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Chair

Mr. Leon Benoit

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● (0850)

[*English*]

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

As you all know, we are here today to continue our study on the rare earth industry in Canada. It's a fascinating topic, and I think we all see the potential of this industry. We are very much looking forward to hearing the witnesses here today.

I understand Mr. Wilson is prepared to present the material that Mr. London was going to present. Before I introduce the witnesses I wanted to mention to the committee members that Mr. Julian has asked for a couple of minutes at the end to discuss the witness list for the cross-country benefits of the oil and gas sector study.

I'll introduce you all first, and then we'll start with Mr. Wilson. We have with us today as individuals Luisa Moreno, senior research analyst, Euro Pacific Canada; Vladimiros Papangelakis, professor, chemical engineering and applied chemistry, University of Toronto; and Steven Wilson, senior vice-president, minerals services, SGS Canada. Welcome to all of you. If Mr. London does get online, he is the chair of the Canadian Rare Earth Elements Network.

We will start the presentations with Mr. Wilson and then you can go ahead in the order that you would like from there.

Go ahead, please, Mr. Wilson.

Dr. Steven Wilson (Senior Vice-President, Minerals Services, SGS Canada, As an Individual): Thank you, Mr. Chairman.

We're pleased to be here today and to be able to participate with you. I apologize that you don't have a translated presentation that we can show you as part of this. With the invitation timing and some of the other things that were going on, we haven't had a chance to do that. We do have a set of slides that will be translated and distributed following the meeting, so you will have an opportunity to review some of the information.

I will also apologize briefly up front for my inadequacies in representing what Mr. London was going to present. But I would like to share with you a little bit about the emerging or developing Canadian Rare Earth Elements Network. Then Luisa will take a chance to talk a little bit about the overall economics of the rare earth elements in the industry and the capital market perspective of those things. Then I'll come back to you and talk a little bit about processing and production challenges. Then Dr. Papangelakis will talk a little bit more about the science and engineering aspects, and I'll try to close up. I understand that generally you do this in several short presentations. We're going to try to pull it all together in one if that's all right with the committee. Then we'll take questions as a group if that's okay.

I know that you have had some introduction and background to rare earths and to their importance. There are tremendous applications in a number of industries that are important in Canada and obviously globally. Certainly considerable aspects relate to magnets and permanent magnets in particular, as they are used in defence applications or in high-tech radar systems and other strategic initiatives like that. But they are also a very important aspect in many of the emerging green technologies, hybrid motors, wind turbines, battery storage, and long-term storage applications.

Canada has a tremendous opportunity and tremendous potential to get out into the forefront of the global rare earth industry with some of the things that we'll talk about later...and the pullback from China. We have tremendous resources, we have valuable and valued expertise in our Canadian mining and processing industries, and we have a tremendous group of companies who are prospective producers developing projects and properties.

As part of that, earlier this year that group has come together to try to establish a rare earth elements network in Canada that we have called CREEN. The vision of CREEN is to establish a Canadian-based rare earth production within five years that is supported by technical and innovative solutions and championed by that collaborative network.

It's a little bit of a paradox or a dichotomy when you talk about potential competitors in an industrial market who come together to collaborate to build infrastructure and to build capacity to enable all of them to succeed. But that's really what the CREEN vision is. As an industry-led multistakeholder network, the intent is to provide collaborative solutions that advance our Canadian rare earth element sector, and our goal is to produce and secure a 20% global supply of the market share of those critical rare earths by 2018.

There are a number of supporting goals that will be driven by that. They include providing that industry-driven vision that can be supported by researchers, by universities, by government agencies, by consulting engineers, and by entrepreneurs to contribute to the industry. But it also will require the timely delivery of solutions for the technical and economic problems to support the industry. There are opportunities for us to facilitate partnerships with other organizations and potentially with other countries as we develop these strategies. One of the key outcomes of the CREEN network and of our progress will be the education and training of highly qualified persons in the industry to continue to support that industry.

● (0855)

We do have a map in the presentation. I think you've seen it before. It identifies more than 200 potential rare earth projects that were identified as part of a 2011 study. A number of the largest—

Mr. Brad Trost (Saskatoon—Humboldt, CPC): I have a point of order. I'm sorry to interrupt, Mr. Chair, but I'm looking around the room and half the room seems to have decks. Were they or were they not distributed?

The Chair: No. I think Mr. Wilson is referring to the departmental presentation where the map was—

Mr. Brad Trost: My mistake, Mr. Chair. My apologies.

The Chair: Okay, great.

Go ahead, Mr. Wilson.

Dr. Steven Wilson: In the investigations or the studies of the industry you will have heard, potentially, a number of different monikers. We talk about the rare earth elements. There are light rare earth elements, there are heavy rare earth elements, and as part of a study in the U.S., they have identified a different group that they call critical rare earths. I think Luisa will talk a little more about some of those as we go through.

In the slides that you will receive in the future there is a table that talks about the Canadian dominance for resources, particularly in those critical rare earth areas. But the reality is that the Canadian potential includes about 50% of the known rare earth elements in recognized deposits globally. So essentially, half of the rare earths that are available for exploitation outside of China are available in Canada. In particular as we look at advanced-stage projects, globally there are 28 that are in an advanced exploration and development stage. There are another 28 that are in resource identification and development. Together, out of those 56 projects, 19 of them are in Canada. By comparison, there are nine in Australia, five in the U.S., and 23 in the rest of the world.

One of the influences in our development of CREEN was the Critical Materials Institute that was formed recently in the United States. It was a Department of Defense initiative and includes, I believe, $125 million of government funding over five years to develop a research and development network that will help the U.S. industry to secure their share of rare earth elements for supply in the industry.

There were two significant concerns that were identified in their strategic study. One is the lack of primary heavy rare earth sources in North America. Projects exist, but we don't have operating producing properties. Finally, there is the lack of resource refineries to actually separate and produce final metal from the rare earth projects. We do have a reputation in Canada as miners, as resource stewards, and we do have experience and expertise in our metallurgical community to do this.

Really, the messages we're trying to share with you today is that Canada has the opportunity and the potential from a resource and a project perspective. We have the capability and capacity as engineers and scientists, and we need to support the industry as together we develop an infrastructure and a capability, a capacity to move forward.

With that, I'm going to pass it on to Luisa, and we'll try to keep things on time.

● (0900)

The Chair: Go ahead, please, Doctor.

Dr. Luisa Moreno (Senior Research Analyst, Euro Pacific Canada, As an Individual): Thank you to the committee for this opportunity.

I will start by going straight to the point that these elements are critical.

I just would like to emphasize that there are light rare earth elements as well as heavy rare earth elements that are critical. For instance, for magnets, neodymium and praseodymium are used in significant amounts in some of the magnets, such as the neodymium iron boron magnets. The estimates are very positive for those elements.

The issue with the heavy rare earths—I believe you have heard this before—is that China supplies almost 100% and they have indicated that their resources are diminishing significantly. They have less than 30 years now in regard to supplies. There has always been a fear that China might decrease further their exports of these elements that they control.

But the way the market sees it and understands it is that, as the global economy recovers, there will be an increased demand for many materials that utilize these rare earths. For instance, in the magnets space again, we have forecasts of an increase in demand of about 40% between now and 2017.

You might ask, then, if these elements are critical, and if there is a consensus among analysts that demand will increase significantly, why we haven't seen more activities from the capital markets and more interest. I want to go back in history a little bit and explain that China has controlled the supply of rare earths in the last few decades. The export quotas were introduced in 2005. At that time, they were around 60,000 tonnes. They decreased that significantly, to about 30,000 by 2010, and when that happened, the markets realized that there was a need for sources of rare earths outside China.

From 2008 to 2010 and part of 2011, many rare earth companies were formed. Over $3 billion was invested in many projects, particularly the larger projects, such as Molycorp in the U.S. and Lynas in Australia. Also, many projects in Canada received investments.

A number of events happened. China usually puts out export quotas semi-annually. In 2010, they reported the first half of exports, which were 35% lower than the previous year. That caused a frenzy in the market. Rare earth stocks were up and prices were up. Many end users stockpiled significantly. Examples include lanthanum, which was $2 per kilo back in 2007 and went as high as $250 per kilo at the peak in 2011. The market did not know and the end users did not know what the next move was and what China was going to do next.

In 2011, however, a number of things happened. China did not cut the export quotas further, as everybody thought. The second half was actually quite high. It was higher than the first half. China reinstated the 30,000 tonnes. Other things happened as well, such as the earthquake and tsunami in the country with the second-largest consumption of rare earths, which is Japan. Their economy slowed down in 2011. There were also a number of flood events in Thailand, which is a region that manufactures electronic equipment, so we saw a decrease in demand for rare earths in that region.

● (0905)

At the same time, during 2011-12, we saw a slowdown in the whole commodity market. The demand for many metals slowed down, and in the capital markets we saw a number of asset management firms that usually invest in mining stocks in recent years consolidate, or even close doors. We have seen a number of boutique investment banks as well that have discontinued their businesses as a result of the significant slowdown in the mining space.

So moving forward, we don't know what China is going to do. Export quotas are now 30,000 tonnes, but again, heavy rare earth demand is increasing, and their supply is diminishing. End users have done a number of things in the last few years. They stockpiled significantly and they exited the market in early 2011, so demand for rare earths in 2011 and the last few years has been really low and prices have collapsed.

Meanwhile, the end users have used their stockpiles, but they have spent hundreds of millions of dollars improving their manufacturing efficiency, particularly in reducing waste. There is this technique that is known as additive manufacturing that essentially is a little bit like 3-D printing. Instead of machining a piece, you add layers of the material, effectively reducing your waste to zero. They're also looking for alternatives for recycling, redesign, and substitution.

I will conclude by saying I think it is clear that there is demand for these materials. They're attached to many important sectors even for Canada, for example the automotive sector. They are very much linked to many green technologies and the green technology sector that is emerging around the world. From the perspective of the capital markets, we understand there is a race to supply. End users are looking for places around the world where they can set up infrastructure, where they can set up separation infrastructure, metal capabilities of rare earth materials, and other manufacturing capabilities associated with the rare earths.

This is a decision that they are certainly thinking about and will be making, and a number of countries have realized that. Brazil has had a number of meetings with Vale and other large mining companies, and they are looking into becoming a large producer of rare earths again. We know Russia is looking into that. We know even North Korea is looking into that.

In Canada's case, we have unique resources, with distribution skewed towards the critical elements. We have what I would call a culture and a knowledge infrastructure of mining that we can make use of to achieve the target that the network wants, which is to set up production and separation capabilities within five years. I think we have all or most of the components that other countries don't have. If the sector could have a little bit more support from the government, as we have seen in other parts of the world, that would be ideal to accelerate this vision.

Finally, the network will be instrumental for this, because what we have right now is individual islands of complexity—the rare earth stocks outside, the rare earth companies—and with this network we'd have a network of solutions where all the companies can come together and potentially solve many of their problems, advance the rare earth industry in Canada, and motivate end users to build the infrastructure of separation, metal-making, and so forth.

So that is the idea, and with that I conclude my remarks.

● (0910)

The Chair: Thank you, Doctor.

Professor, do you have a presentation as well?

Dr. Vladimiros Papangelakis (Professor, University of Toronto, Chemical Engineering and Applied Chemistry, As an Individual): Yes, but I think Mr. Wilson is next.

Dr. Steven Wilson: I'm going to take a spot in the middle.

The Chair: You're going to go to your own presentation now.

Go ahead, please.

Dr. Steven Wilson: Mr. Chairman, just as a time check, so that I know, I didn't notice what time we started. When do we need to be prepared to finish?

The Chair: We want to take time to hear your presentations. So if you can be finished, both of you, in roughy 10 minutes, can you do that?

Dr. Steven Wilson: I think we can do that.

The Chair: We do want time for questions. There will be lots.

Go ahead, please, sir.

Dr. Steven Wilson: I'm pleased to be able to talk to you a little bit about some of the unique processing and production challenges associated with rare earths. I'm a process engineer and a metallurgist by background. I've spent many years in the Canadian mining industry working on technology development, and more specifically on the application of technology development.

Rare earth projects, from one perspective, are like any other mine. You have to identify a resource, you have to dig the stuff out of the ground, you have to find a way to concentrate the valuable minerals and to sustainably and environmentally dispose of the material that is not in your value chain, and you have to go through and refine and purify.

Rare earths go through all of those same common steps, but the steps have to be applied a little bit differently. We're still, in many ways, at the stage where that front-end conventional mineral processing, which would be a size reduction and a physical separation, has to be developed for the unique minerals that are associated with the rare earth elements in their atomic matrixes. That's the kind of conventional development that a mining company would have to go through to produce a concentrate of some kind that could be further purified and refined.

The challenge in rare earths, as I know you have heard, is that after you get to that primary concentration of minerals, the challenge is that you don't actually have a rare earth mineral yet, you have a mineral that has a little atomic component of rare earths that then has to be separated by a process called hydrometallurgy. Dr. Papangelakis is going to talk a little bit more about some of those details.

Even after that, in rare earths you have a challenge because the testing that's required to do that hydrometallurgical flow sheet development, and then the actual separation and production of metals, still requires a sufficient sample to be able to test. What that means is that instead of having a couple of kilograms of sample that you might get from a drill core for a copper mine, or a gold mine, or a nickel mine, you have to take hundreds and hundreds of kilograms of material so that you can get a kilogram of concentrate to do the next testing. What that means is for the producers and for the potential operators of these projects, the development costs might be an order of magnitude larger than they would be for a conventional base metal or precious metal mine.

As we look at those things, specifically in those separation technologies, it's that production of an intermediate concentrate, which you can do further testing and development on, that creates the unique challenge to rare earth elements. Then as you do that test work, each of those heavy and light rare earths are very close on the periodic table and they are very difficult to separate. The final separation and refining stage is tremendously more complicated or complex than a typical gold mine might be, where you're just smelting and pouring off a doré bar.

As I mentioned earlier, Canada has some tremendous leadership in expertise around that science and technology and about applying those technologies into the mining industry. We are uniquely placed in the world, with some competition in South Africa, some competition in Australia, around being able to deliver those services effectively.

Similarly, on the environmental side, we have challenges around the often radioactive nature of minerals associated with the rare earths. There is an effective treatment requirement for uranium, for thorium, for some of the aluminiums that are associated with rare earth deposits. There are challenges there and issues around developing and understanding the toxicity. We have some significant efforts still to go through to be sure that we can produce these metals in an environmentally sustainable and appropriate manner.

The metal production piece, as I mentioned, the difficulty in that final separation and producing something that's available for your customer, is really the key to realizing the overall economic benefit to the industry in Canada.

● (0915)

There are no rare earth refining facilities in Canada, and no real research or development facilities to do that last step in the development process. Most of our Canadian companies are forced to go to Mintek in South Africa or to ANSTO to be able to find that capacity at the moment. Part of the objective of the network is to be able to pull some of that together effectively to be able to deliver those things where we have experience and expertise, to be able to provide an infrastructure and a joint capability to deliver that final stage of the process.

In the short term, our objectives are to look at very focused, industry-driven project work that will apply existing technologies that will get us to that early stage production with what we know now. But the longer-term need that we have as an industry is actually to develop better technologies, to develop more appropriate solutions, and to focus on the downstream opportunities there.

There are conversations in the marketplace about substitutions. At the same time, we have an opportunity as an industry in Canada to develop new applications and to look for new opportunities to take advantage of those things. As I mentioned earlier, the long-term true benefit to our science and technology community is the development of those highly qualified persons who are capable of carrying the industry forward to the next generation.

Dr. Papangelakis.

● (0920)

Dr. Vladimiros Papangelakis: First of all, thank you for the opportunity and the privilege to be here with you to present a few things about the academic and research community in the country.

I would like to emphasize that chemistry, by means of hydrometallurgical technology, is key to the processing and separation of rare earths. I'm sure many of you already know this, but I want to reiterate that hydrometallurgy involves water chemistry. Basically, we selectively dissolve metals—in this particular case, rare earth metals—that exist at a fraction of a per cent by weight in the raw material, in the ore. We try to do that as selectively as possible, put them into a water phase, and then continue with chemistry.

We reject the impurities on the wanted metals, and then separate this multitude of 18 elements from the aqueous phase into separate streams, into as pure a form as possible in order to produce pure rare earth compounds or pure rare earth metals. Chemical processing and treatment are both crucial to achieving these objectives.

Here in Canada we are fortunate to already have a critical mass among researchers and academics, throughout the country from coast to coast, in metallurgical technology. This has to do with Canada being traditionally, for a number of years, at the frontier of developing new technology for the metals industry.

The cost of doing research in Canada as compared with other countries, particularly the United States and the European Union, is much lower. I think this is an advantage for us, because it helps industry engage in university research at a lower cost than in other research-intensive countries, such as, again, the United States and the European Union.

Mineral processing and separation, extractive metallurgy, hydrometallurgy, chemical engineering, design—all of this expertise exists in Canadian universities. I have to make a comment here that in the last 15 years, because of the acquisition of several major Canadian producers by international companies, this activity has somewhat diminished. It's taking place mainly with only the few still remaining truly Canadian companies. Nevertheless, this critical mass exists, is there, and is ready to engage in collaborative research with industry.

The rare earth industry, because it's an industry in its infancy and is not a producing industry. Right now it does not have sufficient cash, like the big metal producers do, to directly support university research—i.e., as Barrick or Inco in the past, Vale, and Xstrata, previously Falconbridge, used to do. One of the reasons we are here today is to emphasize the need for Canada to develop some sort of national policy on the rare earth industry that would help academics not only attract new talent and students, because of the importance that will be evident out of this initiative, but also develop at the same time the resources to pursue focused research in Canadian universities.

It has happened in the United States. For example, President Obama declared, I think two years ago, that the development of the rare earth industry in the United States was a national priority. There is a precedent there. It would be nice if we could have something similar here in Canada.

We have a lot of models in Canada that already support university research. I'm sure you're aware of NSERC, the Natural Sciences and Engineering Research Council, which provides support. It has a number of university-industry collaborative grants. This can be a vehicle for supporting and funding university research in this area.

● (0925)

Provincial research programs, I refer to the Ontario Centres of Excellence in Ontario, this is something that I am most familiar with. Mitacs, another national organization based in Vancouver, British Columbia, is providing support to graduate students and post-doctoral fellows. Canada Foundation for Innovation, CFI, is providing infrastructure support.

So the universities are well adapted to engage in the short term and longer term, as Mr. Wilson explained, to solve problems that will enable the industry to jump-start and be closer and faster to production, and also engage in longer-term, more thorough, science-based, innovation-focused research to push the industry forward. There are a number of models, successful examples. I think it is straightforward if the resources are there for us to do it.

In closing, in our presentation you will find a collage of a various academic institutions from coast to coast. This is not an all-inclusive list. These are universities where activity is already taking place but is uncoordinated, I would say, at this point. CREEN is planning to organize a workshop here in Ottawa in about a month to bring academics from the industry and industry representatives together in the same room. I think this will be housed at CANMET here in Ottawa to discuss projects of common interest among the industry in order to improve efficiencies and push forward the research in Canada as efficiently as possible.

I would like to thank you for your attention and if you have any questions I would be happy to respond.

The Chair: Thank you very much, professor.

Thank you to all of you for your presentations.

We will get directly to questions and comments by members starting with the government side.

Mr. Leef, up to seven minutes, go ahead please, sir.

Mr. Ryan Leef (Yukon, CPC): Thank you, Mr. Chair.

Thank you to all of our witnesses today. You touched a little bit briefly on what some of the other countries are doing. Whoever is prepared to answer this question, I'll leave it open.

What is the rate that other countries are developing in this industry in comparison to the rate Canada is developing it?

Dr. Luisa Moreno: By rate, do you mean speed?

Mr. Ryan Leef: Yes, speed and efficiency....

Dr. Luisa Moreno: For instance, in Brazil they have actually put out a white paper. I believe the government has approached at one point, Vale, which is one of the largest mining companies, to investigate potentially the production to develop separation technology. Another company in Brazil, which is CBMM, has announced that they have invested $50 million in trying to separate rare earths as well. As you know CBMM is the largest producer in the world of niobium. Brazil accounts for about 85% of niobium production and niobium has been identified by EU officials as one of the top five critical materials. So that is an example of what is going on there.

Russia is a little bit less transparent. They have produced rare earths in the past. We have seen some press releases of large business individuals that are investing in the country to develop separation technologies and the government is supporting that.

In North Korea, it's even less transparent, but they have said apparently they have found a large deposit. We don't know how much they have done. I don't think it is of great concern personally, but it is interesting that a number of countries are realizing that.

● (0930)

Mr. Ryan Leef: You mentioned that—

Dr. Vladimiros Papangelakis: I just wanted to add, as mentioned by Ms. Luisa, $120 million has been invested by the Department of Energy in the United States to create the Critical Materials Institute. I'm aware of something similar, although I don't know the exact magnitude of funding, in the European Union. The European Commission in Brussels has funded the creation of a European network, industry-academia, to pursue rare earth metal development within the European Union.

Mr. Ryan Leef: You said that there's a race to supply going on. Considering that, and considering that the rough projection right now is that Canada has 50% of the rare earths outside of China, what does it do...? Is Canada in that big of a crunch? I guess what I'm trying to ask is this. You have other countries that have much smaller resources for rare earths. I can see them being in a real race to get to that first before Canada really exposes the market, but does that put us in a position where we really need to race to get to this? If we're not part of that race and we don't beat everybody to the punch, so to speak, what does that do to our industry? How does that impact us in the longer term, considering we do still have about 50% of the resources?

Dr. Luisa Moreno: What does that do? I'll start with the second part of your question. Canada will continue to be dependent, basically buying these elements for automotive manufacturing as well as green technology, as it emerges.

But what is happening most importantly and what I tried to indicate is that there is a willingness to develop infrastructure outside China, to separate these elements, and to build the supply chain outside China. In the next few years, that will be happening, whether it's in the United States, Brazil, or Russia. It will happen, and I think Canada should start pushing to get into that race so that they attract the funding necessary for that.

Dr. Steven Wilson: If I may, think of this in the traditional metals supply-and-demand cycle. As the Chinese exports decreased, metal prices spiked, and interest in the technology went through the roof. That has all kind of moderated a little bit within the last year or two, but I believe that there is a very real race to be in that early-stage production. As it becomes obvious that companies outside of China are going to be successful producing these materials, the prices will start to tailor back, and the opportunity to develop an economic investment or a hugely successful economic investment in the country will be delayed many years and will respond, as it is delayed, with a much thinner margin and a much tougher success rate.

I think we have the need to exploit the fact that we have the resources and we have the skills. You asked about the speed with which other companies are developing. The reality is that most of those companies outside of China are actually coming to Canada for the early-stage process development already. We need to be positioned to take the back-end process development effectively and to focus on some of our local project opportunities to truly win the marketplace there.

Mr. Ryan Leef: Mr. Wilson, in your first presentation you talked about the training requirements for your highly qualified field—

Dr. Steven Wilson: Persons—

Mr. Ryan Leef: You did outline quite a complex chain to even get to identifying your rare earths and then, of course, we have the mining side, the production side, and the distribution side.

In your mind, where is the focus required in the training aspect? What would the investment look like? What would the training look like, and is there something right now that the Government of Canada is doing or that industry is doing already that's meeting some of those needs?

● (0935)

Dr. Steven Wilson: Certainly some of those needs are being met, and Dr. Papangelakis may have some comments as well, just because of the interactions with universities. In the conventional mining space, Canada is already very good at supporting the development of mining engineers and of metallurgical process engineers and scientists who are doing those things.

We have the technical skills and the capabilities to understand and to do the back-end piece. Part of what really is missing is the combination of industry project work, as Vlad talked about, because many of these companies are still potential producers, not actual producers. They're in an environment where they have capital constraints and fairly significant cashflow restrictions. So they're not in a place where they have an economic opportunity to fund upfront research or to get into the really long-term development opportunities. That's an area where we could as a government add some support and some access through organizations like NSERC or the CFI to continue to develop those areas of expertise.

The Chair: Thank you for your answers, and thank you, Mr. Leef.

We go now to the official opposition, to Mr. Gravelle, for up to seven minutes. Go ahead, please.

Mr. Claude Gravelle (Nickel Belt, NDP): Thank you, Mr. Chair, and thank you to the witnesses.

I have many questions. I'm going to try to do it as quickly as I can.

We heard from the Department of Natural Resources when they were here that the further we go in the separation process, the more it adds value-added jobs. Can most of the grinding, milling, and smelting, the whole process be done in Canada? If it can or if it could, what would be the potential value-added jobs for Canada?

Dr. Steven Wilson: The answer to the first part of your question is yes. Certainly the science, the technology, and the infrastructure exists to do all of those front-end processing steps inside of Canada now.

I do not have a good feel for the number of staff that would represent or the number of associated jobs.

I don't know, Luisa, if that's something you could speak to.

Dr. Luisa Moreno: I think as you go down the supply chain, and you start actually producing magnets and parts that go into automotives and so forth, there is an increase in the number of jobs.

I believe REITA, which is a rare earth association, is currently doing a study. We actually had a slide that had to be taken out because the study has not been published.

The estimates we have are in the hundreds of thousands of potential jobs being associated to the various industries that use rare earth metals. If our forecasts are correct the demand for rare earths is going to increase because there's going to be an increased demand for not just the green technologies but a demand for cars as well in emerging markets and other technologies.

I think if Canada can produce these elements for national consumption as well as for exports there will be more jobs, but we don't have the exact numbers. Hopefully when REITA puts the report out, you will be able to have access to that. But the indication again is that those numbers are higher as you go—and you're correct—down the supply chain.

Mr. Claude Gravelle: So there's a potential for I think I heard you say hundreds of thousands of jobs if this is....

Dr. Luisa Moreno: If we actually are able to attract, again, the infrastructure that needs to be built to be able to separate these elements to produce metals, to produce the parts and so forth.... It's basically to do what China did in the last few years, which is they made it harder and harder to export the rare earths, and they attracted a number of....

Mr. Claude Gravelle: How important is it to create a Canadian rare earth alliance?

● (0940)

Dr. Luisa Moreno: From the technical perspective, I think it's very important, because like I said, many companies are working as individual, isolated islands, and spending millions of dollars trying to develop technologies. Some of them are very similar.

When you talk about separation, or the refining of purity of elements, maybe you can comment on that.

Dr. Vladimiros Papangelakis: Sure. The difference among the companies is due to the fact that each one is dealing with a different mineral deposit. So the front end is different for every company; that is, how you do the chemistry to put these rare earth elements into the solution.

But once you put them into the solution through the so-called leaching process, then the separation is common for all these companies. I'm aware of some discussions about the creation of a toll refinery where all companies put their rare earth solutions into a centralized facility. The facility is doing the separation for everybody and returning back the equivalent benefits depending on the amount of inputs going into the centralized facility.

But again my sense is that there is competition among companies. Each one is working independently. It is very important. That's why CREEN has been developed to bring all these companies together, identify technology issues that are common to all of them, and discuss with universities to identify, as a consequence, a common research project to help universities and private laboratories develop the common technology needed to address this for the sake of efficiency and speed rather than each one of these companies working on their own, in which case they don't have the resources anyway to complete the job.

Mr. Claude Gravelle: So how advanced is CREEN in bringing these companies together? Are we getting close?

Dr. Vladimiros Papangelakis: It's unfortunate that Ian London is not with us today to speak about that, because he has been the workforce in bringing CREEN members together.

CREEN does have a number of companies. Not every company but at least the companies that are at the most advanced production stage are members of CREEN, and there have been coordinating discussions. What is missing as the next step is for CREEN to catalyze the definition of common science projects for the universities to embark on. This is the next step that CREEN is planning to do. As I mentioned, CREEN will host a workshop here in Ottawa to sort this out, hopefully by the end of next month.

Mr. Claude Gravelle: I believe I heard Dr. Moreno say that other governments are supporting rare earths development in their own countries. How is the Canadian government helping the development of rare earths in Canada or are they investing at all in rare earths?

Dr. Luisa Moreno: I'm embarrassed to say that I don't know.

Can you help?

Dr. Steven Wilson: I think at this point the answer is that we are just at the stage inside of CREEN where we are trying to decide what the ask should be and how we could provide an appropriate invitation to government to participate. Those conversations have started to happen, but we're not at the point where we've identified something. Certainly in some other countries governments have responded sooner, but we have tremendous opportunity here to move forward.

The Chair: Thank you, Monsieur Gravelle.

Mr. Regan, you have up to five minutes. Go ahead, please.

Hon. Geoff Regan (Halifax West, Lib.): Thank you, Mr. Chairman.

Thank you to the witnesses for joining us today.

I'm sorry Mr. London couldn't be with us. I had the pleasure of meeting with him in Toronto a few months ago. After talking to him, I understand that, in terms of the importance of this industry and the potential for this industry in Canada and the impact of rare earth minerals on industry in Canada, rare earth chemistry and the products that come from that support something like $31 billion in economic output in this country and that the companies that do this employ nearly 84,000 people with a payroll of $4.2 billion.

So I would have liked to see something in the budget of the Government of Canada showing a little more support for the development of this sector. You've talked already about the kinds of products that are made from and that rely on these minerals, and if in fact we don't have access to these minerals, the problems are obvious.

Ms. Moreno, you said you'd like to see the government do more. What would you recommend the government do? What policies should it implement to help the sector develop and what should the government avoid?

I'd also like Mr. Wilson to comment on that.

Ms. Moreno.

● (0945)

Dr. Luisa Moreno: I think the professor indicated that it is important for the government to make this public, even if they didn't necessarily support them. If the Minister of Natural Resources or the Prime Minister were to acknowledge that rare earths are important and critical as well as strategic elements and that Canada has these elements, and if they were to watch them and find ways to study them to help in the future, I think that would be good. I think the capital markets would receive that well and the potential partners of Canadian institutions that are developing these elements would receive that well also.

In terms of policies, there are many. For instance, in the U.S., there has been a focus on the fast-track permitting process for mining companies. So maybe we could revisit that, in the case of those projects that are not as advanced.

Again, having a budget that could support R and D and support investments in manufacturing of products that use rare earths would be very positive to promote the rare earth industry in Canada.

Hon. Geoff Regan: Anything to add to that, Mr. Wilson?

Dr. Steven Wilson: You asked about supporting and avoiding. I agree with Ms. Moreno's comments about policy and the confidence that would come from statements of interest and statements of importance. There is always an opportunity to look for funding, but I will confess that at this point it's not obvious what that funding would look like or how it would look. That goes back to Mr. Gravel's question, where we're still really trying to work on models that would be effective, that we could propose to government to engage industry.

The only avoids that I could offer at these early stages would be to try to facilitate without taking over the industry. I think the industry needs to continue to be led by the industry partners and by the drivers that are going to have to own the production and own the facilities. The risk is that we might get too aggressive in government involvement. That would be the only caution that I would offer at this point.

Thank you.

Hon. Geoff Regan: Professor Papangelakis, in terms of the byproducts and wastes that are involved in mining and processing rare earth elements, my understanding is that thorium, which normally is produced in that process, is radioactive. Although it has a considerably shorter half-life than, say, uranium, it's still a challenge and an issue.

How much of a problem is it for the development of processing facilities here in Canada, and what research and development is being done to address this challenge?

Dr. Vladimiros Papangelakis: Thank you, Mr. Chair.

First of all, thorium is not an issue for all Canadian development. Thorium is not an element that shows up necessarily with every single rare earth mineral deposit. It occurs with some, not with others.

I am personally not aware of any systematic research that has been done to address the thorium stability issue in tailings. This is something that definitely has to be part of the research priorities.

But in Canada, we have a lot of experience from the uranium mining in Saskatchewan, and dealing with the radioactive tailings. Again, I am not an expert in this area, but I would say in Saskatchewan the management of the uranium tailings should meet the environmental requirement.

● (0950)

Hon. Geoff Regan: Professor, you talked about the materials research institute in the U.S. I have forgotten the exact name of it—

Dr. Vladimiros Papangelakis: Critical Materials Institute.

Hon. Geoff Regan: Thank you.

As well as the European Union investing in research.... Obviously, those are two entities that are much larger than Canada, much larger economies and populations. If Canada's government were to invest in this area, does it make sense to focus on a particular aspect, or does it make sense to try to arrange some cooperation with either the American institute or the European? To what degree should we be doing this entirely on our own?

Dr. Vladimiros Papangelakis: First of all, cooperation already exists in the form of the exchange of technological ideas and each party being aware, more or less, of what the other party is doing. What is missing, in my mind, is an investment that will enable Canada to develop its own in-house technology that is adapted to the types of minerals we have here in Canada because every location has different needs. For example, in the United States, Mountain Pass in California is the major source of rare earth production, although this mine has low grades in heavy rare earth elements.

In the European Union, on the other hand, the main focus is on recycling because it's a huge population and there is a lot of electronic scrap moving around and they are looking at recovery by recycling.

In Canada we have unique deposits. We need to be able to develop technology that is well adapted and suited to these types of deposits.

The way funding for industry-focused and oriented research works here in Canada is NSERC, which is the major funding agency for research in engineering in Canada and is leveraging, for every dollar the industry contributes, about one and a half dollars as a contribution toward research. Given the nature of these companies being in their infancy and not being in production, and therefore not having the cash—compared to other companies that are at the production level—to support research, it makes it a little bit difficult.

This is where the government may allocate or define some priority areas within NSERC, for example, and there are precedents. It has happened in biomedical technologies. It has happened in the past that priority funding has been allocated so that leveraging is not $1.50 to $1 but perhaps $2.50 or $3.50 for a short period of time until we move the technology to a level that will enable the industry to develop and flourish on its own.

The Chair: Thank you.

Thank you, Mr. Regan.

We go now to the five-minute round, starting with Ms. Block, Ms. Crockatt, and then Mr. Julian.

Go ahead, please, Ms. Block.

Mrs. Kelly Block (Saskatoon—Rosetown—Biggar, CPC): Thank you very much, Mr. Chair.

I want to thank our witnesses for being here today.

This is an incredibly interesting study that we have embarked on, and even though it's going to be a short one, I know that we will be left with much to contemplate and consider going forward.

I just want to highlight a few things I heard, and then ask for clarification on two things that I understand about this industry. The first is that we have many potential producers but not actual producers. The second is that every company is dealing with unique or different mineral deposits, and also that these are islands of complexity and that there is a willingness to build the supply chain.

Tying all those things together, it's my understanding—and this is where I need clarification—that there really needs to be a high level of certainty at the front end of the supply chain for a mining company that the deposits they are preparing to drill for actually will yield what they are hoping will be yielded.

The second is that the rare earth elements industry is actually one industry where the complete supply chain, including the value-added pieces, needs to be in place for economic benefits to be realized. It's not that a company can just focus on mining the mineral itself but that we need to see that whole supply chain and value-added piece in place.

I'll throw that out to anyone who would like to answer that or clarify that for me.

● (0955)

The Chair: Go ahead, Mr. Wilson.

Dr. Steven Wilson: Maybe I can start. I think your understanding is good. The four points that you brought up have identified the issues and tell me you appreciate what the challenges are. The conversation about knowing that you can sell your product is a common one throughout the mining industry. Whether that product is a concentrate, a partially refined concentrate, or a finished metal, there is always a requirement in the legislation, in fact, at this point to be able to go forward with a reserve or with a resource calculation, to be able to know that you have an off-take opportunity.

There is certainly more risk around that off-take at the moment in the rare earth industry because there aren't obvious candidates for intermediate products. There aren't refiners in North America who could take something easily and turn it into something that they could market.

Some of the end users are developing their own refining stages, and they're engaged in the early conversations with CREEN to help the producers understand where that trade-off is. There is always a need to be sure that you've defined where you're going to stop and where the additional value comes.

There is great value in getting to where you have a rare earth oxide concentrate. We believe there is greater value in going to those next truly value-added stages in this industry because they don't exist in other places. It's not a commodity business yet, like it is in many of the other metals.

Mrs. Kelly Block: Do I have any time?

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

Mrs. Kelly Block: Then I will follow up on the question that my colleague opposite asked in terms of what the Canadian government has done and on your response that you haven't actually formulated an ask, that this industry is still trying to come together to bring those islands of complexity together and to figure out what in fact you might want or need from the Canadian government. I know you've flagged an overarching statement that this is important.

I just want to hear a little bit more about where you're at in terms of being able to communicate something to the Canadian government.

Dr. Steven Wilson: We have had a couple of preliminary conversations with the minister and with some of the minister's aides around this. The challenge, as Dr. Papangelakis identified, in some cases is to find a model that is effective for industry and effective for government. Where NSERC has been very effective in our traditional base metal well-established areas, it is not clear that it will be as effective in this emerging technology space.

We're fairly close to being ready to come back with an additional conversation. We had enough of a preliminary discussion with the minister that we were watching the budget carefully just to see if anything showed up. I would say that within months we would be in a place where we could be back with a more structured request.

The Chair: Thank you, Ms. Block.

Ms. Crockatt, for up to five minutes. Go ahead, please.

Ms. Joan Crockatt (Calgary Centre, CPC): Thank you very much.

Thank you very much for coming. It's always fascinating to hear the different perspectives that our witnesses bring in today. This has been great.

I'm just wondering if I can go back to some basics. How many players are there in Canada? How many different companies are working on rare earths, significantly?

Dr. Steven Wilson: It's not a big number, six or eight.

There are a number of smaller places, people who are looking and doing things, but in the major deposits, major opportunities, call it 19 projects spread out among fewer than a dozen.

● (1000)

Ms. Joan Crockatt: That's fine. It's not that you need to come in with a big number.

Dr. Steven Wilson: Yes.

Ms. Joan Crockatt: I'm just trying to get a little bit of a handle on this.

Maybe I could ask Ms. Moreno....

Is it Ms. or is it Doctor?

Dr. Luisa Moreno: Doctor.

Ms. Joan Crockatt: Why haven't we seen more interest from the capital markets if Canada has 50% of the supply of rare earths?

Dr. Luisa Moreno: I think the capital markets have realized that it is complex to extract some of these elements. Over the years some of these companies have delayed their feasibility studies, and the results have perhaps not been as expected, particularly as some capital costs have been higher than originally anticipated, and costs as well. But I think stocks are significantly down, because as I alluded to earlier, there has been a significant slowdown in the commodity space. I'm sure you have experienced that as well. That has affected many of the asset management funds. Some have closed down, others have consolidated. As well, there is less funding available for a sector that in the stock market has performed poorly.

Dr. Steven Wilson: If I may, the Canadian industry, because it is so dependent on the resource sector to begin with, is very sensitive to the overall health of the resource market, and the last two years have been a significant challenge in mining and metals. So I think that has drifted into what may still be a very attractive opportunity in the rare earth metals, but there's a general uncertainty and discomfort with the mining space in the last 24 months.

Ms. Joan Crockatt: So prices are low right now?

Dr. Steven Wilson: Generally.

Ms. Joan Crockatt: Now, this is the quintessential natural resources story, right? It reminds me so much of the oil sands. We have MPs here from Saskatchewan who are really familiar with the uranium industry, etc. At the beginning it's always tough, but I'm wondering if at some point we would be irresponsible if we didn't say we need to see some kind of economic study that shows this would actually be of benefit and what kinds of economic benefits we might realistically be able to see from this industry to know how excited we should be getting about it. Right?

We hear a lot of people come in with great ideas in the formation stages. We know that getting financing at the beginning is going to be difficult, so often industries will come to government. I think that's the piece that we would look for. Is this industry going to be economically viable, and do we have some hard statistics?

Is that the kind of study you're talking about right now?

Dr. Luisa Moreno: Part of what we do is look at the economics of the project to reach a stock price, and obviously, the price of rare earths is an important input in the evaluation, as well as capital costs and operating costs and so forth. From the mining perspective, assuming that these companies are able to secure off-take agreements and sell these products, I could say from my analysis that they are economic. Some of them are very economic.

There are two components here. Obviously, being economic is very important, but also there is recognition that there is a strategic component to these elements. If they were not strategic, I think the United States, the EU, and Japan would not have gone to the World Trade Organization to file a lawsuit against China. They are extremely important for the technology we use at present, and going forward as well.

The Chair: Thank you, Ms. Crockatt.

We have Mr. Julian next, followed by Mr. Trost, then Mr. Bevington.

Go ahead please, Mr. Julian.

● (1005)

Mr. Peter Julian (Burnaby—New Westminster, NDP): Thanks to our witnesses. This has been very interesting testimony that will be very useful for us for our study.

I wanted to start by coming back to the issue of where we would be in 2018. If we look at that 20% market share that the network is looking at obtaining, what kinds of investments would be needed to attain that market share? If we're looking at 20% of rare earth metals around the world, what would the worth be in terms of production? What is Canada's current level of consumption of rare earths? We've talked about the manufacturing industry, but I'm interested in knowing what we currently use in our industries across the country.

Those are the first three questions to start things off.

Dr. Luisa Moreno: In terms of consumption, I don't know exact numbers. We know most rare earth products are produced in Asia—China and Japan. Canada is buying finished products. There is a need to study and understand how much rare earths is included in some of the products we consume.

I think in cars it's been quite understood and then I guess it's a question of understanding how much we consume in cars and then other things, wind turbines and so forth. That is a way of understanding how much the Canadian economy is exposed to rare earths in tonnes.

I'm fairly sure we purchase rare earth compounds. I know of one company that produces fluorescent lights, which use rare earth compounds, europium and so forth, but I'm not sure there is a comprehensive study around that.

What was your other question?

Mr. Peter Julian: It was about investment and the worth in terms of production, if we're looking at 20% market share by 2018.

Dr. Luisa Moreno: One way of estimating investments is that we could look at the feasibility studies of various companies—

Dr. Steven Wilson: Sure.

Dr. Luisa Moreno: —at least of those that are more advanced. Two companies—and please correct me if I'm wrong—have completed a feasibility study and that would be Avalon Rare Metals and Matamec Explorations in Quebec. I'd better get these right. I believe Avalon's capex, which includes infrastructure and so forth, is about $1.5 billion. Matamec is a smaller project. Its capex is estimated at $350 million right now, I believe. I should know that because I cover both companies. Then you have others at the pre-feasibility stage and until they complete their feasibility we don't know for certain. Even after they complete the feasibility study, capex usually expands a little as well.

Dr. Steven Wilson: Unfortunately, I'm not sure we have the details of what each of those would produce in terms of how many you would need to make up a 20% market share. Ian could have provided that information, or we may be able to come back to you with it if you would like.

Mr. Peter Julian: I certainly think the committee would appreciate any additional studies that you're aware of that you could pass on to us. I think that would be helpful for our study.

Thank you.

I'll go on to Mr. Papangelakis. You mentioned U.S. policy and how the U.S. has put in place a policy with the rare earth compounds that's been successful in starting to develop rare earth industries. Could you give us some more details about how the U.S. has approached this question? I assume that would offer some advice on how Canada should move forward as well.

● (1010)

Dr. Vladimiros Papangelakis: From my limited exposure, first they initiated a study that resulted in prioritizing what the most critical metals are to ensure an adequate supply to grow the energy sector in the United States into the green era, low carbon emissions. This is when the rare earth elements were identified, particularly the heavy rare earth elements, which possess the higher risk, were identified as the most critical to supplying the future development of green energy technology. Once this study was completed—and there was a similar study in the European Union after it that ended up with more or less the same conclusions—the United States launched a competition within United States research groups about how they could involve academia, industry, and government, bundled together spontaneously, to handle the problem of developing domestic resources for rare earth production, and at the same time, look at replacing technologies for rare earth elements in an effort to reduce the dependency of the United States on China's exports and reliance on rare earth elements.

The budget allocated was $120 million over five years. I was involved in this review process, that's why I have some additional information. There were a number of groups within the U.S. that were formed, completed, and finally, one group was awarded—the Critical Materials Institute based at Ames Laboratory in the United States. This involves three to five universities, five companies, and Ames Laboratory, which is government funded in the United States. This is how the Critical Materials Institute was created.

The Chair: Thank you, doctor. Thank you, Mr. Julian.

We now go to Mr. Trost, followed by Mr. Bevington.

Thank you.

Mr. Brad Trost: Thank you, Mr. Chair.

In our couple of sessions here, listening to witnesses, I've come to understand that there are two types of risk in dealing with the rare earth industry. One is the technological, particularly the processing aspects. The other, and one of the reasons that is driving interest, is the geostrategic, the political, because this market tends to be so dominated by one supplier. One of the difficulties with that supplier —and we saw this with how the markets reacted to some of their export data the other day—is that their numbers are sometimes questioned by people on the outside as being unreliable.

My first question would be to Dr. Moreno. How certain can we be about what China's doing and why they're doing it? China has its own problems with some of these minerals being sold through the black market. How reliable are their figures? How do we really understand what their strategy is? What's the possibility that, when the Canadian industry gets up and running, all of a sudden the China Geological Survey announces that they have a really cheap, low deposit, and are just going to flood the market and wipe us out?

Talk to me a little bit about some of the difficulties in understanding China, its position, and how it affects how everyone else, like Japan, Canada, etc., is making their decisions.

Dr. Luisa Moreno: I think it's very hard to anticipate what China is going to do next, and that is the position that manufacturing economies like Japan and Germany and others are facing right now. Those that are dependent on critical materials from China are thinking exactly that. It's very hard to understand where China is going to be next in terms of their policies with these critical materials that they control. They control rare earths, but they also control the supply of graphite, antimony, indium, and many other strategic materials.

So I think there's an interest in being more independent from China. What needs to be done, and I think CREEN is trying to do that, is to involve downstream players, so we have GE as part of the steering committee, and I know from contacts with other large companies that there is an interest in securing the supply. So what I believe will happen is that when new mines actually come into production—because there's a lot of talk about finding new deposits, and we have found many deposits—developing these projects will be complex.

So you asked, what if tomorrow China comes in with a new deposit? It's possible, and then they have to develop it. Then they have to crack it, they have to separate it, and do all these things that everybody is facing. If it was that easy, they obviously wouldn't be decreasing the quotas the way they are doing and trying to restrict the supply of the less common elements.

So I think it will be difficult for China to come up with a brand new source of the heavy rare earths, for instance.

● (1015)

Mr. Brad Trost: Before my time elapses here, how then is the industry in Canada, Australia, the United States, and some of these other countries coordinating with the more manufacturing-based centres in Germany and Japan? How is that tie-in? Is that just through large multinationals like GE, ones like that? Or are there industry associations from the manufacturing side working cooperatively with organizations like what you're representing today and similar organizations in Australia? How are manufacturing and mining working together? Is there anything the government needs to do to be involved in that?

Dr. Luisa Moreno: In Europe there's an institution called, I think, Resource Alliance. I don't know if you're familiar with that group, Professor, but essentially it's a German group. ThyssenKrupp, I believe, is part of it, and Siemens, Bosch, and a number of other large manufacturing companies. The strategy is to secure critical materials.

To answer your question, we have KORES, Korea Resources, basically looking at critical metal deposits and bringing together industry—Samsung and others. In Japan you have JOGMEC.

So there are institutions around the world, some semi-governmental, that other independents such as Resource Alliance...I'm not sure if they have government support, but it's very industry-focused. But again, these are large companies with better cash positions than the emerging mining companies we have now. So there is an effort to do that, and that is the solution. If these companies want to secure these metals, I think they realize they have to make investments. Toyota Tsusho made an investment in Matamec, and I can tell you that I've met a number of them who are very interested, but again there is a technology risk that they don't really understand. Many of these companies are not mining companies, so I think they will need institutions like CREEN.

The Chair: Go ahead, Dr. Wilson, if you'd like to add to that.

Dr. Steven Wilson: Yes, very quickly.

You asked about where government can contribute to that. I think government's opportunity to contribute in that area is just in the overall support of the industry. I think we have to rely on the industry players and the manufacturers to get together and to partner where they need to partner. They will find the right way to do that. Part of how they are.... You asked about the risk in China and the risks of what might happen there. I think the best indication of that, as Dr. Moreno said, is that they're going to still have those same development challenges and the same development issues.

The willingness, even at the early stage of these unproven projects, of the manufacturers to get engaged I think is the biggest measure of how they are interpreting the risk of what you talked about; that is, they don't see it as a tremendous threat to the industry. They're looking to secure production. They're looking to forward-buy from properties that aren't even operating yet in order to know that they will be in a secure place, or they're actually buying ownership stakes in the producing companies to secure their own supply chain.

● (1020)

The Chair: Thank you.

Thank you, Mr. Trost.

We'll go now to Mr. Bevington for up to five minutes.

Mr. Dennis Bevington (Western Arctic, NDP): Thanks, Mr. Chair.

Thank you, witnesses. It's been an interesting time.

I come from the Northwest Territories, so I've been engaged with Avalon for many years on this. That project has gone through environmental assessment now, not only the feasibility but environmental assessment, so it's probably one of the more advanced projects—

Dr. Steven Wilson: Very close.

Mr. Dennis Bevington: Yes. This whole issue of the processing is certainly something that's bedevilling that company as well. I think you probably agree there.

Dr. Steven Wilson: Let me just say yes.

SGS has done a lot of their work. They've spent a lot of time and a lot of energy to get to solutions.

Mr. Dennis Bevington: Yes. They've talked about a number of things. Of course, they're still talking about mining and milling in the Northwest Territories, but now it's their hydrometallurgy. They're looking at perhaps moving that out of the Northwest Territories because they need to move it to a supply of sulphuric acid, I believe. Is that it?

Dr. Steven Wilson: I don't know the specific details for that project. I'm sorry.

Mr. Dennis Bevington: Okay.

The other thought right now is that there are American opportunities for the separation. Are we going to miss an opportunity here if a company like that moves the separation out of this country?

Dr. Steven Wilson: I think we always miss an opportunity if companies move out of Canada.

Mr. Dennis Bevington: So there is some urgency to getting together this aspect of what you're talking about here with CREEN, to getting this organization together to provide some assurance for that secondary production to these companies that have invested in developing the mining opportunity. Is that correct?

Dr. Steven Wilson: I don't think we can make their economic decisions for them, but certainly, if there were facilities and infrastructure in place to provide what they need in Canada, we would have a much better chance of them staying—

Mr. Dennis Bevington: Well, you know, we—

Dr. Steven Wilson: —and those are imminent decisions.

Mr. Dennis Bevington: Yes. At the beginning of this process with Avalon, there were great hopes—and they encouraged those hopes—that there would even be secondary processing in our territory, but I think that's off the shelf now.

If they go ahead now with their plan to move that kind of production out of the country, would that...? Once you set up these supply and processing linkages, it's pretty hard to get out of them, I would imagine. Or is it possible that it could change in the future?

Dr. Luisa Moreno: Well, if they build infrastructure there, that will be a few hundred million dollars in investment. It would be very difficult to have it coming back to north of that border.

As for what it might do, if there actually is an increase in the future in the development of rare earth mining in Canada, when you have one separation facility there with the capability, it makes economic sense to continue the separation in that area. I think that is actually one of the topics here in terms of a rush to supply. The region that gets the investments in infrastructure for separation and downstream processes will have an advantage and might attract more funding and investment.

● (1025)

Mr. Dennis Bevington: Can the hydrometallurgy take place in Canada now quite comfortably?

Dr. Vladimiros Papangelakis: Right now the technology to separate the rare earth elements exists in China. The Chinese have worked on it for a very long time, and they have the know-how. It is not something that we can't do here in Canada as well, but it is a matter of investing in research and technology, the tweaking that is necessary on the chemistry, to be able to do this. Right now I don't think we have an established technology for how to do that in Canada. We are very close to being there, but we definitely are not there.

That is why this idea of a toll refinery is circulating, where all the companies would make their products at a centralized location in Canada that does the separation. In the absence of this facility, then companies like Avalon make plans to send their material outside.

I would like to add my own understanding on China's advantage here. We have to understand that China dominates the market because they have very easy-to-extract natural resources. It's the nature of the geology there. That's why their cost of production is extremely low. In Canada we cannot compete with the cost of production that exists in China right now. It inevitably will be more expensively here, because the rare earths are locked into more difficult minerals. However, I've been reading a number of resources —and I hope they are reliable—that call for a depletion in the next five to six years of China's easy-to-extract resources, in which case the competition around the world will be more level. Canada hopefully will be there to play a major role in the production.

The Chair: Thank you, Professor. Thank you, Mr. Bevington.

We'll go now to Mr. Calkins, followed by Mr. Julian, and Monsieur Gravelle.

Mr. Blaine Calkins (Wetaskiwin, CPC): Thank you, Chair. This is my first opportunity to participate in this study. I missed the initial meetings that we had, so I apologize if my questions today are amateur.

This is quite interesting, and I appreciate what you've said. I'm not even going to try to say your last name, sir. Can I just call you Vlad? Is that okay?

Dr. Vladimiros Papangelakis: Vlad is good.

Mr. Blaine Calkins: What you're saying is that basically China has the easy stuff to get, which is what's giving them the competitive advantage. So from a Canadian perspective...and I know this is a hard thing to ask. It's hard to know what we don't know. From a geomapping perspective, from all of this stuff that the industry has done, that the exploration has done, we know what we have but we don't know what we don't know we have.

What do we think we don't know that we have?

Mr. Ryan Leef: Well said.

Ms. Joan Crockatt: That's a good question.

The Chair: That question's out of order, because I know I didn't get it.

Anyway, go ahead please.

Dr. Vladimiros Papangelakis: I can answer like this. What we know we don't have is the type of mineral deposits that China has. We know that because these types of deposits develop only in subtropic areas around the world. I know that there are European companies looking at identifying deposits around the world that are similar to China's. They're looking in Africa, for example, or other equatorial countries.

So we don't have these easy-to-take-out rare earths. This we know.

Mr. Blaine Calkins: We have hard rocks.

Dr. Vladimiros Papangelakis: But we may have other untapped resources around the country that would increase our current knowledge on how much we can produce.

● (1030)

Mr. Blaine Calkins: There are yet-to-be-explored areas. We can predict, but it still may be better than we think it is, based on what we know today, right?

Dr. Vladimiros Papangelakis: [*Inaudible—Editor*]

Mr. Blaine Calkins: I want to touch on a regulatory component of it.

When I look at this thing that I'm not supposed to be looking at, government has a role to play in CREEN insofar as our Northern Projects Management Office or our Major Projects Management Office are concerned. Have those been helpful in any way, shape, or form in getting some of these projects going forward?

Is that too specific a question?

Dr. Luisa Moreno: I should actually just go back a little bit here. I was asked earlier what Canada has done, and I think we should acknowledge that NRCan has put together two workshops that have led to the creation of CREEN by the institutions.

In terms of direct support, individual support, to different projects, I think in the Northwest Territories maybe there has been some interaction between the local government there and Avalon and involvement of first nation groups to understand the project and so forth. I'm just not sure whether there's been any direct support.

Mr. Blaine Calkins: Fair enough.

Dr. Steven Wilson: I understand that you'll meet with some producers in the future. That would be a much better question for them.

Mr. Blaine Calkins: It would be a much better question to ask them. Fair enough.

When it comes to the regulatory environment for the current mining operations we have, my guess is that there weren't a lot of regulatory considerations when the oil sands were developed. I mean, regulations get developed synonymously with the advancement of new technologies, new mining techniques, new exploration.

Where are we insofar as current mining is concerned, whether it's nickel mining or whatever we currently do? Does that regulatory framework work well, or will it need to be adapted, modified, and expanded for rare earth elements?

Dr. Steven Wilson: I would suggest that in general, the regulatory framework that exists for the existing base metal, precious metal, and uranium mining structures will be sufficient.

Mr. Blaine Calkins: Okay.

We also talked about the competitiveness. I think today we're talking about a market window to potentially get into the game. Canada has to get into the game. That is what we're talking about here.

Given the environmental regulatory regime in Canada as compared with China, or our labour costs as compared with China or other places, or even our access to markets where the major destinations are, I would consider us to be, on at least all three of those fronts, at a competitive disadvantage. I'm not sad about the fact that we have a cleaner environment and all those things; that's a good thing.

What assurances can you give to this committee to suggest... before we as parliamentarians go through the decisions or the debates to make recommendations on spending taxpayers' dollars to invest in this? Given just these three things that I've identified, and other obstacles that might be in the way, what assurances can you provide to this committee that we should actually spend taxpayers' dollars to assist this industry?

Dr. Steven Wilson: I think it's important to balance what may be perceived as those disadvantages with the reputation that Canada has as resource producers and with the value that is placed increasingly in a global economy on being effective environmental stewards and appropriate-level employers. I think you leverage those positions against the best deposits in the world. You take advantage of the opportunity you have with the best geology, and with the experts who can exploit those resources effectively, to overcome what economically are real but relatively minor, I believe, disadvantages in the grand scheme of things.

If you look at the rest of the mining industry and the effectiveness with which Canada has competed in that arena for all the other metals that are produced here, I don't think that story changes for the rare earths.

The Chair: Thank you.

Thank you, Mr. Calkins.

We go now to the official opposition, to Mr. Julian. If there is some time left, we'll go to Mr. Gravelle.

Mr. Peter Julian: Thank you, Mr. Chair.

We'll be splitting the time evenly, so if you can cut me off after two and a half minutes, that would be great.

I'm sure you'd enjoy that.

Voices: Oh, oh!

● (1035)

The Chair: I was going to suggest that I do that right now, Mr. Julian.

Go ahead.

Mr. Peter Julian: I want to go to the issue that we haven't explored yet, and that's around social licence.

A number of us were up in the Ring of Fire area of northern Ontario last week. The companies there are very concerned. They've basically been left to themselves in terms of discussing with first nations, who are often the stewards of the areas that the mining companies are looking at. They said they feel betrayed by a process where the governments are not involved in consulting with first nations and they're not working to facilitate the social licence.

I'm wondering to what extent this has entered into your considerations. For the moment we don't seem to have that kind of leadership in the Ring of Fire, from either the provincial or the federal government, in assuring that social licence and that duty to consult with first nations. Is this something that has entered into part of your considerations as you look to what could be an extremely interesting development for Canada in the years to come?

Dr. Steven Wilson: I think, sir, that the first general look has been that most of the properties that we're considering are not significantly impacted by first nations relationships. But I think it would be inappropriate for the three of us to try to answer that question. I think that's a question again that you would need to ask of those who are engaged in those communities, on a level of developing the properties. I apologize, but I suggest you defer that to the next committee meeting.

Mr. Peter Julian: My second question is around development costs.

You mentioned, Mr. Wilson, that development costs are considerably greater than they would be for other types of mining properties.

Can you give us a sense of what the order of magnitude of the increased development costs are for rare earth developed property as compared to a more traditional mine?

Dr. Steven Wilson: Perhaps I can give you just one example.

Inside the company that I work for, we do a lot of development work, so we would traditionally be contracted to run a pilot plant, for example, for a new copper mine. The difference is that we would be able to run that entire program for something less than $1 million. The challenge that we have in a rare earth organization, or in a rare earth property, is that we need to run that million-dollar campaign on an intermediate product, not on a primary feed source. So the company might spend anywhere between $5 million and $10 million to process enough material to generate the feed for that million-dollar development campaign. From my perspective, in terms of the actual test work, and then the follow-on work for both the separating and the refining, just a very crude estimate would be 10 times.

Mr. Peter Julian: Thank you.

The Chair: Okay, Mr. Julian. Actually, you're way over time.

Mr. Gravelle, you've been cut short as a result of Mr. Julian.

Mr. Claude Gravelle: Thank you, Mr. Julian.

If you were able to ask the government something tomorrow, what would that ask be?

Dr. Steven Wilson: I think there is real value in a public endorsement for the industry and that there would be confidence garnered in the capital markets and in the producing companies as a part of that. I think the other part of that ask would be around some assisted development funding for common problem issues, whereas we mentioned earlier that these companies simply don't have a cashflow opportunity now to be able to put dollars back into that kind of technology development.

Mr. Claude Gravelle: Any idea what that amount might be? Ballpark?

Dr. Steven Wilson: I would prefer not to answer that question at this time.

Mr. Claude Gravelle: I think it was Dr. Moreno who said that foreign companies that operate in Canada are hindering the advancement of rare earths. Can you expand on that?

● (1040)

Dr. Luisa Moreno: Sorry, what did I—

Mr. Claude Gravelle: One of you said—I thought it was you—that foreign companies that operate in Canada are hindering the development of rare earths.

Dr. Steven Wilson: Maybe I can go back.

I think that was Dr. Papangelakis. The point he was making was that historically, in Canada, we have had a number of major Canadian mining companies that were very patriotic in their support for research and development efforts—the Incos, the Falconbridges of the world. What we have seen in the transition to foreign ownership is a noticeable decline in their willingness to contribute to locally funded research efforts.

The Chair: Thank you very much.

We are out of time. We'd better take a little time to talk about witnesses for the next meetings.

But I do want to thank all of you very much for the information you've given the committee here today. It's very much appreciated.

Thank you to Dr. Papangelakis. Thank you to Dr. Moreno, and thank you to Dr. Wilson. It's very much appreciated and very helpful. This is a fascinating continuation of our study.

We will suspend the committee meeting for a minute to go in camera and come back with a very short future business discussion.

[*Proceedings continues in camera*]