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Chair

Mr. Leon Benoit

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● (1530)

[*English*]

The Chair (Mr. Leon Benoit (Vegreville—Wainwright, CPC)): Good afternoon, everyone.

It's great to be back and to have our committee sitting again.

I know you all took time with your constituents. I hope you also took some time with your family and friends and got a little downtime so you're ready to go and refreshed for this session.

We are starting today by continuing our study of innovation in the energy sector. We're having our second-last meeting on the supply side of that study, and we'll go on to the other two sections later.

We have with us today four groups of witnesses.

We have from Sustainable Development Technology Canada, Rick Whittaker, vice-president, investments and chief technology officer. Welcome.

We have Sailesh Thaker, vice-president, industry and stakeholder relations. Welcome to you.

We have from the Canadian Wind Energy Association, Tom Levy, manager, technical and utility affairs. Welcome.

We have, by video conference from Calgary, Alberta, from Suncor Energy Inc., Bradley Wamboldt, general manager, supply chain management operations, business services. Welcome to you, sir, Mr. Wamboldt.

We have from Edmonton, by videoconference, as an individual, Dr. Murray Gray, director and professor at the Centre for Oil Sands Innovation at the University of Alberta. Welcome to you again, sir. It's good to have you back at our committee.

We will go to the presentations. You have up to seven minutes. It's in the order the witnesses are listed on the agenda. Then we'll go to questions and comments from members.

We'll start with Mr. Whittaker and Mr. Thaker from Sustainable Development Technology Canada. Go ahead, as you wish, with your presentation.

Mr. Rick Whittaker (Vice-President, Investments and Chief Technology Officer, Sustainable Development Technology Canada): Thank you, Mr. Chairman.

Thank you, everyone, for having us here today. Obviously this is a very important study, one that's near and dear to our hearts. I'm certainly happy to be here to talk about some of the questions you have on the supply side and where Canada ranks in these and where we might be going.

You have in front of you the slide presentation we have by way of background. The first slide or two are on SDTC. Suffice it to say SDTC is a commercialization instrument for clean energy and clean technologies. It focuses on all the primary economic sectors in terms of the types of technologies we invest in. So it's kind of a broad perspective on the technology scenario here in Canada and certainly as that applies internationally as well.

I'd like to draw your attention to slide 4, which really talks about the clean technology opportunity for Canada and about where some of this is going. As you see, today it's about a $1-trillion market. It's about as big as the defence market globally, and by 2020 it's looking to grow to about $3 trillion. Canada already has today a $10-billion opportunity in that, and it is looking to grow to $62 billion in revenues. So this sector we're calling clean technology and clean energy is a very substantive economic generator. A significant number of jobs are created out of this and a significant amount of economic growth is created out of this sector. There are 52,000 jobs today—and I'll get into that in a minute—which should grow to about 126,000 jobs by 2020. So clean energy is a very important topic.

I'm glad to see that this committee is diving into where the priorities need to be on the supply side and where Canada can really play a leadership role and continue to play a leadership role.

If we flip to slide 5, we'll look at what this means to employment in Canada. You'll see there are two graphs there. The first graph shows clean technology as a sector. If you collect all the clean technology and clean energy folks who are out there working, you'll see that this is a sizable sector. It's as big as the other primary economic sectors in Canada, and certainly as large as the aerospace sector itself. However, the jobs aren't just in a convenient single slice of the economy; they're actually distributed across it. The green bars or the light bars on the top of the graph on your right-hand side of slide five show how clean technology employment is spread out throughout oil and gas, throughout mining, throughout aerospace, and so on. So these are jobs throughout all the important economic sectors throughout Canada.

If we move to the opportunity spaces, to where Canada does well, it's really hard to pick a single sector. Naturally Canada has strengths across the board. I'm not here to be all-inclusive and to say we need to do everything. That message is there for sure. Canada has strength in a number of these sectors, but importantly, as you dive into these sectors, there are some areas of priority, some areas of focus where we can really shine above the rest of the global economy.

If I start with our aspirations to be a clean energy superpower, Canada and Canadians are already arguably in this space and have the aspirations to continue to be. SDTC's portfolio consists primarily of energy technologies. Eighty per cent of what we invest in touches on energy in one form or another, whether it's exploration, energy production, transportation efficiency, generation, or so forth. We work with the major players in those sectors—what we call "go-to-market consortia"—to realize these technologies. Without them you really don't have a channel to market. So those become a really important element in the overall innovation equation to ensure we have healthy relationships with the major players. You can see the types of folks we do work with. Their logos are at the bottom of the screen.

On slide 6, if we're looking into the traditional sectors, you'll see that efficiency and productivity is a theme. It's a theme that we keep pushing. Companies like Synodon have focused on a remote sensing technology for pipelines. Obviously natural gas pipelines are a very important topic. All pipelines seem to be very topical these days. Being able to detect the robustness, the security, and the integrity of these pipelines provides these operators with a social licence to operate. It provides them with a surety that these things will function. If they don't, we'll detect them early. Those are the types of enabling technologies that give Canada that advantage in being able to produce those traditional energies.

● (1535)

Similarly, there are companies like N-Solv partnering with Suncor for solvent-free bitumen extraction. There are certain types of solvents that reduce the amount of water consumption. The ability to reduce water for steam-free extraction is an important element if we want to improve the efficiency of the oil sands.

It is not a question of yes or no to oil sands. It's a question of where in the oil sands we can place the most emphasis to have the most impact, and these are some of the technologies that enable that to happen.

If we go to slide 9 on the new generation technologies, we're looking at different types of resources, different types of feedstocks such as waste and other renewables. This is an important area. Companies like Nexterra are partnering with large entities like General Electric, developing a distributed power-generation architecture based on biomass. As you get into the distribution side of your study in the next segment, you'll see that the choices between centralized and distributed become more and more prominent. These types of technologies enable those choices.

RER is looking at leveraging global river resources. These are things you can implement today to realize energy technologies in the market for global advantage and advantage back to Canada economically as well as the environmental benefits we get from using more renewables.

Finally, there are more examples of renewable energy dealing with grid reliability issues. These are predicated on the changing network we have out there right now for power generation as well as on the way we're going to change distribution, and so whether you're up in remote communities or you want to be off the grid or if you're right in the central part of the grid, as we start introducing more and more generation technologies, elements like grid control, grid stability, and storage, these are the technologies that become the prominent piece.

Just as a small example of where the priorities can play, if we look at the speakerphones that we have around the conference room today, the value in some of these speakerphones is not in how many of them you produce or in the microphone. It's actually in a little chip that does echo cancellation inside. So if we look at these renewable technologies in a very similar light, we're not necessarily looking for the whole big system. We are looking for the most benefit, the most revenue, the most profits that occur from the equivalent of that little echo-cancellation chip in each one of these sectors. That's what SDTC is trying to suss out of the market today. We are looking at the wind sector, the solar sector, the oil and gas sector—all of these—to find the key elements that are going to enable our social licence to operate.

Moving forward, we look at economic competitiveness. This is always a challenge, because as Canadian companies, we've been dealing with thousands of these companies, over 250 in our portfolio in consortium, which, when you add them all up, is into several hundreds of companies. They typically raise, on average, half to one-quarter as much money as do their counterparts globally when they develop new technologies. I use the American example here.

It is not the better technology that wins; it's the last dollar in. So what we really need to be sophisticated about is making sure we are attracting that last dollar in, through better management teams, more integrated packages, the ability to pick that echo-cancellation chip in each of these sectors. That will really enable Canada to be competitive in these sectors then.

If we look at the two programs we've created—these are on slide 13—you'll see that raising financing and getting customers, obviously, are the order of the day for any of the technologies, whether in traditional sectors or renewable sectors, whether you're dealing with the supply side or the distribution side. Being able to address those two elements is of prime concern for most of these entrepreneurial companies, and so SDTC has created two programs. One is technology adoption, which is rolling up the sleeves, partnering with the multinational firms that have access to the market, and the second one is enabling follow-on financing. As venture capital fades away into later- and later-stage rounds, the ability to track that capital becomes more and more difficult, so a focused effort on being able to track that private sector investment in these companies is important.

I will leave it at that.

● (1540)

The Chair: Thank you very much for your presentation.

We'll go now to the second presenter for today, from the Canadian Wind Energy Association, Tom Levy.

Could you go ahead, please, sir, with your presentation?

Mr. Tom Levy (Manager, Technical and Utility Affairs, Canadian Wind Energy Association): Thank you, Mr. Chair and committee, on behalf of the Canadian Wind Energy Association.

We'd like to thank you for inviting us to speak with you today. I'm very happy to be here sharing our thoughts on R and D as they relate to wind energy.

I'll jump very quickly into the third slide on CanWEA. We're the national industry association. We represent about 400 corporate members that are involved in all areas of the supply chain. We're engaged in policy development, advocacy, communications, outreach, and so on.

I'll turn the page to a quick snapshot of the Canadian market. It's seeing substantial growth; in fact, about 40% on average since 2005. We're going to see this continue in the years ahead. Today it's supplying about 3% of our electricity needs. In some jurisdictions, that's rising to 10%, and even to 20% on the east coast.

Next you'll see a quick snapshot of the installed capacity. In fact, it just goes to show how quickly wind energy moves. This slide is now out of date. We're now at 6,500 megawatts in Canada. It does move that quickly, and sometimes it's hard to keep up. Broadly speaking, you can see that we have installed projects in every province in Canada. System operators continue to reconcile how to manage that variable supply of wind energy. Some of the R and D tools I'm going to speak to you about today are exactly that: tools that these system operators are using to manage that variable supply as we modernize the grid.

I'm not going to go through the whole slide on wind energy R and D in Canada. There are a lot of words there; you can read them for yourself. There is a wide variety of R and D initiatives across Canada: storage, modelling, and system operator tools. All of these initiatives are funded through the federal government. In support, with the federal government, there are many private companies—to name a few, GE, TransAlta, and so on—that continue to invest some of their own dollars, sometimes in partnership with SDTC, to bring projects to fruition and to commercialize these new initiatives as they improve the efficiency of wind turbines and siting and so on.

We have a good story to tell about R and D and funding from the federal government. I included, not in this presentation.... A table should have been provided to you that shows how Canada ranks relative to other countries. If we rank Canada on a per megawatt basis, while it's on the list, which is good to see, I think we clearly can see that we can do better. There are a lot of opportunities to do so. I'm going to go through these as we move forward.

Turning to the next slide, the 2008-09 “Wind Energy Technology Roadmap” developed with Natural Resources Canada and various other stakeholders—universities, academics, the system operators, and industry itself—identified a number of means of moving wind energy forward in Canada. I've pulled out a few of them in terms of the R and D side. I think these warrant a closer review. They certainly are areas in which we could see additional investment that would improve how wind energy is brought onto the grid and would ensure that it's brought on reliably.

In no particular order, these areas are integration—and I'll go into some detail on that in the next few slides, tools and materials to reduce icing, numerical weather prediction models and forecasting of wind energy, and a huge opportunity in Canada in terms of our remote communities, remote mining resources, and so on. These remote operations have a very heavy reliance on diesel fuel, making it expensive and difficult for them to manage.

Turning the page to “Areas of Need—Integration”, I'll very broadly describe integration. Our electricity system is undergoing massive change. The Conference Board of Canada is projecting that over $300 billion of investment will be needed between now and 2030.

This is being brought on by a number of needs. One of them is decarbonization, for various reasons. Others include: reduced volatility; improved domestic supply; an overall need to invest in our infrastructure, which has not seen significant investment and needs investment; refurbishing of plants; upgrading of the various systems; the onset of the smart grid; demand side management; and electric vehicles. All of these things are pressing on the electrical grid that we know today and are changing the way it interacts.

We are no longer a centralized grid per se. We're looking at distributed sources of energy. The customer is getting involved. There are a lot of changes, and with these changes comes a need to bring in new tools. When it comes to wind energy and other aspects, integration is a modelling exercise of examining that grid using very sophisticated models and seeing what is going to happen to it when we play out various scenarios.

There are no national studies of an integration model in Canada. They are done provincially. With an interconnected system such as ours, it certainly makes sense to study this on a national basis. We're unable to take part in continent-wide studies with the U.S. Our system is heavily interconnected with that of the U.S. We need to actually study this with the U.S., and we can't do so at the present time.

● (1545)

We require a technical foundation in which we can make policy decisions. We don't yet have that technical foundation. We do have a multi-million dollar proposal into NRCan, and we are quite confident that it will move forward. It is a proposal that has the support of every single utility in Canada as well as every single utility in the U.S. that borders the Canadian markets. They want to see us move forward on this.

Currently Environment Canada is undertaking a study that will provide necessary inputs into that study. We're looking forward to positive signals from NRCan as we move this proposal forward.

Moving forward into the issue of icing, obviously it's a common occurrence in Canada. We might step outside today and see some icing on our cars.

When icing happens, it reduces the efficiency of existing wind parks and causes them to shut down in some cases. The efficiency of the blades is reduced as ice accumulates on them.

We need to improve the prediction. We need to improve the tools to reduce the amount of ice that grows on blades when freezing rain or other such events occur. There is some limited research, but we can do a lot more. Countries like Sweden, with much less wind than us, are outpacing us in that area.

WESNet, or Wind Energy Strategic Network—a group of universities across Canada that have received significant funding from NSERC and that are about to run out of that money—has done a lot of research on that. The TechnoCentre éolien in Quebec, which receives federal and provincial funding, is at the forefront on that in Canada.

Certainly we could do more. We'd be ashamed to see Sweden outpace us in an area where we should clearly be leaders.

The next page addresses remote communities and the harsh climate. This report is not yet public, but I understand there is a report coming out, with the support of Natural Resources Canada, that details the number of remote communities and their reliance on diesel fuel, and what that means to them in terms of exposure to volatile fuel prices and significant environmental costs associated with emissions and the storage of large amounts of diesel fuel, which can only be brought in at certain times of the year, requiring significant amounts of storage of fuel.

The opportunities are nearly endless, especially when we start looking at remote operations. Just last year, our second of our third territory had brought a new wind project online at the Diavik Diamond Mine. That was a fully private investment. That shows the opportunity is there. It shows the need is there.

Studying how we can better interconnect wind in these very remote electrical grids, which are different from very broad transmission grids, is an area that certainly we could be leaders in as well. Benefits from environmental, economic, and local labour force perspectives can certainly be realized when we look at these sorts of opportunities.

Lastly, forecasting is a tool that is used to minimize challenges associated with variable energy. We're not talking about the six o'clock news weather forecast. We're talking about very sophisticated forecasts that look five minutes, one hour, three hours, two days ahead at what the wind is going to be, at what we think it's going to be. With that knowledge in hand, the system operator can ensure that they have a reliable and efficient system.

Certainly if you asked any system operator around the world if they'd like to have a better knowledge of what's coming up in the next hour as far as the wind goes, they'd say they would love to. The more knowledge they have and the more accurate that forecast is, the more efficiently the rest of the system operates as well, including the wind system itself on the grid.

The occurrence of improved forecasting will be shown as provinces like Alberta, Ontario, and Quebec continue to improve their forecasting. As these provinces grow their amount of wind on the grid, we'll find that the need for forecasting grows significantly as well. Certainly that's an area we can focus on. There has been some work with Environment Canada and Hydro-Québec, but obviously there's always room for more.

In conclusion, we certainly appreciate the involvement of the federal government in terms of R and D investments in Canada. It's reaped significant rewards in terms of improving efficiencies, improving the way wind is interconnected, improving the way we see wind at the community level as well. But there's room for more, and when we look at the way Canada is placed in the world, we think that's quite obvious.

When we look at the technology road map, there are certainly areas where we can identify significant need; integration, icing, remote communities, and forecasting are some, but that's not to take away from the need in other areas, such as storage and so on.

● (1550)

Thank you for your time. I'd be happy to entertain questions.

The Chair: Thank you very much, Mr. Levy, for your presentation today.

Our third witness today is from Suncor Energy and is here by video conference from Calgary. Mr. Bradley Wamboldt is the general manager, supply chain management and operations, business services.

Welcome to you, sir. Thank you for being with us. Please go ahead with your presentation for up to 10 minutes.

Mr. Bradley Wamboldt (General Manager, Supply Chain Management - Operations, Business Services, Suncor Energy Inc.): Thank you, Mr. Chair.

First, let me say that Gordon Lambert, our vice-president of sustainability, intended to be here today. Unfortunately, he's quite ill. I've been asked to stand in for him, given my previous role as general manager of tailings operations in Fort McMurray, as well as the fact that I spent the previous four years implementing our TRO technology on site. I am going to read from some prepared remarks and take questions afterwards.

Good afternoon, Mr. Chair and members of the committee. It's a pleasure to be here as part of this important discussion on innovation in the energy sector.

At the outset, I wish to extend my congratulations to the committee for the great work that it has been carrying out over the past few years. The committee has looked at a number of interesting issues, all of which are leading to increased understanding and appreciation for the tremendous work being carried out in Canada's energy sector. Suncor is proud to have been part of some of your earlier studies, and we are equally proud to be part of this one today.

Suncor has had the pleasure of hosting several of the members of this committee on tours of our oil sands operations, including our reclamation activities and, more specifically, our tailings management. As such, we are pleased to be here to offer insight and further understanding on TRO.

As a starting point, I thought I would take a few minutes to talk about Suncor and then address our approach to tailings management. Suncor is Canada's largest integrated energy company and, while we pioneered the development of oil sands in 1967, our operations now include upgrading, conventional and offshore production, both on Canada's east coast and in the North Sea, and our refining and marketing business, which operates four refineries as well, in Edmonton, Sarnia, Montreal, and Denver.

For many of you, I hope we're known as Canada's gas station, retailing products through a network of 1,500 stations under our Petro-Canada brand.

We're also very proud of our growing renewable business, with six wind farms now in operation in Alberta, Saskatchewan, and Ontario, and Canada's largest biofuels facility and ethanol plant in Sarnia.

While we maintain a significant scope of operations, it's our integrated business model—all pieces fitting together—that helps us drive value for our shareholders, spur investment in the resource, and contribute to the economy through jobs, taxes, and royalties.

Clearly, the biggest single challenge to our industry's continued success is demonstrating that we are developing and can continue to develop the oil sands in ways that minimize our impact on precious air, land, and water resources. The good news is that we're making significant progress.

On the air front, our industry is working hard to address carbon emissions. Compared to 1990, the oil sands industry as a whole has reduced energy emissions intensity by a third. That puts us among North American leaders on this front, along with the steel industry in Ontario.

Water use within the industry continues to decline. As an example, Suncor has reduced water use at our oil sands operations by 50% since 2004. Despite bitumen production nearly tripling, our water use is below 1998 levels.

If anyone doubts our industry's ability to drive positive change, consider what we're doing on tailings ponds. All mining operations produce a waste product known as tailings. For the oil sands industry, the sheer volume of tailings and the fact that they're difficult to solidify has meant building more and more holding ponds. To put it bluntly, the ponds are big, unsightly, and difficult to reclaim. However, we are making game-changing progress when it comes to tailings ponds. Allow me to quickly review for you our tailings challenge.

Tailings are leftover mixtures of fine clay, sand, water, and residual bitumen that are produced during the extraction process which separates the bitumen from the oil sand. Tailings are pumped into holding ponds, where the solids settle from the water.

The heaviest material, mostly sand, settles to the bottom. Water rises to the top, and the middle layer, mature fine tailings or MFT, is made up of fine clay particles suspended in water. Some of these MFT particles settle, but most remain suspended in water. MFT takes many decades to consolidate to a state where it can be reclaimed. As a result, Suncor has required more and larger tailings ponds over the years to store MFT, but these ponds take up space and are a significant environmental footprint.

● (1555)

In response to this enormous challenge, Suncor implemented a new tailings management technology that promises to dramatically accelerate the pace of reclamation. TRO is a new dewatering process developed by our company that will reduce our tailings backlog and the need for future ponds. It should also allow us to reclaim entire mine sites in one third of the time it now takes. Implementing the TRO process involves converting fluid tailings, the leftover material produced through the extraction process, into solid landscapes at a faster rate. To accelerate the speed at which the solid landscapes are formed, MFT is combined with a polymer that causes clay particles to bundle and separate from the water. The MFT mixture is then deposited in thin layers over sandbanks with shallow slopes to dewater. Water released during this process evaporates or drains back into the settling pond for reuse in the extraction process. Once the MFT has dewatered, it is capable of being reclaimed in place or removed to another location for final reclamation. At the end of 2012, we will have spent more than $1.2 billion to implement this technology.

Because tailings management is an industry-wide concern, all seven oil sands companies currently running mine operations have committed to an unprecedented level of cooperation on this issue. Suncor, for its part, has agreed to share its patented technology with industry competitors as well as university and government scientists so the environmental benefits can be maximized. The progress we are making on tailings is something we believe we can repeat in other areas including greenhouse gas intensity and water-use reduction and discovery of more efficient energy sources to power our operation.

We look forward to accelerating environmental improvements. In early 2012, along with other oil sands producers, we announced the creation of Canada’s Oil Sands Innovation Alliance or COSIA. To our knowledge COSIA is the largest collaborative effort of its kind in any industry anywhere in the world. But collaboration on our energy future must go well beyond industry alliances. We need to involve every sector of our economy and all our citizens in an informed, fact-based dialogue about the path forward.

Suncor has a strong track record of engaging with communities and stakeholders including critics of the oil sands industry. We believe that no one has a monopoly on good ideas. When it comes to our shared energy future, we need to get past our differences to that which unites us: strong communities, a healthy environment, and ample economic opportunity for the future. By listening closely to the concerns of our stakeholders and responding in an appropriate and timely manner, we are working to build bridges rather than walls.

As many here know, success in the energy industry is achieved by taking a long-term view. Not only are we collaborating on environmental performance but we're also working on a world-class water monitoring system, facilitating discussions on a national energy strategy, working together on socio-economic impacts, and more. Our industry is responding to our stakeholders and changing the way we do business.

I'm confident that by working with our stakeholders and finding workable solutions to environmental and market-access questions, we can continue to be a strong force in the Canadian and global economies.

On behalf of Suncor, I appreciate the opportunity to be part of the committee's study and look forward to any questions you may have.

Thank you.

● (1600)

The Chair: Thank you very much, Mr. Wamboldt, for your presentation.

We'll go to the final presenter of the day by video conference from Edmonton, Dr. Murray Gray, director and professor, University of Alberta, Centre for Oil Sands Innovation.

Welcome, sir. It's good to have you before our committee again.

Dr. Murray R. Gray (Director and Professor, University of Alberta, Centre for Oil Sands Innovation at the University of Alberta, As an Individual): Thank you very much, Mr. Chairman, for inviting me to participate by video conference this afternoon.

I would like to bring my perspective as a university researcher and leader with a particular interest in energy research and development and significant activity in oil sands processing.

The Centre for Oil Sands Innovation at the University of Alberta was established in 2005 as a collaboration between universities, industry, and government. A $20-million commitment from Imperial Oil was leveraged in partnership with Alberta Innovates, the Natural Sciences and Engineering Research Council of Canada, and Natural Resources Canada.

Currently we have 20 active projects with seven universities across Canada and with government labs as well. We're focused on breakthrough technologies for oil sands mining, focusing on reducing the footprint of the mining operation; trying to extract the bitumen without freshwater consumption, and with minimal creation of tailings; and upgrading the bitumen to valuable products with less rejection of resources and higher energy efficiency.

The Centre for Oil Sands Innovation is only a small part of an extremely large effort on energy at the University of Alberta, where we estimate we have as many as 1,000 researchers, faculty members, graduate students, and lab technicians working on not only oil sands but a range of fossil and renewable energy sources.

It's with that basis that I would like to comment on the questions posed by your committee with respect to the role of the federal government in energy innovation.

In terms of the current status of research and innovation, let me comment specifically on the oil sands industry, where the industry as we know it is largely the result of the application of Canadian inventions and continuous innovation to an extremely significant world-class resource. We have a thriving ecology of industrial innovation that is supported by both university research and government laboratories, such as the CANMET labs of Natural Resources Canada.

The investments by government in the 1970s and 1980s provided some of the key prerequisites for the oil sands industry as we know it. One was a range of new ideas that have been subsequently commercialized and developed into important new technologies. The other was highly trained personnel to actually move into the industry and make that happen. I think it's important to keep both of those aspects in mind when we look at the long-term strategic role in supporting energy research.

As an example, the research partnership program of NSERC was essential for the expansion of university capacity since 1990, especially at the University of Alberta, by supporting university-industry partnerships.

I'm very happy, Mr. Wamboldt, that Suncor is one of our most important partners in many of these efforts.

During that period, though, NSERC did not actually identify oil sands as an area of strategic importance; rather, their general programs enabled a broad range of industry partnerships to develop and flourish and launch a huge amount of very important work.

I think the point here is to think about enabling a broad range of activities and not try to pick too many as high priorities. An example is the national centres of excellence program, which for most of its history has had no particular activity whatsoever in the oil sands, with the exception of one recent effort that includes work on carbon dioxide emissions only.

In terms of comparison with other countries, clearly Canada is a world leader in research and innovation for production and processing of oil sands and heavy oil. The oil sands technologies in many areas are moving internationally and are having a significant impact.

I won't spend too much time talking about new technologies except for two that I'm particularly excited about. Since they're launched from university labs, they have a longer timeline than the kinds of developments you've heard about so far this afternoon.

The first is non-aqueous extraction, where we take the mined oil sands and extract the bitumen without using water. By using solvents and other chemicals, we have promising results that show that we can create dry tailings instead of some of the wet tailings materials that Mr. Wamboldt was talking about with the TRO process. This approach uses an insignificant amount of fresh water and leaves no tailings ponds.

The second technology that's further down the road is a new class of very high-activity catalysts, using cheap metals like iron and nickel, that would enable much cheaper upgrading of bitumen from the oil sands into high-quality crude oil.

From the university perspective, we've seen many new technologies developed in the oil sands. As I said, we see a very rich level of innovation and commercialization going on.

● (1605)

The main barrier we've seen on the university side has been intellectual property. It was delightful that the oil sands companies, with Suncor as a leader, were able to put aside intellectual property issues and combine efforts to form COSIA last year.

In terms of what role the federal government can play in strengthening the foundation, the federal government is responsible for international relations, but from the perspective of the University of Alberta, we see relatively weak support for international research linkages related to energy in a range of other areas.

The University of Alberta is internationalizing its research effort. For example, we have a very large collaboration with the Helmholtz Association in Germany focused on oil sands research. We're building a new collaboration with the top university in China, Tsinghua University, focused on coal conversion and carbon capture technologies.

Unlike many other western countries, the federal agencies that work with universities on research have a much narrower mandate to help support and encourage international linkages. This is an important gap. It's not unique to energy but cuts across many different sectors.

Major problems of research like the oil sands need not only the best brains in Canada but also international cooperation to bring the best available minds to bear. We think the support, not for money to go overseas but to help fund and support Canadian efforts in joint international efforts, is an important opportunity to advance energy leadership not only in Canada but internationally.

Thank you for your attention. I'd be delighted to answer questions.

The Chair: Thank you, Dr. Gray, for your presentation.

We have four presentations that will be very helpful to us in preparing our report.

Just before we get started with questions and comments, I want to say a couple of things.

First of all, we will have a short future business meeting at the end of this, at 5:15.

Secondly, I want to take this opportunity to introduce a new member of our committee, in fact a new member to this House, elected in a byelection in Calgary Centre, Joan Crockatt.

Welcome to our committee. We're delighted to have you here and look forward to your active participation.

Let's go to questions and comments.

Mr. Trost, you have up to seven minutes.

Mr. Brad Trost (Saskatoon—Humboldt, CPC): Thank you, Mr. Chair.

To the witnesses, if you're new here, seven minutes goes past very, very quickly.

I'll start with you, Mr. Whittaker. Let's say I have a company that I've put together with a few of my friends. If I come to you and say that I need some help, what are the practical things you can do? What are the successes you've found? Maybe more importantly, what are the failures where you haven't been able to help smart guys with a better mousetrap to move forward to the next level and maybe sell their product or get a Suncor or something interested?

Briefly, what works, what doesn't, and how would you help me and my colleagues around here when we start our next company?

● (1610)

Mr. Rick Whittaker: Great. No problem.

The first thing is to have a conversation with SDTC. Our organization is one that provides funding to companies. That's usually what gets people interested. But what they really find valuable is not the money; what they really find valuable is actually the support they receive from such programs as our tech adoption or follow-on funding—the coaching.

To get these folks who are coming out of labs, coming out of getting together in their garage and saying, “Hey, we've got a great new technology”, to now become at a tiered level where they can sell product into large companies like Suncor is a lot of work. There's a cultural divide. Getting from the entrepreneurial, where you break all the rules to see if something happens, or if you can make a go of something, into a really well-run organization is an awful lot of work. And that has to happen in a very short period of time. You're talking about a timeframe of 18 months, two years, five years to see these things go.

To do that involves an awful lot of coaching. One thing you can expect by coming to SDTC and to organizations that do the types of things we do is not so much just about the money. It's how do you partner? Who can you introduce me to? What should I be doing at this stage of my company? What are the most important things in order to realize that opportunity?

Mr. Brad Trost: Okay.

To take away from that and ask another question, I'll ask you, Mr. Wamboldt, from Suncor, how you take advantage of situations like that. When these junior companies or whatever, these bright inventors, come to various organizations, how does a company like yours say—not just through in-house R and D, but how do you actually say—that, hey, this guy has an innovative project, so how do I integrate that?

Do you look for opportunities at that? If so, how? If not, why not?

Mr. Bradley Wamboldt: I'll start by saying that it's not exactly my area of expertise, as in Suncor I was previously in our operations group, but I can say that we have a large technology group, both in Calgary and on site, that does look for innovative new solutions. They work with universities and other research providers.

I think companies like Suncor can offer access to materials, certainly, to do testing on, as well as space on our site to perform research live, if you like, in taking things out of the lab to the next step. Suncor in particular does not do a lot of—

Mr. Brad Trost: Okay. So you don't do a lot of work with small, innovative companies. Most of what you're doing, then, would be in-house?

Mr. Bradley Wamboldt: Well, what I would say again is that it's not my area of expertise, but we have worked with—as I understand it—outside research providers and with small companies, with opportunities to work on site.

Mr. Brad Trost: Okay. Thank you.

I sort of cut you off, Mr. Whittaker, so if you want to, keep going a little bit on where you're going and finish that off.

Mr. Rick Whittaker: It's indeed a great topic. In fact, with Suncor in particular we have companies that do partner with the organization, such as EnSolve.

I think we heard earlier today from the witnesses about how we need to reduce water and about all the fantastic work that has been done to reduce water. One of the ways we reduce water in different operations like SAGD—steam-assisted gravity drainage—extraction is to substitute solvents for water.

Where do those innovative solvents come from? They come from small companies, but do those small companies have the capacity and the wherewithal to scale up? That's part of the bridging. That's part of the growing: to allow small companies to deal with large companies. That's really what's needed. And you know what? The industry puts their money behind it. When I see that happen, our money is leveraged two or three times over.

Mr. Brad Trost: Okay. Let me then go to Mr. Gray.

You said a couple of things that struck me as interesting. You mentioned the importance of people, which ties in to what Mr. Whittaker is saying: not just people individually but how to coordinate them. Then you brought in the international perspective, which again is about coordinating people but maybe in a different way, on a different perspective.

Could you comment about how we could possibly coordinate and integrate internationally people with the various programs that we have here and about the human resource aspects of what we need to do? How do we tie this in? If you can tie it in with any of the other witnesses, that just adds to their testimony as well as yours.

● (1615)

The Chair: Go ahead, Dr. Gray.

Dr. Murray R. Gray: Let me give you an example based on our work with researchers in Germany with the Humboldt institute. That's a partnership between the University of Alberta and the Helmholtz Association, which is the German equivalent of the National Research Council. We have teams of researchers from Canada and from Germany who are working on applying new technologies, particularly for land reclamation. In dealing with some of the sites—for example, at Suncor—they've been advising on how to bring in new technologies that have been tested in Germany for reclamation of mine sites and that can be applied in Canada to speed up reclamation and to enhance the development and restoration of active ecosystems.

This is an example of where another country has had significant experience, and we're working with them to try to bring that activity to Canada and establish whether some of those ideas from Germany work in the boreal forest of Canada or whether they don't work. That's part of the screening that's essential before it can be applied on a large scale. I'd like to think that in terms of examples we are interested in collaborative research and in getting our students working with German researchers to learn about the best they have to offer. That's an example.

The Chair: Thank you, Mr. Trost.

Thank you, Mr. Gray.

We go now to the official opposition critic.

Mr. Julian, you have up to seven minutes. Go ahead, please.

Mr. Peter Julian (Burnaby—New Westminster, NDP): Thank you very much, Mr. Chair, and happy New Year to you and the members of the committee.

I'd like to start with Mr. Wamboldt and Mr. Gray.

Mr. Wamboldt, I've been happy to tour Suncor's facilities a number of times over the last few months. I've been up there of course with the NDP team on natural resources with our leader of the official opposition, Mr. Mulcair as well as a couple of times on my own. So we thank you for your accessibility.

I wanted to quote from an article that was written by Jeff Rubin, who's the former chief economist of CIBC World Markets. He says the following, which was published just a couple of weeks ago:

> The rest of the oil sands industry may need to take a page from Suncor's playbook. Before rushing ahead to double oil sands production to 3 million barrels a day—and sending billions more in de facto energy subsidies to U.S. refiners—investors and the Canadian economy may be better off if producers figure out how to capture more value from what they're already digging out of the ground.

My question to you to start, Mr. Wamboldt, is whether you would agree that the issue of value added is becoming perhaps the significant energy issue that we're going to have to contend with in the coming period. Why do you think the government's falling short on encouraging value added, wanting to rip and ship raw bitumen rather than concentrating and focusing on value added in the way that Suncor has so successfully done?

Mr. Bradley Wamboldt: I have to apologize to the committee on that particular question. I am not at all briefed on our thoughts with respect to value added. I can tell you what I know with respect to the development of our TRO technology as we were asked, but I'm afraid I don't have a good answer for you, Mr. Julian.

Mr. Peter Julian: I'll ask the same question to Mr. Gray.

Do you not feel that valued added has to be something that we need to emphasize as part of a national energy strategy?

Dr. Murray R. Gray: My personal opinion is that you're exactly right. The challenge of course is how to set the strategy and how to make it successful.

What we've seen of the history of upgrading of bitumen from the oil sands has shown us that in some cases it's been extremely successful and profitable. Some of Suncor's operations show that and show the benefit of having a blend of different products, not just bitumen and not just fully upgraded material but everything in between. At the other extreme we have examples of big investments through government-industry partnerships. Depending on the timing, they look either wonderful or awful.

One of the difficulties we see in looking into the future is that when you look at the value of bitumen versus upgraded product, there's a cycle. At present there is an extremely high incentive to upgrade. Five years ago there was very little incentive to upgrade. The challenge, in terms of public policy—and clearly from the government perspective and from the point of view of the public—is that you want to maximize value-added manufacturing, absolutely. But you also don't want to subsidize manufacturing that makes money sometimes and doesn't make money all the time. So you'd have to be very cautious about how to approach that problem. These are products that are going into a world market.

● (1620)

Mr. Peter Julian: Thank you very much for that. I appreciate it. I have only seven minutes, and as Mr. Trost said, it goes by very quickly. Certainly when we look at the fact that we've lost half a million jobs on this government's watch.... We've never lost as many manufacturing or value-added jobs in our history as we have over the last six years.

I'd like to move on to Mr. Levy. There is a very interesting group of statistics here on the R and D budget for wind energy: Canada's spending is lamentably low. It's about 7% of Germany's spending, 5% of Spain's, 4% of Denmark's, and a tenth of Norway's. Other countries seem to be far ahead of us in terms of R and D in wind energy.

I recall that one of the members from your association, Sean Whittaker, appeared before this committee in April 2010 and said at the time that the cuts to ecoENERGY were something of real concern to the association. “While Canada's commitment to ecoENERGY is declining, the U.S. commitment to their incentive is actually increasing quite rapidly”.

My question to you is this. We're seeing this government falling lamentably short on investments in renewable energy. It just doesn't seem to get the importance of renewable energy. How do we address this issue when Canada is so far behind our major competitors in investments in R and D on wind energy? What impact do you think the cuts we're seeing in programs like ecoENERGY are having in getting us even further behind?

Mr. Tom Levy: That's a good question. ecoENERGY is the equivalent of a production tax credit, which is what has just been renewed in the U.S. We no longer have that in Canada. It was in fact an immensely beneficial program that allowed the growth to go from where it was in 2005 and before that to what it is today, which is quite remarkable.

The benefit of R and D is somewhat of a different fold. It is one that sees opportunities to maximize the investments we have made in wind energy and other renewables to ensure those are operating efficiently, and that when we do bring more on those continue to operate efficiently. The investments the government makes today will continue to have benefits in the future as well, as the system operators become more comfortable with the various tools we are suggesting need researching, such as forecasting and other integration tools. It's a tough question to say how do we catch up. I think we continue to make investments and continue to top up the clean energy fund and other sorts of funds that have seen those investments in R and D be made.

Mr. Peter Julian: Thank you for that. The facts are quite astounding that Canada is this far behind, spending only a small fraction of what our chief competitors are spending in terms of wind energy.

My final question goes to Mr. Whittaker from SDTC. We're looking at a global market for renewable energy. As you know, it's about $1 trillion now. In the next 10 years, it's going to be $3 trillion. Canada gets a minuscule part of that. I'm wondering to what extent you are seeing support from the federal government now for SDTC. For example, what are you receiving in this fiscal year, and to what extent is that adequate to finance the race that Canada is losing, where other countries are investing far more in renewable energy? Canada simply isn't there.

The Chair: Mr. Whittaker, I need a short answer. Mr. Julian's time is up. Go ahead, please.

Mr. Rick Whittaker: For sure. Thanks for the question.

Obviously, we are very thankful for the support the government has given us. As this committee probably knows, we do have a recapitalization request in front of the government. In budget 2011, we received $40 million. We have put that to good work. We will continue.

Mr. Peter Julian: So it's done?

Mr. Rick Whittaker: It will be done, yes. It's done.

The Chair: Sorry, Mr. Julian, your time is up.

We will go now to the Liberal member on the committee.

Mr. Hsu, welcome, first of all, to our committee today. Go ahead for up to seven minutes.

Mr. Ted Hsu (Kingston and the Islands, Lib.): Thank you, Mr. Chair.

There are going to be a number of random questions.

First, to Mr. Levy, it was almost an offhand remark you made about WESNet and about it running out of NSERC funding. I was wondering if you could elaborate a little bit about how it's running out of NSERC funding and why it might be important to not run out of NSERC funding.

● (1625)

Mr. Tom Levy: For full disclosure, I sit on the board of WESNet. The WESNet fund is primarily driven through NSERC, and that has a time allotment of, I believe, five years. We have just received a one-year extension as some activities continue. Essentially, what we were told is that there is no more money, and there is a lot of competition for other sources of NSERC funding, and WESNet has essentially run the course.

Mr. Ted Hsu: Why do you think you should get one dollar that somebody else doesn't get?

Mr. Tom Levy: Because there is still need for additional R and D, and for the activities that WESNet undertook under four primary themes—forecasting, integration, interconnection, and the other I can't recall-—we still have a need for understanding how those activities can impact the existing wind fleet and future wind fleets.

Mr. Ted Hsu: For Mr. Whittaker, how do the changes in the scientific research and experimental development tax credit affect your partners, if at all?

Mr. Rick Whittaker: That's a great question.

I will frame that question around the federal R and D review that was done, which pointed out Canada's relative position on direct versus indirect mechanisms, such as SR and ED, which is an indirect tax measure. Organizations that focus on direct funding—SDTC is one—are disproportionately smaller than our competitors. The recommendation to re-shift that balance is a good one, especially given that all the countries we compete with have more direct funding mechanisms as a proportion than indirect. In terms of impact to the folks we deal with, most of them are small and medium-sized enterprises. In fact, 86% of the folks we invest in are small and medium-sized enterprises. They're the ones that have the most difficult time accessing funds like SR and ED. For them, seeing the shift into direct funding mechanisms is very welcome.

Mr. Ted Hsu: You're saying that grant applications for these SMEs take less time and effort than applying for the SR and ED tax credits. Is that what you're saying?

Mr. Rick Whittaker: It's not the time and effort that goes in. In fact, it probably takes more time and effort to apply for a grant. The ability to get it and actually put it to work and the net benefit you receive from it is greater for the smaller and medium-sized companies.

Imagine taking the equivalent of a $3-million investment in a small company versus the tax break. That makes a huge difference to them and their consortium.

Mr. Ted Hsu: Okay.

I have a question for Messrs. Gray and Wamboldt. Is it fair to say that a barrel of synthetic crude produced a year from now will be produced in a way that's cleaner and safer and cheaper? Is that fair to say?

I seem to see that as time goes along, the cost of producing every barrel is less and the environmental impact is less. It seems that there are a lot of technologies in the pipeline to continue that trend. Is that a fair assessment?

The Chair: Let's start with Mr. Wamboldt.

Mr. Bradley Wamboldt: What I would say is that with associations such as COSIA allowing our technical folks to work with technical folks from other competitors as well as with universities, without the shackles of IP, etc., what we're seeing is the opportunity to lead certain technologies. In other words, people aren't working on the same things and getting the same results. We're actually able to build on each other's work.

So I would say that yes, I think we should see an accelerated pace of technology innovation that will lead to lower environmental footprints per barrel in the future.

The Chair: Go ahead, Dr. Gray.

Dr. Murray R. Gray: I would agree, although it is important to keep in mind the timeframe for technological innovation. The history of the industry has been to develop better and better operating practices and better operating expertise, which drives down the energy intensity and drives down the water use, as Mr. Wamboldt said.

Any new technologies that come in usually have a three-year to five-year horizon, minimum, before they start to have an impact. So year by year, you can see improvements just by doing a better job with the existing infrastructure. Three to five years out is where you start to see the benefits of technology-sharing and new technology.

● (1630)

Mr. Ted Hsu: Perfect.

One of my motivations for a question like that is to ask a bigger question on the value of every barrel of oil produced from the oil sands. If it's produced a year from now, what is the total value to society and the economic value and the value to the natural assets we have? Is it possible that producing a barrel a year from now could actually be more valuable because it will be cheaper and safer and cleaner?

Mr. Wamboldt, do you have any thoughts on that?

Mr. Bradley Wamboldt: I think I understood the question to be whether the oil will be more valuable in the future than it is as produced today? Was that the question?

Mr. Ted Hsu: Yes.

Mr. Bradley Wamboldt: I'm not quite sure how to answer that other than to say that producing oil today is what funds the research that's going into these improved innovations.

To get back to Dr. Gray's point that there is some time required with respect to the development of these technologies to bring them on board, certainly the observation I've had, working in this field for a little bit, is that these goals are not mutually exclusive. In other words, generally we find that if we can do things more efficiently, it is economical and reduces the footprint on the environment. So continued incremental change, followed up by some of these technology game-changers, is the way forward.

The Chair: Thank you, Mr. Hsu.

We go now to Mr. Calkins to start the five-minute round. Go ahead, sir.

Mr. Blaine Calkins (Wetaskiwin, CPC): Thank you very much, Mr. Chair. It's certainly a pleasure to hear from the witnesses today.

I'm going to start with Mr. Wamboldt. Can you come back to TRO? I'm very interested in this. How much time do you think is going to be saved when we go to reclamation? Because in the past with the mature fine tailings and some of the issues that have surrounded that, we were looking at a project start-up through to a final reclamation certificate being quite broad, several decades until those permits were signed off, and that's with the provincial government. What do you expect will happen in terms of that window closing or narrowing until you get that final reclamation certificate? How much do you expect that the area, once you get to the full implementation of the TRO technology...what percentage of reduction do you expect to see in tailings ponds sizes? How long until we can see those results of full implementation?

Mr. Bradley Wamboldt: Okay, first let me say that every situation is quite different in terms of the operation and it gets rather complicated quite quickly with respect to running mine plans on your operation. What we did with our existing operation was to compare a mine plan using the existing technology at the time, which was consolidated tailings, and compared that time between what you might call tree-to-tree. The first tree that's harvested is compared to the first tree that's planted in reclamation. That mine plan was in the neighbourhood of 30 or 40 years. That's consistent with our reclamation on pond one, if you look at 1967 to 2007. When we rerun the mine plan using both our sand dumping technology as well as the TRO technology, which work hand in glove, we anticipate that we're able to go to a tree-to-tree type of number of more like 10 years. This is where the one-third number comes from in the prepared notes.

That's the best way that I can think of to answer that question. It is very specific to various mines. Of course, when it comes to certification there are a number of issues with that as well with respect to location of the reclaimed land and the certification process itself.

● (1635)

Mr. Blaine Calkins: I want to congratulate you and your partners in the consortium working together to do this. We had Mr. Julian just say that the number one issue facing us now is the ability to do value-added. It looks as if you've taken the environmental issue off the number one chaser for some of these organizations looking at the oil sands. Well done.

Mr. Gray, I'm going to move over to you. It's good to have a chance to speak with you. We had a chance to meet at an environment committee meeting in Edmonton several years ago. I asked you then what we could expect in the next five years—and I think that was about five years ago—and you've come up with this non-aqueous extraction and these catalysts for the upgrading process. What's the current pace to get these things into the marketplace?

Dr. Murray R. Gray: Our expectation, working with our partners at Imperial Oil, is that they will start construction of a major pilot plant next year for the non-aqueous extraction technology. It will take about a three-year cycle to build that, prove the technology, and see whether it's ready for large-scale commercialization. If it is, then it would take another three to four years to go through construction and commissioning. So for a major industrial technology, you're looking at somewhere between six and eight years to go from lab conception through to full operation. Our new catalysts are a little further away. They're a great curiosity on the lab bench. We're probably looking at five to eight years before we really know the potential there; it's longer term.

Mr. Blaine Calkins: That's great. Very quickly, I'm running out of time, you said that NSERC wasn't focused on the oil sands in the 1990s when it came to their granting process. Did I hear that right, that they were more interested in $C0_2$?

Dr. Murray R. Gray: You're almost right. NSERC had a range of programs that we were able to use very effectively. Their research partnerships program was a general enabling program. The centre of excellence program is not run by NSERC. It's run by a different secretariat and the centre of excellence program has never particularly focused on oil sands throughout its history. The one exception, as I mentioned, is a new centre of excellence that is now working on carbon dioxide emissions broadly, not just in the oil sands industry.

The Chair: Thank you, Mr. Calkins. We're out of time.

I'll go to your colleague, Mr. Anderson, for up to five minutes.

Mr. David Anderson (Cypress Hills—Grasslands, CPC): Thank you, Mr. Chair.

I want to thank our witnesses for being here today. I think we're getting some great information, and it has been an interesting study.

I want to come back to upgrading. Three of my colleagues have already talked about that a little bit.

Both Mr. Wamboldt and Dr. Gray, I'd like you to talk a little bit about the innovation in upgrading. You've mentioned the catalysts. What other innovations will we see in upgrading? We've heard lots about extraction, various changes in the extraction processes, but how do you see innovation impacting upgrading over the next 10 years if you say it takes eight years to bring something online? What changes do you see coming there?

I'm going to ask SDTC if they have some projects they are working on in that area as well.

Dr. Gray, maybe you want to start.

Dr. Murray R. Gray: The history we see in upgrading is that the technology has developed very slowly. The first plant that Suncor started in 1967 and an expansion they did in 2000 used basically the same suite of technologies. We've seen incremental improvements in upgrading, but we haven't seen major breakthroughs.

My hope personally is that some of the work we're doing in the lab and work that's going on in a number of innovative small companies and large companies will result in some very different upgrading technologies within the next decade, but it has been slow to develop. I certainly acknowledge that.

Mr. David Anderson: Are you willing to share some of the directions that might go in?

Dr. Murray R. Gray: What we're most excited about I think in the upgrading area is our new, very high activity catalysts. These materials are unprecedented, which actually raises a challenge in terms of getting them to commercialization. If those are successful it would dramatically cut the cost of producing high-quality synthetic crude oil from oil sands, probably by a third.

Mr. David Anderson: Mr. Wamboldt, do you have anything to add to that?

● (1640)

Mr. Bradley Wamboldt: No. I'm afraid I don't have any background in the upgrading technology.

Mr. David Anderson: That's fine.

SDTC, are you involved in this?

Mr. Rick Whittaker: Absolutely. I can't resist. Thank you for the question.

The areas we see or the areas we have put investments in are in situ upgrading, again focusing in on some areas where you can create a big impact. One example would be in situ upgrading to avoid having to add a whole bunch of diluent. What that does is allow you to ship your oil to multiple refineries. It creates a bigger market. That's one technology that's well along, and well developed, and coming through our process.

The other side of it is providing other ways of producing hydrogen for hydrocracking. All the work and all the investment that has gone into the hydrogen economy up until now is shifting direction for it to say how can we produce hydrogen more efficiently to apply to the oil sands. That's something we've started to do.

Mr. David Anderson: Thank you.

I want to change the direction quite a bit here and ask you another question. You talked a little bit about innovation and financing, your technology adoption, and the follow-on financing. Is that what the two programs are called?

What do you see as innovation that's going to be taking place in terms of financing over the next few years? We were talking about energy innovation. I'm interested in whether you have new products coming on market in terms of being able to finance innovation.

Mr. Rick Whittaker: What's going to become available? I guess one of the interesting things that both the Jenkins study and now, more recently, the aerospace study focused on was the ability to leverage more government procurement. That may actually provide a source of financing for a number of these initiatives. By being able to leverage the obligations to Canada managed through Industry Canada's IRB program, it may be an opportunity that provides additional capital from the private sector.

This isn't just theory. We have actually been implementing this now since 2009 with investments from the aerospace and defence prime contractors into our projects. We're seeing that as a supplemental source of financing for sure.

Mr. David Anderson: I'd like to switch over to Mr. Levy.

We've had some other folks in here talking about different electrical technologies, but can you talk a little bit about battery technology in terms of wind power. One of the issues you have, of course, is not having a steady supply of energy.

I'm wondering how are you dealing with this issue, and can you talk about new battery technology we might see over the next few years.

Mr. Tom Levy: Sure. I'd say that study after study and experience show that right now at the levels we're at in Canada we don't need storage. Our system is interconnected enough and the tools are available to manage our existing supply of variable sources without need for battery. But we certainly need to—

Mr. David Anderson: Is that accurate in rural and remote areas as well? You were talking about the Northwest Territories. Is that an—

Mr. Tom Levy: Those are often interconnected with diesel systems, so there is some very sophisticated switching that goes on between them. It depends on the scenario, really. If you are talking about a house or a cabin in the woods, you are going to need a diesel generator and some batteries. But in terms of large-scale commercial applications of batteries within a large transmission system—not a remote system, but ones we have in the bulk of North America—we don't need battery storage at the present time. But we certainly need to start thinking about it if we want to get to those levels of penetration of renewables that will receive 30%, 40%, 50%, 60%, or 70%. There's a lot of innovation going on right now as utilities prepare for that time when they will need it.

Storage can take on many different aspects. Batteries are one, and there are a lot of different chemicals. I'm not an expert in storage to that level of granularity. But there are other options out there. There are flywheels. There's compressed air. There's pumped hydro, and so on. Jurisdictions in Quebec that enjoy significant amounts of stored water have storage already as an inherent part of their system.

I would say that utilities in Ontario are starting to look at these areas of innovation and research as preparation for such time as they will need storage.

The Chair: Thank you, and thank you, Mr. Anderson.

We go now to Mr. Nicholls, for up to five minutes.

Mr. Jamie Nicholls (Vaudreuil-Soulanges, NDP): Thank you, Mr. Chair. Just to continue on from Mr. Julian's question to SDTC, your direct public funding is fully allocated. Is that correct? There is no more funding to be given at the present moment.

Okay, thank you. That's very interesting. It shows maybe the interest the government takes in sustainable development technology.

I was reading a speech by Roger Gibbins last night. He's the outgoing president and CEO of the Canada West Foundation. He was talking to young graduates at the University of Calgary and he says that the challenge of the past was securing a national voice for the west. He says that nowadays, this has been largely achieved. He says that today's challenge is finding a prosperous and respected place for Alberta within the global economy. And he raises some interesting questions. He asks what those challenges are. He says:

> Simply put, although there is nothing simple about it, how will we take a provincial economy that is still heavily dependent on resource extraction and position it for success in the knowledge-based global economy? How will we ensure that Alberta's economy is tomorrow's economy, and not yesterday's economy? How will we ensure that Alberta will truly be “next year country"?

My colleagues from the wild rose country will know what “next year country” means. I've heard a lot of testimony here about the knowledge void as well as the commercialization gap, but I don't want to get into that.

Mr. Levy, you mentioned, for instance, that you need to have the basic information, basic indicators, in order to increase efficiency. Mr. Gray, there are two prominent researchers, Mr. Moore and Mr. Majorowicz, at your institution who are looking at geothermal and have suggested geothermal for pre-heating at in situ sites. Mr. Wamboldt, TransAlta's Poplar Creek cogeneration plant has increased efficiencies.

My question to you would be this: What's the next generation?

Generally, to all of you gentlemen, where can the federal government play a role in engaging and supporting the knowledge economy, particularly innovation in the energy sector?

It sounds to me as if just basic information is needed as a first step for us to move forward into the future, rather than continuing the regressive ways of the current government. Can you address the question, gentlemen, starting with Mr. Levy?

● (1645)

Mr. Tom Levy: I'm sorry. I'm not sure what the question was.

Mr. Jamie Nicholls: You mentioned that basic information, such as wind currents and stuff, is missing. How can the federal government play a role in helping?

Mr. Tom Levy: The pan-Canadian wind integration study is an initiative we've been championing since 2009. That study examines wind on a national level using our widely integrated, interconnected system. The provinces up until now have taken this upon themselves. They have studied it within a vacuum.

Mr. Jamie Nicholls: You need the federal government to play as an integrator, in a way.

Mr. Tom Levy: Exactly. The federal government's role is quite clear in that regard.

Mr. Jamie Nicholls: All right.

I'm interested in Helmholtz's work in terms of the development of renewable energy sources, particularly geothermal energy. Could you address how we can advance advances in the field of geothermal energy and their use for oil sands pre-heating at in situ sites?

Dr. Murray R. Gray: One of our theme areas under the Helmholtz initiative at the University of Alberta is working with German researchers on exactly that question of how to use geothermal energy.

The Germans have been leaders in setting up some pilot facilities at which they actually have drilled wells we can use to collect data and do simulations. One of the results we expect to see over the next one to two years is a much clearer assessment of what the cost and benefit of applying geothermal energy in oil sands and other energy-recovery areas would be. That's an example of—

Mr. Jamie Nicholls: Sorry, Mr. Gray. I know that two researchers, Mr. Moore and Mr. Majorowicz, said in 2008 that the federal government should get involved in getting basic information on the geothermal facts of the fields in Alberta. It's five years later now. What has stalled this progress? Why hasn't the federal government gotten involved in looking into this?

Dr. Murray R. Gray: I can't comment on that specific question. All I can say is that the University of Alberta has been actively filling that gap.

The Chair: Thank you, Mr. Nicholls. Your time is up.

We go now to Mr. Allen for up to five minutes.

Mr. Mike Allen (Tobique—Mactaquac, CPC): Thank you very much, Mr. Chair.

Thank you to our witnesses for being here.

My first question is for Mr. Whittaker from SDTC. Can you comment about the relationship that you just signed with EDC in October with respect to cleantech innovation and companies from a global perspective, Canadian companies competing globally? Can you talk a little bit about some of the innovation and some of those companies that you believe you are going to be able to help innovate and be players in the global sector?

● (1650)

Mr. Rick Whittaker: It's no surprise that most of our companies, 90% of our small and medium-sized companies, are export-oriented. You make a business out of the global economy, not out of the local one necessarily.They are all export-oriented. So it was essential that we provide a mechanism and linkage to other federal programs and initiatives that would allow them to access some of those markets and access some of that financing to make it happen as they graduate beyond SDTC and now move out into the market. That MOU we signed with EDC spells out exactly how that relationship can work in a two-way fashion, as our companies need export expertise and as they need to draw on SDTC's expertise on due diligence. It's a little bit of a two-way street that way.

Mr. Mike Allen: Thank you. I appreciate that.

Mr. Levy, I'd like to ask you a few questions about wind energy. Can you talk about the trends in wind power installed cost over the last 10 years? I know there has been a little bit of an uptick, and now it has gone back, and in the last couple of years we've started to see the technology cost per kilowatt go down. Can you talk a little bit about that, and can you talk about where you think it's trending?

Mr. Tom Levy: Sure. There have been a few studies. We've undertaken one ourselves. Notably, however, I'll start with one from the department of energy in the U.S.

Lawrence Berkeley National Laboratory does wind technology updates every year, and those consistently show that in the past few years it has been trending down in terms of the installed cost per kilowatt. It is subject to raw material costs, and so as raw material prices go up, then certainly some aspects of the cost of wind can also increase. Coupled with improved efficiencies are improvements in technology, which are also highlighted in these reports, and largely a drop in costs. A study we commissioned in British Columbia showed similar trends.

Mr. Mike Allen: I'm looking at your chart in which you talk about national R and D budgets. Obviously, national R and D budgets are going to be influenced by the fact that energy policy is provincial in Canada, so obviously they would be spending money on that as well, so it's an apples to oranges comparison.

I find it interesting that Sweden shows installed-cost dollars per megawatt at 5,000, and in Canada it's 1,473, yet they spend more in R and D. Go figure. How can you explain that?

Mr. Tom Levy: I can't. At the end of the day, the information was pulled from the IEA report. They obtained their details from various government departments. I understand that one comes primarily from Natural Resources Canada. I would agree that certainly the provinces also make investments, and I don't have that information in front of me. That was what I pulled from their latest report.

Mr. Mike Allen: If I understand it right, in wind-power production the penny-per-kilowatt hour is going out until 2020 or more, so incentives are still being paid to these wind-power operations until 2020, correct?

Mr. Tom Levy: Yes. They'll continue to get paid for the projects that came in prior to, I think the end date was March 1, 2009.

Mr. Mike Allen: Okay.

What is the industry doing with respect to this NIMBY syndrome, which is coming up with respect to wind power now too? How are you innovating with respect to trying to deal with some of those energy supply issues that are happening at the local level because we don't want wind power in the area because of infrasound and all those kinds of things?

What are the major innovations in those areas that you're accomplishing to prevent that?

Mr. Tom Levy: There's no real silver bullet. At the end of the day it boils down to community engagement and respect for responsible community engagement. Certainly, many other industries are facing similar aspects in terms of local response but then also recognizing an overall need for a certain technology. The aviation industry has been undergoing those types of responses; we need to fly people around, but then people don't want to live next to airports for one reason or another.

In the seventies they undertook a lot of work around community engagement. We've produced a best-practice guideline that has been viewed around the world as a significant document that underscores the need for that community engagement, to get that local community support to be equally translated to that regional support that is consistently shown in polls around the world.

The Chair: Thank you, Mr. Allen. Your time is up.

We will now go to Ms. Liu for up to five minutes.

Go ahead, please.

[*Translation*]

Ms. Laurin Liu (Rivière-des-Mille-Îles, NDP): Thank you.

Welcome back, everyone.

My question is for Mr. Whittaker.

You said that you received a budget allocation of $40 million from the current government. I know that you also participated in the pre-budget consultations of the Standing Committee on Finance.

How much extra money are you asking the government to invest?

● (1655)

[*English*]

Mr. Rick Whittaker: Right now the request that we've got in front of the government paints a number of different scenarios. Our investment in the Canadian economy today is about $100 million per year for these promising companies. The status quo or the existing mode of operation sees about $100 million per year.

[*Translation*]

Ms. Laurin Liu: I reread the evidence and I know that you asked for $110 million a year over five years.

In which sustainable development sectors will those funds be invested?

[*English*]

Mr. Rick Whittaker: The question around sectors is very consistent with what we're doing today. We see a need across the Canadian economy. I will refer to the slides that were presented earlier that show that jobs are created across all the primary economic sectors in Canada whether it's oil and gas, aerospace, mining, forestry, or what have you. I anticipate none of that changing and that we will continue to support all those important sectors.

[*Translation*]

Ms. Laurin Liu: Thank you.

You have already commented on the SR&ED tax credit. I would now like to ask Mr. Levy this question.

What do you think about the tightening of the rules that govern those tax credits?

[*English*]

Mr. Tom Levy: To be honest, I'm not entirely familiar with it. I don't have much to say on it.

[*Translation*]

Ms. Laurin Liu: I would also like to ask Mr. Gray a question.

A number of businesses, including RIM, have already said that this could result in the outsourcing of research and development.

Are you also seeing this trend in the oil industry?

[*English*]

Dr. Murray R. Gray: My impression in the oil industry is that we're seeing growth, research, and investment in Alberta although I don't have the statistics in front of me. We're also seeing international groups interested in getting more involved in R and D on energy-related issues across the board. I see an increase in research activity rather than outsourcing, which I think is the kind of issue you're referring to, Ms. Liu.

[*Translation*]

Ms. Laurin Liu: Let me go to another topic.

Some witnesses, particularly the representatives from Écotech Québec, suggested the idea of a marketing tax credit.

Mr. Whittaker, do you think that is a good idea?

[*English*]

Mr. Rick Whittaker: One of the recommendations from the Jenkins study was providing these coupons, if you will, for different types of activities. And the value-added services, so the marketing services and being able to put together proper business plans, raise financing, the types of things we're doing at SDTC, the follow-on financing and quick adoption, are all good things to do. Whether it happens as a tax credit, which is something that smaller companies have a more difficult time taking advantage of—larger companies have an easier time taking advantage of it in general—or it happens through a different mechanism, the need is there. I think the need is correctly identified. The actual instrument is certainly one that can be debated.

[*Translation*]

Ms. Laurin Liu: Thank you.

I also noticed that you calculated the total annual reduction of greenhouse gas emissions as a result of projects funded by SDTC.

How many megatonnes do you expect Canada to eliminate?

[*English*]

Mr. Rick Whittaker: That's a great question.

The data that we have.... It's eliminated over time, and recognize that these are all around implementation, and so depending on the uptake and depending on how you calculate it, and the timeframe that you take it.... So this becomes a "how long is a piece of string" type of question, because there are a lot of caveats and conditions on how you actually measure your emissions: are you measuring at a point in the year, or are you measuring the net emissions? What we've done is a net present value of these emissions over time, and what is the societal benefit, because people think in dollars and cents, they don't think in tonnes of CO_2 necessarily.

When we look on the domestic side, the net benefit from our early investments, which were just several hundred million dollars, show that it's several billion dollars worth of return. So there has been a 14 times, 15 times return on that kind of investment. Those are kind of the figures we're looking at. That's how we do the math on emissions and turn them into a quantifiable economic value.

● (1700)

The Chair: Thank you, Ms. Liu.

We go now to Mr. Leef for up to five minutes.

Mr. Ryan Leef (Yukon, CPC): Thank you, Mr. Chair, and thank you to the witnesses for attending.

We heard in past testimony, and I think it was Mr. Gray who touched on this a bit...maybe I'll just put this question to everybody in order. Mr. Gray was talking about better operational strategies for today and then seeing technology show its benefits three to five years down the road. We did hear that from past witnesses, who were talking about how what they were doing to contribute to innovation was largely just trying to find ways of improving day-to-day operational strategies and not necessarily seeking out the latest and greatest technology that will see benefits down the road.

Could we start with Mr. Levy, and then Mr. Whittaker, and then we'll go over to the gentleman joining us by video conference? Maybe touch on what things you're involved in, or your appreciation for where operational advances are today prior to looking at the longer-term technology things that we're talking about.

Mr. Tom Levy: The today stuff is certainly around issues such as icing and forecasting; when icing is going to occur and day-to-day management of a wind farm that has received an icing event and is shutting down. The long-term stuff is certainly around storage and whatnot, and where is that. When do you make those investments? Is it based on a certain level of wind in the system, or is it based on the economics of actually building and implementing those? As wind forecasting improves, they can put that in the control rooms immediately and start using it in day-to-day operations, which immediately see efficiencies in overall dispatch of energy.

Mr. Rick Whittaker: Thank you.

We've looked at this issue together with McKinsey & Company quite extensively. It comes down to risk, and every shareholder in the shareholder base behind these companies has different expectations of risk and return. And so if you look at the building sector, clearly you can get 80% of your efficiency gain in improved operations, the actual better operating of the building itself. It's not to say don't do new technologies, you have to, but it's in the operations that you're going to realize those savings. If you look at other sectors, they're different in the way that they invest in R and D, in what shareholders expect, and so all of that needs to be taken in the context of how you implement a new technology strategy. For some, you will be able to capitalize it very easily and readily and implement it. For other ones, it's going to be a long haul before you get these technologies adopted. Each sector, whether it's transportation, building, oil sands, has its own kind of profile for adoption.

Mr. Ryan Leef: I appreciate that. Thank you.

Mr. Wamboldt.

Mr. Bradley Wamboldt: Having been a GM of operations, this is actually quite an interesting area for me.

As we're introducing these new technologies, I guess the real trick is to operate what you've got as efficiently as you possibly can. You'll see within Suncor that we have quite a big push on what we call "operational excellence", which is really just tending to your knitting: monitoring your operations and keeping things within tighter bands.

If you look at some of these air emissions intensities as well as the water usage numbers I referenced in the prepared notes, those largely came from really the operators doing the right things at the right time, monitoring things more closely, having the right metrics and measures, and so on.

The operations side is rather mundane, I guess, but there is quite a bit of opportunity in that.

Mr. Ryan Leef: Thank you.

Mr. Gray.

Dr. Murray R. Gray: All I'd like to add to my earlier comments, Mr. Leef, is that if we look across the energy sectors, both renewables and non-renewables, they're all characterized by huge capital investments for energy generation, distribution, and delivery. Whenever you have that situation, you have a strong incentive to operate as efficiently as you can and to get every possible benefit out of the investment.

● (1705)

Mr. Ryan Leef: Thank you.

Do I still have a couple of minutes, Mr. Chair?

The Chair: One minute.

Mr. Ryan Leef: Okay.

Mr. Whittaker, you sort of touched on this, the fact that 80% of efficiencies are found in operations. You articulated that this is not to say that you don't invest in newer technologies and move on. But I guess the same could be said, then, about the government's strategic approach to funding R and D: strategic investment on the government's part is as sensible to find those efficiencies and where to invest as it is just about...you know, pouring a whole bunch of cash into a pot and saying, "Have at 'er, boys".

Would you agree with that?

Mr. Rick Whittaker: I would say that you have to be selective. You have to be really selective.

I mean, the reality is that you can't put everything into a single initiative or be too broad. You actually have to pick where the biggest gains will be made. When you're operating something new, because it's operations, you have to make sure that you've commercialized that thing appropriately, that it can be operated.

That's really where the gap exists. When you commercialize new technologies, you can have dozens of new technologies, but they don't get adopted because they can't be operated. It's that gap in there that says, as we commercialize these things, let's make sure they get used.

The Chair: Thank you, Mr. Leef.

We go now to Ms. Crockatt for up to five minutes....

Oh, my apologies, Monsieur Gravelle. I don't know how I could miss you.

Mr. Claude Gravelle (Nickel Belt, NDP): I don't how you could miss me either.

The Chair: You should be heard. You have up to five minutes. Go ahead, please.

Mr. Claude Gravelle: I think you did it on purpose.

Voices: Oh, oh!

Mr. Claude Gravelle: My question is for Mr. Wamboldt. I want to quote from a *Globe and Mail* article entitled "Dramatic temperature increases could threaten Canadian health, infrastructure".

In the article, a Mr. Blair Feltmate is quoted. Mr. Feltmate runs Canada's Climate Change Adaptation Project. I'll just quote from the article:

> ...Mr. Feltmate said. But "climate change is a done deal. There's nothing we can do to turn it off....How do we adapt to that new reality?"

Now, I'm quoting this because of the tailings:

> Take tailings impoundment areas—the ponds used to store mine waste. Mr. Feltmate said many of the ponds in northern areas were designed "with the idea that permafrost will be in the ground permanently." In many regions, that isn't the case.

Can you tell me if this is something that you're looking at? Is this a big issue? And what are the solutions?

Mr. Bradley Wamboldt: Specifically with respect to permafrost, there is no expectation for permafrost in any of our designs in Fort McMurray. These are sand-dike construction, with liners in some cases.

I'm not really sure of the nature of the question, I guess. From the permafrost perspective, it was never an expectation in the Fort McMurray area.

Mr. Claude Gravelle: I know there's no permafrost in Fort McMurray, but climate change also affects Fort McMurray. Are you taking into consideration future climate change when you're building these tailings ponds?

Mr. Bradley Wamboldt: I'm not certain of the link, actually, between tailings ponds and greenhouse gas emissions in this regard.

Mr. Claude Gravelle: All right. Thank you.

Mr. Levy, in our briefing notes there's a reference to how Ontario is expected to install more than 5,600 megawatts of new wind energy capacity by 2013, creating 80,000 person-years of employment, and to how wind energy can satisfy 20% of Canada's electricity demand by 2025. Is most of the employment in the building of the turbines? Where in Ontario are they projecting there to be wind energy capacity growth? In your view, are those projections of 20% realistic?

Mr. Tom Levy: They're certainly realistic. It requires stable policy. With that stable policy, then, certainly the industry can meet those demands. In terms of the jobs, the breakdown is about two-thirds in construction and one-third in operations and maintenance.

The other question that I believe you had was about where in Ontario we are going to see most of that growth. Certainly, southern Ontario is seeing a substantial number of the contracts already in place, as well as some regions in northern Ontario, assuming appropriate electrical infrastructure to transmit it to market.

● (1710)

Mr. Claude Gravelle: In your presentation you also talked a little about the far north. I read an article about there being enough wind in the far north to take some of these communities that rely on diesel oil for power and remove them from using diesel oil. Is this something you have studied?

Mr. Tom Levy: We haven't studied it specifically. I'd caution the 100% wind; I don't think that's necessarily a realistic application at this point. With the advent of reduced cost in terms of storage, certainly, that might be a possibility. In terms of wind resource up north, there is a significant resource, and there are significant opportunities to capture that and reduce the reliance on diesel.

Mr. Claude Gravelle: Okay. Some of the wind farms are going to be in northern Ontario. We're getting a lot of complaints from people. They don't want these wind farms because of the noise pollution. Have you studied this also and can you tell us what you're doing to remove this noise pollution?

Mr. Tom Levy: Well, in terms of the physical noise, there's research under way in all parts of the world to see where that noise is produced and what is done to mitigate it. Most of the time, it really does boil down to good community engagement.

Time and time again, it is shown that a good relationship with a community—one that sees broad distribution of benefits within the community, the use of local labour, and certainly some innovative ways to engage the communities and share that economic wealth that's generated—will often result in a positive response in the communities. Engaging the community in a responsible and respectful manner is at the forefront of what we're promoting. We're certainly meeting that through production of documents like our community engagement and best practices document, which right now is undergoing a review and updating.

The Chair: Thank you, Mr. Gravelle.

Finally, we'll go now to Ms. Crockatt—this time really—for up to five minutes.

Ms. Joan Crockatt (Calgary Centre, CPC): Thank you very much. I'm going to address my questions to Professor Gray and Mr. Wamboldt.

What I'm actually hearing is that this is a very good news story and that you've made really great progress on the technological side and environmentally. We've heard from you, Professor Gray, that Canada is a world leader in oil sands technology, and from you, Mr. Wamboldt, that we're decreasing our GHG intensity, the tailings ponds reclamation has been cut by one third, and the water use has declined by half. These things are really important, because the oil sands are the future for Canada and a very significant part of the way that we are going to continue both to balance our budget and to pay for our important social programs.

But my question is about innovation and communication. I think that you know all these things and that some of the members of this committee know these things. I'm sure that for others it's new information. I'm wondering if this same level of innovation that you're supplying on the technological side is also being used on the communication side, because I see the biggest barrier to market here being the social licence to operate. I'm wondering what your comments are with regard to that.

The Chair: Go ahead, Dr. Gray.

Dr. Murray R. Gray: That's a fascinating question. I'm trying to think of an appropriate response. I completely agree that communication and understanding are a huge part of the issue, because I've lately been engaged in some of the pipeline debates in the United States and have observed the difference between information and misinformation in some of those debates.

That's an interesting challenge that I'd like to take away, think about, and discuss with my colleagues at the university, as to what we can do in terms of communication when you get these kinds of issues that become so polarizing in some communities. How do you work around that?

Ms. Joan Crockatt: Mr. Wamboldt.

Mr. Bradley Wamboldt: Again, that's a very interesting question; I appreciate your asking it. It's one that over the last four years in my previous job I've been puzzling over with our communications department. The fact is some of the stuff is not very interesting in terms of actually getting to the facts. How do you get these dry facts to the people who are forming opinions? What we've tried to do recently is a program called OSQAR, which is a blogging type of set-up, to try to make these messages a little more available to people. We have a Facebook account now and a Twitter account, so we're trying to use some of the new social media channels to get the facts out there, both as a company and also, of course, through CAPP as an organization.

We get the facts on the ground. We're open to a discussion. As I said in the prepared notes, nobody has a monopoly on good ideas. We've certainly welcomed a number of people onto our site to come and see things for what they are, and I've always had very engaging discussions with folks out there.

From an innovation perspective, it's things like OSQAR blogs, Facebook, Twitter—whatever channels we can land on.

● (1715)

Ms. Joan Crockatt: Okay, maybe it's just a bit of a challenge to you. While you're moving ahead by leaps and bounds on the technological side, we need to get the public to catch up so that you can continue to do what you do and so that Canada's resources can be developed.

I might just pose the question to Mr. Whittaker about innovation. You're there to spur innovation. Is there much of an emphasis being placed on the need to make sure that the public knows what's being done here?

Mr. Rick Whittaker: There are lots of good news stories out there. I'd agree that more needs to be done. You can never do enough, really. And there's enough fresh innovation out there going on, both what the companies develop themselves and from new entrepreneurs coming about. We see it every day, coming about, what this could mean. And we're at a stage of development where these things aren't too early, when you wouldn't want to announce them; they're actually on the ground, commercializing, demonstrating, and operationalizing what's going on. So the more announcements in every media, the better. There's actually a whole stack of those ready to go. We put out two a year, so there in itself you have 15 or 20 companies with great announcements.

The Chair: Thank you, Ms. Crockatt.

I'd like to thank all the witnesses we've had before us today. The information you've given us really will be a help in writing our report. Thank you so much, and thank you to all the members for your great questions.

We will suspend the meeting for just a couple of minutes as we go in camera and as the witnesses leave, and we'll get right back to a short in camera meeting.

[*Proceedings continue in camera*]