canadian industries. We're quite seized with that.

Mr. Frank Des Rosiers: The last point I would emphasize is around the IP for international projects. That's a tricky thing. For instance, when we do a joint project with the United States and the Department of Energy, who owns the IP?

Every government historically used to claim 100% of it. That isn't going to work. We have to find ways to find such solutions. We managed to do so with a $20 million demonstration project at our CanmetENERGY Ottawa facilities. The parliamentary secretary was pleased to integrate with the senior DOE officials, and we had to negotiate it.

As we're looking through Mission Innovation to do more of this international collaboration, we'll have to find ways to come to an agreement on IP.

Mr. Marc Serré: Thank you.

The second question is related to R and D. Australia has done a lot in the last few years, spending $2.2 billion on R and D. They have done a lot more commercialization when you talk about the valley of death. A lot of what they have done, they have learned from us over the last few decades.

Can we return the favour and have formal agreements with Australia, and visit them and have links with them to learn more about what they have done with the R and D to have commercialization, leading to clusters and all that?

Ms. Julie Sunday: They're in clusters.

Some hon. members: [*Inaudible—Editor*]

Ms. Julie Sunday: Absolutely. Part of what we've been doing over the past year and a half is really looking at some of those international best practices, and certainly Australia is on our list of countries to get to know.

In terms of our relationships, we have multiple international relationships but I would say, truly, we've been quite focused on a very intensive back and forth with the U.S from an R and D perspective. Certainly, that system is very impressive in hitting all the marks that Frank was talking about earlier, in terms of foundational R and D with the national lab structure, and translational R and D and moving stuff into the commercial space, pulling that research into commercialization. Disruptive innovation is the other one. They have an agency that's part of the Department of Energy, called ARPA-E, which is effectively an institute that generates disruptive energy technologies. It's one of a kind, but has proven to be a very effective model at generating those breakthrough technologies and creating new business lines, new cost curves that we know we need to get beyond the 2030 mark, and then finally, really good integrational structures.

So we've looked at that. Certainly we've looked at the U.K. system. Mission Innovation provides us with a real opportunity to get to know these 23 other countries that we're collaborating with, and we'll be doing that over the coming....

● (1725)

The Chair: Thank you very much.

Mr. Cannings, we'll go to you for three minutes.

Mr. Richard Cannings: Thank you.

I just want to pick up on Mission Innovation because you both mentioned it. It was announced in San Francisco last year, and everybody wants to get on the innovation clean-tech bus. Hopefully, it's an electric bus. I'm just wondering if there are sectors where you see Canada already leading, being a world leader, where we should perhaps concentrate both our efforts and our money and solidify our status in that world leadership, rather than trying to play catch-up in all sorts of other places. Not everybody can be a world leader.

Are places where you think we should concentrate?

Mr. Frank Des Rosiers: Sure. Mission innovation is one place where we're playing this, and some of you will have noted that Minister McKenna contributed to that announcement in Marrakech at COP 22 around the seven challenges identified in Mission Innovation. These will be pursued as priority areas in the coming years.

Canada is co-chairing this set of activities with the United Kingdom. So we play quite a significant leadership role, and the one area where Canada has already put its hand up to be a global leader is around bioenergy. Generally, countries widely recognize Canada as a world leader in this domain, but we're also playing quite actively in a number of other domains, like smart grid energy storage, where we have a lot of strengths, both nationally and in our companies, especially in the Toronto area. We've got quite a strong concentration of companies in this space. Off-grid/remote communities were also specifically identified as one of the seven priorities, and I mentioned earlier to committee members our keen interest in Canada to make some headway. We think we have important things to contribute in that regard.

Another area I would note is carbon capture, utilization, and storage. As we know, we have large-scale commercial sites already fully operational in the country and have made a lot of progress lately with the technologies on the use side of CO2s. There's an Xprize competition currently under way that is co-funded by Canadian producers, and we're now at the finalist stage, with 28 or so finalists. They want to bring it down to the top five. That's a pretty exciting area where we're looking for global solutions to that issue of the use of CO2s, and on the capture side of CCUS, Canada is very much a world leader, along with the U.S., I would say. We're probably the top two nations in the world in bringing the cost down, which is the main focus.

I wouldn't want to lose sight of sectors that maybe are seen by some as less sexy, but where Canada has a lot to offer. One of those sectors is energy efficiency, because a lot of our energy ends up being used in our residences and a lot of solutions have to be tailored to our climatic conditions. A lot more can be done in that regard for houses, commercial buildings, and industrial sectors. So I think it's important to keep an eye on those.

Mr. Richard Cannings: Thank you.

The Chair: That's fantastic. Thanks very much, both of you. I said at the beginning that you were starting us off, and you did a tremendous job. So thank you very much for taking the time to be here today.

Mr. John Barlow: It's a good start.

The Chair: I believe that's it for today. The meeting is adjourned.