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• (1300)

[Translation]

The Chair (Mr. Francis Scarpaleggia (Lac-Saint-Louis, Lib.)): Good afternoon.

Welcome to this meeting of the Standing Committee on Environment and Sustainable Development, which is being held on a Friday afternoon for the first time. So this is a kind of inaugural meeting.

I would also like to welcome Mr. Trudel, who is replacing Ms. Pauzé today, as well as Gary Vidal, who is replacing Earl Dreeshen.

This is the third meeting with witnesses that we have had as part of our study on clean technologies in Canada.

I know all members of the committee are aware of the ground rules, but I would remind witnesses to keep your mike muted when not speaking. Witnesses may speak in the language of their choice. That's all I have to say from a procedural standpoint.

[English]

We have two panels today. The first panel is made up of the Association québécoise de la production d'énergie renouvelable.

[Translation]

We have Gabriel Durany, who is its president and chief executive officer.

[English]

From Carbon Infrastructure Partners Corp., we have Mr. Craig Golinowski, whom we've met before. From Efficiency Canada, we have Dr. Brendan Haley. From GHGSat Inc., we have Mr. Stéphane Germain.

Each witness will have three minutes to make opening remarks, and then we'll have some rounds of questions.

Let's start with Mr. Durany for three minutes, please.

[Translation]

Mr. Gabriel Durany (President and Chief Executive Officer, Association québécoise de la production d'énergie renouvelable): Thank you very much for welcoming me to your committee.

Three minutes is not much time so I'll try to describe briefly who we are and explain why we're interested in this study.

I am the president and chief executive officer of the Association québécoise de la production d'énergie renouvelable, or AQPER. We are an industry association representing approximately 110 businesses and our mission is to increase renewable energy generation in Quebec based on sustainable development principles. Our members are active in Quebec, of course, but also in several other regions of North America and internationally.

When we established the association's vision of the way we wanted to address the Quebec government and other renewable energy stakeholders, we based it on how we thought we could meet the climate targets set by the Quebec government for 2030. They are ambitious targets. As we noted in our brief, they include a 37.5% reduction of greenhouse gas emissions, or GHGs, from 1990, in an environment where the electricity sector is virtually decarbonized.

As I'm sure you are aware, most of the emissions we produce come from energy generation. To enable people to understand the role that increased renewable energy generation must play in these decarbonization efforts, it's important for us to rely on the techno-economic modelling commissioned by the Quebec government and then to interpret it. That means providing our comments on necessary legislative and regulatory amendments so that each of the industrial sectors we represent at AQPER can play its market role. We represent many businesses in those sectors, particularly renewable electricity, bioenergy and hydrogen. Our strategy outlines the adjustments that must be made and the work that must be done for each sector to find its market niche.

What I will say about our vision, and what might be of interest to members of the committee, is that there's no single solution to meeting our climate targets, those of either Canada or Quebec. At AQPER, we encourage a rational modelling-based approach. Efforts to improve energy efficiency go hand in hand with efforts to increase renewable energy generation. These are complementary rather than contradictory notions. That's what the models show us.

I believe I've used up the three minutes allotted to me. Thank you very much for listening. Please feel free to ask any questions you may have in the language of your choice. I will be pleased to offer my comments.

• (1305)

The Chair: Thank you, Mr. Durany.

Time will definitely be set aside for that during the period of questions.

I would also like to inform witnesses that the headsets have been tested and everything is in order.

I now give the floor to Mr. Golinowski.

[English]

Mr. Golinowski, it's nice to see you again. Please share with us your opening remarks.

Mr. Craig Golinowski (President and Managing Partner, Carbon Infrastructure Partners Corp.): Thank you, Chair. It's an honour to once again be invited to present.

I'm here to comment on the financial realities of deploying carbon capture and storage technologies in Canada. Deployment at scale requires certainty on the value of carbon.

I'd like to make three points.

First, the combined Canadian investment tax credit and carbon price framework need to be competitive with the section 45Q tax credit in the United States. Capital has a choice to make, and it can go to the United States. The recently passed Inflation Reduction Act in the United States significantly upgrades the 45Q tax credit.

Second, certainty on the value of carbon is critical in any company's evaluation of risk, which in turn drives the cost of capital. With carbon capture, a lower cost of capital, as in the utility industry, means more tonnes are captured and sequestered per dollar invested.

Third, the market is unable to underwrite political risk. That is a general proposition, so the risk that the government will change the carbon price in the future away from the scheduled increase of \$170 a tonne is a risk that the market is unable to underwrite.

Those are my opening remarks as to the importance of certainty on carbon prices.

The Chair: Thank you very much.

We'll go now to Dr. Brendan Haley from Efficiency Canada.

Go ahead, Dr. Haley.

Dr. Brendan Haley (Director, Policy Research, Efficiency Canada): Thank you very much.

What I'd like to help you think about today are the opportunities for innovation in energy savings or energy demand technologies.

Let me provide a couple of examples of problems that are being solved by energy-efficient clean technologies.

One way to deliver quicker building retrofits at scale is to manufacture insulated panels in a factory instead of installing insulation on site. These panels are being manufactured right now in Brandon, Manitoba, by a company named Greenstone.

To rightsize those panels, you need to measure building dimensions exactly. A software developer in Alberta is using drones to take pictures that go into a 3-D model to get highly accurate measurements. That's a great example of mass customization, which involves figuring out how to deal with the intricacies of each building more productively.

Digital technologies play a role. BrainBox AI is a Montreal-based company that uses artificial intelligence to adjust HVAC systems in commercial buildings to get more energy savings.

The other thing we need to do is coordinate retrofits across many buildings at once that have similar equipment replacement cycles. That coordination can provide forward guidance to manufacturers and to other solution providers to come to the market with lower-cost and more innovative solutions.

All these examples are needed because we need five to 10 times the number of building retrofits that we're doing right now to achieve net-zero emissions. Figuring out how to scale energy efficiency can be almost a Canadian version of a moon shot that will produce clean technology spinoffs, because the objective is clear. How to get there involves solving a host of problems by inviting solutions from a variety of different sectors. That coordination between those user needs and domestic solution providers is an innovation strategy that has worked well in other small-economy clean technology leaders, like Denmark.

Of course, there are also social benefits, especially if we target low-income Canadians for energy savings. I would be happy to talk about that further during questions.

To conclude, we're not going to achieve the type of scale-up we need or the clean technology opportunities that could arise by offering small incentives to retrofit one building at a time. We need a more mission-oriented approach that actively explores innovations to solve energy efficiency and building retrofit challenges.

● (1310)

The Chair: Thanks very much.

Last but not least, we have Mr. Germain from GHGSat Inc. for three minutes, please.

Mr. Stéphane Germain (President and Chief Executive Officer, GHGSat Inc.): Thank you, Mr. Chair, and thank you to the vice-chairs and members of the committee for the opportunity to appear today.

My name is Stéphane Germain. I'm the CEO of GHGSat. I'm grateful for this opportunity to provide our thoughts for the committee's study of Canadian clean technologies being utilized in Canada and globally to reduce greenhouse gas emissions and reduce harms to the environment.

GHGSat is a Canadian small business headquartered in Montreal with offices in Ottawa and Calgary, and international offices in London, England, and Houston. We have a fleet of satellites and aircraft-based sensors that monitor greenhouse gas emissions across Canada and around the world. There are currently six satellites in space, the newest three of which were launched in May. Last year alone with just three satellites, GHGSat detected a total of 143 million tonnes of carbon dioxide equivalent, and supported the mitigation of 2.3 million tonnes of carbon dioxide equivalent, which had the same climate impact as taking half a million cars off the road for a year. By the end of next year when GHGSat will have 10 satellites in space, we expect to be supporting the mitigation of more than 50 million tonnes of emissions per year.

The Government of Canada's space-based observation strategy calls for using satellites to generate solutions for climate change mitigation and adaptation, and to measure key environmental and health indicators. This strategy also calls on the Government of Canada to explore new datasets by launching pilot programs for commercial data purchases and testing of pre-commercial offerings that can provide new insights into how our planet is changing.

Canada's commercial satellite remote sensing companies such as ours stand ready to support our national climate change obligations under the Global Methane Pledge and the Canadian Net-Zero Emissions Accountability Act. For this to happen, the Government of Canada must, in accordance with Canada's earth observation strategy, commit to ongoing bulk procurements of earth observation data and analytics from Canadian commercial satellite remote sensing companies as an anchor tenant.

This approach is common practice amongst Canada's international partners through initiatives such as NASA's commercial satellite data acquisition program and the Earthnet Programme of the European Space Agency. Under the European Space Agency's program, satellite data is provided from companies, including GHGSat, and provided free to researchers in earth science and climate change. GHGSat will soon also be evaluated under the NASA commercial satellite data acquisition program.

To summarize, I'll paraphrase the conclusion of Canada's earth observation strategy, which states that our future environmental security depends on our ability to understand and respond quickly to accelerating climate change. A whole-of-society approach is required in which Canada's clean technology companies complement government efforts, enabling cost-effective and novel capabilities for reducing greenhouse gas emissions that would otherwise not be possible with either private or public sector solutions alone.

That concludes my prepared remarks. Thank you very much.

• (1315)

The Chair: Thank you.

We'll go to Mr. Seeback for six minutes, please.

Mr. Kyle Seeback (Dufferin—Caledon, CPC): Thank you very much, Mr. Chair.

Mr. Haley, I was really interested to hear you talk about building retrofits and new builds. Do you think the government would have a role in making that more affordable for Canadians? Lots of people

would like to retrofit their homes to make them more energy efficient and thereby reduce greenhouse gases, but it's quite expensive. Heat pumps are very expensive. What role do you think the government has to play in making that more affordable for Canadians? Do you think the current government has put proper incentives in place to address that affordability issue?

Dr. Brendan Haley: Thanks for the question.

For residents, the principal program in market right now is called greener homes, which you might be aware provides both an incentive and loans. The loan is about \$40,000. A deep retrofit can cost a bit more than that—\$50,000 to \$80,000, even \$100,000 is often what you need to achieve a net-zero standard.

I think one way to get there is actually better coordination with some of the provincial programs that are also in market and trying to stack some of the incentives that are at the federal level with the provincial level. That is an area where I think better coordination could play a role. The major concern I have is that the Canadians who are really left out right now are those with low income, because with that greener homes program, you have to pay up front to access incentives or to take out that loan. Also, a lot of low-income homeowners or renters are not going to be taking out a loan. It's really not an accessible program for those with a fixed income.

A specific approach is always needed for low-income households. The United States has had a dedicated low-income weatherization assistance program since the 1970s that receives broad support. That's really the type of thing we should be looking at also having in Canada to help people.

Mr. Kyle Seeback: We don't have a similar program like that in Canada.

Dr. Brendan Haley: No. Right now, essentially, federal energy efficiency policy leaves out most low-income Canadians.

Mr. Kyle Seeback: Thanks very much.

Mr. Golinowski, you mentioned the Inflation Reduction Act. How does that compare with what's happening in Canada with respect to tax incentives?

Mr. Craig Golinowski: Thanks for the question.

Broadly speaking, the Inflation Reduction Act for carbon capture addresses two major areas. The first is a significant increase in the value. For geologic storage, the 45Q tax credit will be \$85 U.S. per tonne and \$60 per tonne for enhanced oil recovery. It's worth pointing out that the Canadian investment tax credit that was announced specifically excludes enhanced oil recovery.

Mr. Kyle Seeback: That's right. Yes.

Mr. Craig Golinowski: It's an important difference. The increase in the value is significant.

The other significant piece is they simplified how that credit is turned into money. In previous versions of 45Q, monetizing the tax credit required a complex tax structure called tax equity finance. What they've introduced now is a direct pay mechanism. For the first five years, it's a refundable tax credit. It's paid in cash. For the balance of the 12 years that 45Q is certain, the transferability of those tax credits will be enhanced.

An increase in the value and a simplification of how that credit is turned into cash are the two major changes for 45Q.

Mr. Kyle Seeback: The exclusion of enhanced oil recovery, which I know is a big deal, plus these other things that you were just talking about.... Where is capital going to flow? Is it going to flow to the United States or is it going to flow to Canada?

Mr. Craig Golinowski: The United States is far and away superior with this change, compared to Canada. We are electing to solve this problem slightly differently by relying on a combination of the investment tax credit and the federal carbon price.

Part of what I'm here to discuss is the importance of the Government of Canada providing contractual certainty on the schedule of the carbon price, so that people who are developing carbon capture and storage projects, which can be billion-dollar projects, are able to underwrite the scheduled carbon price. Without that certainty, I'm afraid that carbon capture in Canada will suffer from the market being unable to underwrite political risk because that carbon price can be changed or there's a change in government. It effectively sterilizes any large-scale investment. There's a risk of sterilizing until we have certainty on the carbon price.

• (1320)

The Chair: You have time for a quick comment, Mr. Seeback.

Mr. Kyle Seeback: No. I had another question, but I guess I don't have time. I'll pass my time on to the next Conservative.

The Chair: Okay.

Go ahead, Mr. Weiler.

Mr. Patrick Weiler (West Vancouver—Sunshine Coast—Sea to Sky Country, Lib.): Thank you, Mr. Chair.

I'd also like to thank the witnesses for joining us today.

I'd like to start with Mr. Golinowski.

As you know, we've set ambitious targets to reduce emissions by 2030. As oil and gas is our largest source of emissions, it has to play a major role for us to get there. You talked a bit about the tax measures related to encouraging carbon capture and storage in this year's budget.

Despite making record profits right now due to the impact of the war in Ukraine and what it's done to the price of fossil fuels, to my knowledge, the only company that's made a recent announcement about investments to reduce absolute emissions is Suncor, with a focus on wind energy and the transition from some coal power to some natural gas power for a boiler. We know these profits are instead being distributed in dividends to shareholders.

You mentioned before a bit about the competitive issues with the U.S., with the incentives for carbon capture and storage, but I want to touch on the other point you mentioned with respect to certainty. What will the government have to do to ensure investment in carbon mitigation and clean tech from these companies, by way of making it more certain with the price on pollution and perhaps also with the incentives that we have for clean tech?

Mr. Craig Golinowski: Broadly, carbon capture is applicable to things like fertilizer production, for example, cement production and electricity production. These are materials that need to be made for the economy. Carbon capture assists in reducing emissions from the production of these items.

In the United States, 45Q provides 12 years of certainty as to the total volume of dollars that are to be earned for each tonne of CO₂ that's captured and sequestered into the ground. When you do your financial model, you understand exactly what the size of the pie is.

In Canada today, we have a combination of the investment tax credit, which would alleviate up to 50% of your up-front investment, and then the operating costs and the return on the capital is relying on the carbon price, and the carbon price is subject to change from a political perspective.

What I'm suggesting is a contract with the government where a developer enters into a contract with the Government of Canada so that, if the carbon price is changed by a subsequent government, the contract would state that any differences would be made up for if the carbon price ended up being changed to a lower number. There would be no benefit per se if it was increased faster, but the certainty on a floor price would be visible and contractual.

Then I could approach the Royal Bank of Canada, CIBC or whoever, and say that they should lend me money, that they could provide me a loan because I have certainty on the cash flow. Without that certainty in the form of a contract, it's basically a political risk, and that's highly problematic, given the capital-intensive nature of these projects.

Mr. Patrick Weiler: Thank you very much for that.

I'd like to direct my next question to Dr. Haley.

You mentioned in your opening statement some of the programs that Canada has on the demand side with the greener homes grant and the greener homes loan to support households to make home energy retrofits.

We've also included some measures more on the supply side with some of the tax credits we have for net-zero emissions manufacturing and the tax credit for clean tech.

I'm wondering what other measures you might suggest to be able to scale up clean tech in the built environment.

• (1325)

Dr. Brendan Haley: I think the key thing that could be really transformative is coordinating the demand on the supply side and having them work together better.

For instance, we need to not just retrofit every building at a time; we need to retrofit thousands, millions, of buildings. By aggregating a bunch of those buildings together, you all of a sudden have reshaped the nature of demand to open up a negotiation with manufacturers and other solution providers in your market to say, "If we can deliver all this demand, you can now have that certainty to change your manufacturing process, to perhaps manufacture certain types of products in Canada that aren't done now or to come up with solutions that nobody has thought about before to solve the problems we have." Matching that supply and demand is really where we need to go.

Initiatives under what's called the greener neighbourhoods program and the retrofit accelerator initiative that have also been supported are starting to get there. Right now those are mostly at the pilot project stage, and they're quite restricted in terms of what kinds of buildings they are functioning. A larger scale, more flexible approach to really thinking about coordinating demand and supply could really help clean technology in the country.

The Chair: There's time for a 15-second comment, Mr. Weiler.

Mr. Patrick Weiler: How do you ensure that you're promoting the right type of retrofit over a large scale?

Dr. Brendan Haley: I think you need to find what a net-zero retrofit means, and we haven't done that yet.

[*Translation*]

The Chair: Mr. Trudel, you have the floor for six minutes.

Mr. Denis Trudel (Longueuil—Saint-Hubert, BQ): Thank you, Mr. Chair.

I too want to thank all the witnesses for being with us today.

My first question is for Mr. Durany. I'm curious about green hydrogen.

Mr. Durany, you held a conference on green hydrogen in 2019, and you say on your website that hydrogen is currently in a marginal position. However, recent technological advances suggest quite a promising future for green hydrogen as a factor in the energy transition. As you've no doubt seen, green hydrogen has reemerged as an issue in the provincial election campaign.

Sectoral experts have identified some obstacles to the development of this fuel. In their view, governments are unaware of hydrogen's potential. As a result, governments are disinclined to develop the sector, innovation support programs are unsuited to hydrogen production projects and there's considerable government inertia on the issue.

I have two questions for you on this.

First, do you think the Canadian government adequately supports Quebec's green hydrogen sector, in a manner commensurate with its potential?

Mr. Gabriel Durany: Thank you, Mr. Trudel.

That's a very good question. AQPER looks to the Quebec government first but is always in touch with the federal government. It's extremely important that the country explore the green hydrogen issue. Let me explain.

A review of the hydrogen and bioenergy strategy has begun in Quebec, and the Quebec government announced it at AQPER's last conference. The idea, first of all, is essentially to use hydrogen to decarbonize various industrial sectors in Quebec. You take Quebec green electricity, switch it over to hydrogen and then use that hydrogen in the form of an energy product. As you know, hydrogen can be used to form many types of molecules that meet needs in various industrial sectors.

This is something that AQPER supports. AQPER members that produce hydrogen, or are preparing to do so, combine it with other types of molecules to make more complex molecules: biofuels, low-carbon-intensity fuels, next-generation renewable natural gas, or RNG, methanol, ethanol and so on. These molecules are often used in industrial sectors such as transportation.

Is Canada adequately supporting hydrogen? Here's my answer to that question.

First, until you understand the uses and how those uses are sequenced—I'm talking about the technological roadmap—you may be wrong about the type of incentive you should provide.

Second, Canada must consider this in the context of its Canada-Germany accords and of the current calls for help from our European partners regarding gas energy projects, for reasons you're aware of.

If we don't see a major change in attitude toward meeting the urgent need to encourage a sector like green hydrogen to provide an export energy product for the use of our international partners, then we may be missing a major opportunity for our industry. The demand is huge. Offtake agreements are the thing. For us, they're the whole ball game.

Mr. Trudel, I'd like to say two things. First, our roadmap very clearly outlines, in four stages, the type of incentive needed to lift the hydrogen sector. It's a marginal sector right now, but it could break out very quickly.

Second, given the current international situation, we should all be extremely vigilant and recognize the rapid paradigm shift respecting the position of hydrogen in the global energy environment.

• (1330)

Mr. Denis Trudel: Thank you very much, Mr. Durany

Apart from green hydrogen and hydroelectricity, what renewable energy in Quebec is ready to be deployed? What major advances can we expect in Quebec over the next few years, with or without government intervention?

Mr. Gabriel Durany: That would be electrical energy, by which I mean renewable electricity. As you know, we talk at length in our brief about bioenergy, which is also an important aspect.

If I correctly understand your question, Mr. Trudel, we're talking more about electricity in this case.

In Quebec, and in many regions of Canada—not just Quebec—wind energy is the most reliable one out of the box. It's readily deployable, at more than acceptable cost, and costs to acquire it are declining. At AQPER, we promote abundant, modular wind energy that meets the needs of our major industrial sectors, or future green hydrogen production.

There's considerable potential in eastern Quebec, but not just in that region. Its potential in the Maritimes is enormous. So potential, technology and viability are all there. Most of the provinces have developed the wind energy sector.

When we looked at Dunskey Energy's techno-economic modelling, which was commissioned by the Quebec government, we established wind energy as our focus.

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

I now give the floor to Ms. Collins.

[English]

Ms. Laurel Collins (Victoria, NDP): Thank you, Mr. Chair.

My first question is to Mr. Haley.

First, how big a role does energy efficiency and energy conservation play in Canada's efforts to reduce our greenhouse gas emissions and meet our climate targets?

Dr. Brendan Haley: It's a good question.

You're catching me without specific numbers. The potential study that was done for Canada said we could save about 40%, I think, of our energy needs by 2050, which could be met by energy efficiency, by saving energy instead of supplying it, I believe.

Ms. Laurel Collins: Thanks so much.

Leaving aside the opportunities for future innovation for a moment, how would you say we are doing when it comes to energy efficiency technologies that we have available right now?

Dr. Brendan Haley: I think there are multiple technologies, but I think maybe the innovation in energy efficiency that's needed is around specific technologies like cold climate heat pumps. A lot of it is finding the process to really scale up energy efficiency.

Some of that could be technologies like software to better coordinate retrofits over a number of buildings, for example. Those are the types of more process-based technologies that I think are important and actually might be easier for Canada to show leadership in.

• (1335)

Ms. Laurel Collins: Great.

You mentioned in your opening remarks that we need to expand building retrofits by five to 10 times their current rate if we are going to achieve net-zero emissions. You talked a little bit about a

kind of aggregate approach. What else could we be doing to scale up at the pace we need?

Dr. Brendan Haley: I think the government needs to set a clear goal, including what net-zero emission performance would look like for a whole bunch of different building sectors. Then they need to target any incentives, any financing and any policy towards meeting that goal. Right now we're saying that if you save energy, that's good, but we need to answer the question of how much energy and how much greenhouse gas emissions can be saved.

A big part of that is the government leading with enough public investment to catch attention and to say that the markets here are going to be transformed. This is an area where the private sector needs to pay attention. I don't think we've done that yet. It's very focused on one building at a time instead of saying that this is a big mission that you should be paying attention to.

Ms. Laurel Collins: There's a huge opportunity for building retrofits in creating jobs in Canada. Can you comment on the job potential and how we can best support workers in this area?

Dr. Brendan Haley: I'm again blanking on the numbers, but certainly the jobs created per million dollars spent for energy upgrades tend to be much higher than in most other initiatives in the economy.

I think part of it is that this is an area for good jobs, especially good jobs in the trade. A lot of the sectors, such as high-tech sectors or even manufacturing sectors, are not actually providing the jobs that we need in the economy anymore. We really need to start focusing on smaller businesses in the trade. What is the policy that can help some of the contractors involved in energy efficiency actually change their business models to be more productive and be able to pay higher wages?

It's helping some of those contractors to not just install the exact same furnace as the one you had, but to provide a fuller spectrum of services that include insulation, air sealing, comfort, humidity control. I think those are the types of business models that policy can promote to provide higher-wage jobs to Canadians.

Ms. Laurel Collins: You spoke briefly in your opening remarks and also in your comments to Mr. Seeback about energy savings for low-income Canadians. The cost of everything is going up. I think the cost of living is really top of mind for a lot of people who right now are wondering about how they're going to afford to pay their bills.

Can you speak more about the benefits of targeting energy savings to low-income Canadians?

Dr. Brendan Haley: As I said, these are obviously the people in need. These are obviously the Canadians who are not going to do the retrofits on their own unless they receive some help. They're highly vulnerable to energy price increases that are happening because of global factors and because of the carbon price. I think it's a major policy gap that we really need to fill.

Some of the big benefits are health benefits. People who are not heating properly get issues with mould and issues from living in colder temperatures. A huge opportunity and often a huge benefit of upgrading low-income homes are the health benefits and the ability for seniors to live at home longer. Those are some of the non-energy benefits we get out of that.

The other thing I might mention is that some of the technologies I talked about are really relevant to low income. For instance, insulating from the outside instead of the inside allows tenants to stay in the building while the retrofit's being done, which is key.

In dealing with inflation, there are opportunities in a low-income program that don't exist in other programs to coordinate a whole bunch of buildings together—

The Chair: Unfortunately, we're out of time. We'll have to go to our second round.

Mr. Mazier, you have five minutes, please.

Mr. Dan Mazier (Dauphin—Swan River—Neepawa, CPC): Thank you, Chair.

Thank you to the witnesses for coming out this afternoon.

Mr. Golinowski, my questions are for you today.

You mentioned in previous testimony at this committee that “the United States doesn't hate industry. They want industry to be productive”. I've heard from a lot of business leaders who believe that the current government is hurting Canada's business environment. Were you implying that Canada hates industry?

• (1340)

Mr. Craig Golinowski: I think my observation on the United States is that at the state level and the federal level, there's an acknowledgement of the importance of things like liquid natural gas and significant manufacturing capabilities that require energy-intensive steel production and petrochemical production. I think what we're seeing today in Germany is effectively an implosion of German industry. What's happening in Europe is a precise example of what happens if we are insufficiently supplied with fossil fuels. Zinc smelting, aluminum smelting and fertilizer production are substantially shut today in Germany and in Europe.

These ideas that we somehow are able to replace fossil fuels in industrial production or that industrial production itself should be punished as a polluter are being demonstrated in Europe, and they don't work.

In the United States, the section 45Q tax credit for carbon capture is a strong economic signal that the United States in fact wants heavy industry to remain in place and that the United States government will effectively pay for the entirety of carbon capture. These are clear differences in philosophy.

Mr. Dan Mazier: Thank you.

I'm hearing that clean-tech businesses are leaving Canada to restart their operations in more business-friendly countries. We've heard consistently that although Canada invests in research and development of clean tech, we fail to commercialize this technology.

How big an issue is this, and what can government do to address it?

Mr. Craig Golinowski: The United States is a massive market. That's one advantage that Canada just won't ever be able to replicate, but one item that I'm suggesting is clear certainty on carbon value and having a contractual approach so that if a future government elects to change the carbon price, it is underwritten contractually and bank loans and large-scale equity investments can be made in projects that are based on these carbon prices.

I think Canada can observe what's happening in the United States with the Inflation Reduction Act and the magnitude of those incentives, which apply to renewables and hydrogen and across many of the energy transition technologies. Canada can take a lesson on having more certainty. Fundamentally, the rate of return on these projects needs to be observable by the market and the financial risks need to be minimized as much as possible.

Mr. Dan Mazier: Do you have an idea by how much emissions can be reduced by utilizing carbon capture and utilization?

Mr. Craig Golinowski: The reports from a variety of research groups often show carbon capture representing between 10% and 20% as an emissions solution across all emissions. In terms of scale, carbon capture is a massive component. This category also includes things like direct-air capture, which would be pulling CO₂ out of the atmosphere with industrial processes.

Basically, there's no way for any of the net-zero forecasts to come true without carbon capture playing a leading role in the solution.

The Chair: You have time for a quick comment, Mr. Mazier.

Mr. Dan Mazier: How important is CCUS to meeting our climate goals?

The Chair: Could we have a quick answer, please?

Mr. Craig Golinowski: I think there's no way for Canada to meet any of its climate goals without large-scale deployment of carbon capture, because we need the energy production—

The Chair: Thank you.

Mr. Longfield, go ahead for five minutes, please.

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

Thank you to the witnesses for today's discussion.

I want to start with you, Mr. Germain, and first of all congratulate you on being one of the world's leading clean-tech start-ups. I was reading the report from the Global Cleantech 100 list and I was happy to see your name on the list. Being one of 13 Canadian companies on the global list of the world's leading clean-tech companies is quite an accomplishment.

• (1345)

Mr. Stéphane Germain: Thank you very much.

Mr. Lloyd Longfield: Just to contrast some of our earlier testimony, could you comment on the growth of clean tech in Canada and the role that pricing mechanisms have played in stimulating clean tech in Canada?

Mr. Stéphane Germain: Clean tech has certainly been expanding rapidly over the last 10 years or so. There have been a couple of different cycles and venture capital investments in clean tech. In the last five years, it has certainly very much accelerated.

Pricing mechanisms have been an incentive that has helped many clean-tech companies build financial models and business models that allow them to demonstrate to investors that there will be a return on investment for their venture capital investments. That's certainly true in our case. We demonstrate that when there's a price on carbon, it motivates our customers to better understand, control and ultimately reduce their emissions.

Mr. Lloyd Longfield: It's been shown that the venture capital in Canada went up to \$66.3 billion in 2021. That could never have been dreamed about in 2015 before we had pricing mechanisms in place. Is that a fair statement?

Mr. Stéphane Germain: I would certainly agree with that, although I would point out that I think venture capital in Canada for clean tech still remains dramatically underfunded. Right now the capital available to Canadian companies to go from initial start-up to grow to scale is available primarily outside of Canada. Canada really needs to step up in fostering and accelerating the amount of venture capital available to start-ups in the growth phase in particular.

Mr. Lloyd Longfield: It's always good to point that out. Thank you for doing that.

The attraction of external capital into Canada is another part of the equation, though. When we look at Germany and other very mature markets looking for new opportunities, Canada is quite often a country they come to for investments.

Mr. Stéphane Germain: Yes. Over 50% of the capital we've raised—and we've raised over \$100 million Canadian—has come from outside of Canada.

Mr. Lloyd Longfield: In terms of your business itself, I'm very interested in the work that can be done on soil health and carbon capture within soil. Working with the University of Guelph, we're looking at new ways of managing fertilizer and restoring soil carbon levels through new techniques, and then measuring the results.

Is that something your company is involved in?

Mr. Stéphane Germain: Our company is not directly involved in that, although I am aware of other satellite solutions and aerial solutions that are available for measuring the various compositions of soil and looking at carbon content as well. They are called hyperspectral technologies.

Mr. Lloyd Longfield: Thank you.

It's a depth that may be more than we can do in this study, but it just showcases that clean technology also applies to agriculture solutions.

Mr. Stéphane Germain: Absolutely. In our case, we have used our satellites to monitor methane from agricultural feedlots, for example. When you put 10,000 cows into a one-square-kilometre area, they do produce a lot of methane, and we have been able to detect it from space. That can help to prioritize the solutions that are required for dealing with those methane emissions.

Mr. Lloyd Longfield: I zoomed in to Guelph using your technology and I looked at the methane on farms around our area and saw that we were in the yellow/orange level, which isn't great, but it could be worse, I suppose. There are some pretty deep oranges around us.

Mr. Stéphane Germain: It can be a lot worse; trust me. Canada has done pretty well. We monitor the entire planet on a regular basis. Although we certainly have room for improvement in Canada, there are lots of other places that need to look at agricultural and other industrial emissions much more rapidly than we do.

Mr. Lloyd Longfield: It's great to hear from clean-tech businesses, and congratulations for the great work you're doing.

Mr. Stéphane Germain: Thank you.

The Chair: Thank you. That's very interesting.

Thank you, Mr. Longfield, for always being on time.

[*Translation*]

Mr. Trudel, you have the floor for two and a half minutes.

Mr. Denis Trudel: Thank you, Mr. Chair.

Mr. Germain, I'd like to ask you a few quick questions since I only have two and a half minutes.

Does your technology preclude any likelihood of false reporting of greenhouse gases? For example, can your clients manipulate the data?

• (1350)

Mr. Stéphane Germain: The measures we take are entirely independent, and clients therefore can't manipulate the data.

Mr. Denis Trudel: Your business focuses mainly on the markets that are hardest to decarbonize, such as cement plants, steel plants and so on.

Could you tell us about heavy industry's market share in Quebec and Canada?

Mr. Stéphane Germain: We mainly measure methane emissions in the oil sector. Approximately 50% of the emissions we've measured come from the global oil sector. Then there are landfill sites and coal mines.

In the case of Quebec, in particular, the only emissions we've measured to date come from landfill sites. That's unfortunately still a major challenge for us in Quebec.

Mr. Denis Trudel: What recommendations would you make to the federal government regarding current funding for clean technologies?

Mr. Stéphane Germain: It should definitely encourage venture capital investment in clean technologies. As I mentioned in my introduction, it should support Canadian industries by buying data from other Canadian satellites, by which I mean not just ours, but also those of several other businesses that provide satellite data to measure environmental indicators.

Mr. Denis Trudel: You mentioned to another speaker earlier that the federal government isn't doing enough in the ecological transition area.

What would you recommend in that regard, in 30 seconds?

Mr. Stéphane Germain: It's very important to make investments to encourage venture capital investment in clean technologies. The funding available in this field internationally is much greater than that in Quebec. We also need to encourage our businesses to expand outside Canada. Lastly, we should encourage purchases of data from Canadian businesses to accelerate our growth.

Mr. Denis Trudel: I believe my time is up.

Thank you very much, Mr. Germain.

The Chair: Thank you, Mr. Trudel.

Ms. Collins, you have the floor.

[English]

Ms. Laurel Collins: Thank you, Mr. Chair.

Again to Mr. Haley, the government's approach to clean technology so far seems to be to offer incentives in various pots of money. You've talked a little bit about this, but is this approach enough, or should the government be taking a more proactive role in shaping a market transformation through clean technology?

Dr. Brendan Haley: If you look at the last federal budget, it seemed very focused on crowding in private sector capital. I think everybody would love to see more private sector investments in reaching net-zero emissions, but I don't think you get that by offering incremental incentives to co-fund with private individuals—which is what the greener homes program does—or financial organizations.

You see the Canada Infrastructure Bank doing that to some extent. Those are not bad, but if we really need to transform in the way that the net-zero objective requires, we need our public sector investments to really almost reshape the structure of markets so that it's just a no-brainer for the private sector to see energy retrofits as a productive area for investment and innovation.

This strategy that we've written about in connecting the demand and the supply side, reshaping demand to be at very high scale and then negotiating how we meet that demand with private sector partners, is the type of structural change we can do. You only get there when you really start investing at scale and retrofitting at scale.

Ms. Laurel Collins: What do you consider that scale to be? The government recently promised \$250 million over four years to help homeowners switching over. Is that going to be enough to make a difference? Do you think that this scale is big enough and that the scope is wide enough?

Dr. Brendan Haley: We ran a model in which we tried to add up what it would take to retrofit almost every building, and the cost would be \$20 billion to \$30 billion a year, so it's huge. The public sector has to lead that, and of course we need private sector investment to come in too.

You mentioned the \$250 million for those with low income that was announced last week, and \$2.6 billion was put on the table for

what I would say is the ability to pay middle-class and upper-class homeowners—

The Chair: We're out of time. We can pursue this line of thinking in answer to other questions, of course.

We will go now to Mr. Carrie.

• (1355)

Mr. Colin Carrie (Oshawa, CPC): Thank you, Mr. Chair.

I want to continue with you, Dr. Haley. You mentioned some no-brainers, so I'm going to throw a few things out.

I had the opportunity to speak with the trades for insulation, and they mentioned that they could have great opportunities for job creation if they were supported. The federal government, I think, is the largest real estate owner in Canada and the biggest landlord in Canada. Are you aware of any large retrofits right now that the federal government is actually participating in?

Dr. Brendan Haley: I'm aware of the greening government strategy, which I would say is really a leader in defining the standards that they want to hit and trying to give forward guidance to industry about how they can do that.

Mr. Colin Carrie: I'm aware of that, but here's the challenge: We can talk about it and we can put money aside, but one of the things you mentioned was leadership. You need these large projects in order to get the private sector on board. What was a no-brainer for me when I spoke to these insulator trades was that the federal government actually just started retrofitting its own buildings. You mentioned we need five to 10 times more retrofits and that 40% of our reductions could be met by retrofits. Doesn't it make sense that the federal government would actually take a leadership role?

We have seven and a half years until 2030, and if we don't start getting that infrastructure in place, we're going to be way behind. Doesn't it make sense that the federal government would take that leadership role?

Dr. Brendan Haley: It does, absolutely. I'm in complete agreement.

It could also be expanded to Crown corporations—not just exactly narrowly government, but kind of a larger expansion of government, including public buildings and high-value buildings that people go to.

The other thing I think is really useful to trigger larger transformations is clearly defining what standards need to be met and having those leak into the private sector, as well as trying to really encourage apprenticeship and training, because we really need more training in the trades and more people entering the trades as part of that government strategy.

Mr. Colin Carrie: I'm thinking a kick-start would really be appreciated.

You mentioned different innovative strategies that other countries are using, and you mentioned Denmark. I wonder if you would mind just taking a minute or so to let the committee know what Denmark is doing well that we could copy to get our own act in order so that we reach the 2030 targets.

Dr. Brendan Haley: Denmark—and this was a while ago—was named one of the most energy-efficient countries in the world.

The example that comes to mind about how they do user-producer interactions is actually from the wind industry. The textbook case of wind development was that technology developers worked very closely with agricultural co-ops and there was consistent feedback on how to improve the technology over time, so that's the key example I'm thinking of.

That's the type of thing I think can work well in the building retrofit energy-efficiency space, because there are a whole bunch of small problems, such as how to measure a building really accurately so that we can manufacture panels off-site. People have already come forward with “Well, we're going to use drones to do that.” Getting that type of consistent feedback between the users with the problems and the potential solution providers is, I think, a good innovation strategy.

Mr. Colin Carrie: All right. Maybe it's something that we can look into a little more, but I just think that if our government would take a leadership role, it would not only create the market for these innovative companies—you mentioned the panels pre-engineering and the HVAC AI—but if they had a place to do their job, I think they would invest more money, ramp it up and make it cheaper for the private sector and individual low-income earners.

I have only 30 seconds left, and I wanted to ask Monsieur Durany about the rural communities.

I looked at your presentation. If farmers want to dry their hay in Quebec, for example, they need propane. Do you have any solutions for the rural communities? It seems that what you have is good, but what if I'm a farmer and I need to dry my hay? What am I going to use if there isn't another solution out there?

• (1400)

The Chair: Unfortunately, we're out of time. Perhaps we can squeeze in an answer into another question.

Mr. Gabriel Durany: One word? Two words?

The Chair: Two words.

Mr. Gabriel Durany: Biomass: We're looking for a biomass product for that particular usage.

The Chair: Okay.

Next is Ms. Taylor Roy.

Ms. Leah Taylor Roy (Aurora—Oak Ridges—Richmond Hill, Lib.): Thank you very much.

Thank you to all the witnesses here today. I think we have a good panel that is showing the scope of the challenges and the opportunities to invest and grow clean tech in Canada.

I want to start at the beginning, which is the R and D. I think Mr. Mazier spoke earlier of the government support for R and D at early-stage clean tech. I know that during the Conservative government up until 2015, that budget was slashed considerably. I'm just wondering if you could comment on how important you think that funding for R and D is in the overall process. Then I want to go to different stages, but I'll start there, at the initial R and D.

Also, how do you feel about the government funding projects that fail, and the R and D projects that fail as well? I'd love to hear your comments on that.

Perhaps we can start with Mr. Haley.

Dr. Brendan Haley: In my previous life as an academic, I did quite a bit of work on governance of innovation in public sector organizations that govern innovation, so I'll pick up on some of that.

One thing that's quite important is to have clear goals and missions, but with the flexibility to seek out innovative ideas. That makes sure that any R and D is targeted and invites that ability to welcome failure and be accepting of failure.

I think the way to get out of that, which we really need to think about—and I see this in the green building strategy—is not having rigid program boundaries, but allowing and really thinking about an innovative solution for how to retrofit a building and how it seamlessly goes from demonstration phase to scale-up.

The way to do that and maintain the accountability you need is often to have sector-specific experts within the public sector almost embedded within the private sector and working on these solutions, so that they have that information at the ready to scale up something that's working or to cut off something that's not working and not have anyone feel bad about it. This is like ARPA-E in the United States. These are the types of governance systems that you see in public sector organizations that are trying to promote R and D and innovation, and I think we need more of that in Canada.

On the building retrofit side, I actually see a way to put that model to building retrofits and not just have a bunch of programs that people get lost in.

Ms. Leah Taylor Roy: Thank you.

Specifically on the building retrofits, I do have another question.

It seems that a lot of our logjam is in the energy audits and having people get out and do those audits. I guess this is a question for you and Mr. Germain, because of your work. I know that satellite technology may not be the thing, but what about virtual energy audits in companies that are now saying that they don't have someone to actually go out to homes and that they can do this in a more expeditious manner?

What is your opinion on that?

Dr. Brendan Haley: Yes, I think that's something we definitely have to explore. There's one company that sends drones over buildings and looks at heat loss on the roofs and so on.

One real value of a virtual energy audit is actually being able to get a quick energy performance label, which is quite key for defining the market. Then we save the valuable time of those in-person audits, which are still going to be necessary for those deeper retrofits and those buildings in need of bigger upgrades.

Mr. Stéphane Germain: In response to your initial question with regard to R and D in Canada, I would say that Canada does an excellent job of stimulating clean technologies in Canada at the R and D phase. We would not exist without the risks that Sustainable Development Technology Canada in particular took, along with several other organizations, over the years, which have supported the R and D that we've done.

Today we find ourselves with a technology that is unmatched in the world. There's nobody else in the world, literally, that can do what we do today. It's patented in many countries as a result of the kind of innovation that was fostered for us to do it here in Canada.

What I would say is that failure is part of that. There will always be start-ups that try to do things that will fail, and that's part of the risk that we have to accept as taxpayers and citizens of Canada. We need to invest in these risks that we all need to take through R and D.

• (1405)

The Chair: Thank you very much.

I want to thank the panel for a very rich and insightful discussion this afternoon. It's good input for our eventual study report.

We're going to break for about a minute and we'll resume for our second panel.

Thank you again to all the witnesses. It was great to hear from you today.

• (1405)

(Pause)

• (1405)

The Chair: For our second panel today, we have with us David Schick and Lisa Stilborn from the Canadian Fuels Association.

From Electric Mobility Canada, we have Daniel Breton.

From Kleen HY-DRO-GEN Inc., we have Thomas Fairfull, Sam Soliman and Doug MacDonald.

Jasmin Raymond is with us as an individual.

Each witness will have three minutes, and then we'll go on to two rounds of questions.

We'll start with Ms. Stilborn, followed by Mr. Breton, Mr. Soliman and Mr. Raymond.

Go ahead, please.

Ms. Lisa Stilborn (Vice-President, Public Affairs, Canadian Fuels Association): Good afternoon, Mr. Chair and members of the committee.

[Translation]

Thank you for the opportunity to take part in this study.

[English]

I'd like to begin by acknowledging that the land I'm on today is the traditional unceded territory of the Algonquin Anishinabe people.

Mr. Chair, I'd also like to mention that with me today virtually is Dave Schick, who is our vice-president for western Canada, innovation and regulatory affairs.

Our members provide 95% of Canada's gasoline, diesel, marine and aviation fuels, or over 100 billion litres of liquid transportation fuels per year. They also make over 25% of the biofuels that we use in Canada.

Two years ago we released "Driving to 2050", which spoke to the contribution our sector could make to Canada's climate goals. We believe all transportation energy alternatives will be needed to achieve net zero, and low-carbon fuels have the potential to cut transportation emissions in half by 2050.

Maximizing this pathway is also the key to maintaining energy reliability, security and affordability as we continue the diverse bioenergy mix. Also, our members are at the forefront of innovating large-scale biofuel projects, leveraging existing energy infrastructure and creating economic benefits through the fuel value chain, from agriculture and forestry feedstock, from suppliers to retail.

Increasing domestic production of biofuels will also reduce our reliance on imports, but we have a long way to go. Canada is already a net importer of biofuels, and policies such as the clean fuel regulations will increase this trend. Why is that?

It is because the North American fuel market is integrated, so Canada competes with the U.S. for investment. In the U.S., long-standing programs have built a robust biofuels industry, and the recent Inflation Reduction Act doubled down with new measures, including a production tax credit.

Comparable Canadian incentives are needed now to level the playing field for capital investment. That's why we're recommending a new 10-year low-carbon fuel production tax credit for budget 2023. Like the Quebec credit, it would be tied to carbon intensity, with the highest reductions receiving a 34¢-per-litre credit, equivalent to the U.S. production tax credit of \$1 per gallon, and it would apply to all low-carbon fuels produced in Canada.

Government can also play a role in attracting investments through fostering a stable, predictable regulatory environment; promoting alignment of federal and provincial policies; and having paced regulations and timely permitting.

In closing, there's a tremendous opportunity for low-carbon liquid fuels to be produced right here in Canada to the benefit of our environment, our economy and our energy security. We urge the committee to support our proposals.

Thank you, Mr. Chair.

• (1410)

The Chair: Thank you, Ms. Stilborn.

We'll go to Mr. Breton.

[*Translation*]

Mr. Daniel Breton (President and Chief Executive Officer, Electric Mobility Canada): Good afternoon.

I want to thank the members of the Standing Committee on Environment and Sustainable Development for taking the time to examine the advances that have been made in clean technologies in Canada and the potential they represent.

My name is Daniel Breton, and I am the president and chief executive officer of Electric Mobility Canada.

Founded in 2006, Electric Mobility Canada was one of the very first organizations in the world to get involved in the electrification of transportation. Our members include manufacturers of light, medium, heavy and off-road vehicles, electricity and charging infrastructure suppliers, mining companies, technology companies, research centres, cities, universities, fleet managers, unions, non-governmental organizations, or NGOs, and so on.

In short, Electric Mobility Canada is the national voice of transportation electrification.

[*English*]

Today I will focus on the economy. Here is some important information on the great potential of electric mobility in Canada.

According to a report published by the International Energy Agency in August 2022, approximately 50% of the energy jobs in the world were in clean energy in 2019, which includes clean transportation. Even in North America, where there is an important fossil fuel industry, clean jobs represented almost 50% three years ago.

New energy projects are the major driver of employment, with around 65% of energy workers employed to build and deploy new solar plants, wellheads, electric cars and more. As you can see in the following graphic, raw material, manufacturing and construc-

tion are at the heart of this clean energy revolution, and electric mobility is front and centre.

Back home, in the past six months the Government of Canada has secured \$15 billion of investment and tens of thousands of jobs in Canada's electric vehicle ecosystem. Canada is now developing an innovative electric mobility industry, from mining to assembly to infrastructure to education to electricity production and distribution, and more needs to be done, as this is the fastest-growing industry in the world.

According to another report published just a few days ago by Clean Energy Canada and Trillium Network for Advanced Manufacturing—in which EMC participated—by 2030, Canada's EV battery supply chain could support nearly 250,000 direct and indirect jobs and add \$48 billion to the economy. When induced jobs are considered, a total of nearly 323,000 jobs could be created across Canada and \$50 billion could be added to the Canadian economy.

Canada ranks among the world's top five countries when it comes to battery supply chain potential, largely due to its access to key metals and minerals.

To give you an example of the potential that Canada has on that front, note that there are two battery chemistries in Tesla cars today. These are NMC batteries, which were developed in good part at Dalhousie University in Nova Scotia, and LFP batteries, which were developed in good part at IREQ in Quebec.

• (1415)

The Chair: Thank you, Mr. Breton.

I'm sorry. We're going to have to stop there, but you'll have an opportunity to share that information in answer to questions.

We go now to Kleen HY-DRO-GEN. I don't know if I mentioned that Mr. Doug MacDonald was on the line with us, but I believe it's Mr. Sam Soliman who will be delivering opening remarks for three minutes, please.

Mr. Sam Soliman (Head, Engineering Services, Kleen HY-DRO-GEN Inc.): Thank you, Chair, for the introduction.

[*Translation*]

Good afternoon, colleagues and members of the Standing Committee on Environment and Sustainable Development.

[*English*]

My name is Sam Soliman. I am the head of engineering service at Kleen HY-DRO-GEN Inc.

My colleagues, Mr. Thomas Fairfull, who is the president and CEO of the company, and Mr. Doug MacDonald, the company's manufacturing consultant, are here with me. We're pleased to participate in this meeting and we would like to spend a few minutes—

The Chair: Excuse me, Mr. Soliman. We don't know if you're coming through on the mike or not. Do people hear an echo?

Mr. Sam Soliman: Is it clear now?

The Chair: Now it's better. Go ahead.

Mr. Sam Soliman: We bring an innovative solution to today's climate issues, one that supports the Government of Canada's climate objectives and goals in reducing greenhouse gas emissions and becoming a global leader in transitioning to a green economy.

Our proudly Canadian KLEEN HEAT is an enriched hydrogen gas heating unit that can be retrofitted to work with virtually any heating system on the planet. It produces zero output of greenhouse gas emissions, so nobody will die from carbon dioxide.

The product has been ingeniously developed with an energy-efficient water electrolysis unit to separate distilled water into its proprietary hydrogen and oxygen gas mixture. The gas is supplied to a patent-pending manifold assembly that can be retrofitted to any heat exchanger unit for complete gas combustion. This results in a significant amount of heat that can be utilized for space-heating applications.

The unit is safely designed to generate and enrich hydrogen gas on demand, and consume it without any storage at any point in time. The by-product of the combustion process is pure water, which is automatically collected and reused by the system.

KLEEN HEAT is a flexible modular system that produces 30,000 BTU per module and is designed to be powered from renewable energy sources and battery bank units. The system can be scaled up to meet any space-heating requirements.

The KLEEN HEAT benefits are, first, that it is proudly made in Canada and expected to provide hundreds of jobs and manufacturing facilities. Second, it was developed with the ability to be compatible with virtually any home on the planet. The gas is safely generated and consumed without any storage at any point in time. The combustion by-product is water. It produces zero greenhouse gas emissions. There are no chimney requirements, no venting is required and, most importantly, no one will die from carbon dioxide.

Third, it supports the Government of Canada's climate plan, "A Healthy Environment and a Healthy Economy", with an estimated reduction of 6.4% of the current 672-megatonne target of carbon dioxide equivalent set in 2020.

Fourth, Canadian households will enjoy tremendous—

The Chair: Thank you, Mr. Soliman. We're going to have to stop there, but that won't prevent you from sharing further information in response to questions.

We will go now to

[*Translation*]

Mr. Raymond, who is a professor at the Institut national de la recherche scientifique.

Mr. Raymond, you have the floor for three minutes.

Mr. Jasmin Raymond (Professor, Institut national de la recherche scientifique, As an Individual): I am a professor at the Centre Eau Terre Environnement in Quebec City, where I conduct research on geothermal energy in my capacity as a research chair at the Institut nordique du Québec. We evaluate the geothermal potential of northern communities [*Technical difficulty—Editor*] and a UNESCO working group as part of its international geoscience and geoparks programme.

I will be delivering my statement in French today,

[*English*]

but I will be happy to answer questions in English if needed.

[*Translation*]

I'm going to tell you about geothermal systems, which are a clean technology used to heat and cool buildings and to generate electricity. Heating and cooling buildings generally involve geothermal heat pumps, which are installed over surface boreholes drilled to a depth of 100 metres. This makes it possible to extract energy from the ground and to direct it into buildings to achieve significant energy savings in the range of 60% to 70%. While these systems are installed in institutional, commercial and industrial buildings, the market penetration rate of this process as a heating technology is still marginal, in the order of 1% to 2%.

At the other end of the geothermal technologies spectrum, we have geothermal power stations, which draw on geothermal reservoirs situated at depths ranging from two to five kilometers beneath the earth's surface. Since the deeper you drill, the hotter it gets, it's possible, at those depths, to extract underground water at temperatures of more than 100 degrees Celsius.

Geothermal energy offers many benefits. It emits less greenhouse gas than fossil fuels. It's also a primary energy that's available 24 hours a day, 7 days a week, unlike solar and wind energy, which are intermittent sources of renewable energy. Geothermal has a smaller surface footprint than hydroelectric dams, in particular. However, the cost to install geothermal systems is still high. To lower those costs and disseminate the technology, government assistance is needed to accelerate the research and development required to progress to the pilot project stage.

In the course of my research, I'm in touch with numerous isolated northern communities, which, in many instances, are indigenous communities where diesel is the primary energy source. Those communities want energy independence and must therefore find new local solutions to reduce energy imports from the south. My work is to support and assist them to ensure that projects designed by local interests are based on advanced scientific principles so those communities can access the best technologies and meet the highest environmental standards.

We lack support for the moment. We need increased government assistance in order to advance research and development projects and community demonstration projects.

Thank you.

• (1420)

The Chair: Thank you very much.

I now give the floor to Mr. Carrie for six minutes.

[*English*]

Mr. Colin Carrie: Thank you, Mr. Chair.

I want to continue with Mr. Soliman. He was cut off there, but I'm excited to hear a little bit more about these hydrogen retrofits for heating units. I know that there have been challenges with hydrogen regarding safety and storage, but it seems that you have developed a way in which there's no need for storage. If you are using non-emitting inputs for the electricity, that seems like an excellent solution.

Monsieur Raymond mentioned rural and remote communities. Could you describe how this would be a game-changer to get them off diesel?

Mr. Sam Soliman: Thank you for the question, Mr. Carrie.

The remote areas, and the indigenous areas in particular, will be a great example for establishing the system there. It is powered from green energy, and it produces zero greenhouse gas emissions. It meets exactly what the government is looking for, and in particular, there is no storage, so there is no point in time at which anybody will die from carbon dioxide or be exposed to any hazards, because it is generated on demand.

For example, when the temperature drops in a house, the furnace will kick in. That's exactly how it's going to work with our system. It's produced only when the temperature is dropped below the desired temperature, and this makes it need no storage at any point in time.

Mr. Colin Carrie: The greenhouse gas emissions savings seem to be tremendous with this type of technology, especially in this country. In the previous panel, Dr. Haley mentioned that we could reach our commitments, that 40% of the reductions could be made by retrofits. You're saying that with your technology, you could actually go into a home, a business or a government building that's being run by natural gas and retrofit the infrastructure that is in there and change it over to hydrogen. Is that what you're saying?

Mr. Sam Soliman: That is absolutely correct. Whatever pollution is being emitted from the current fossil fuel, whether it is natural gas or any other source of fuel, will be completely eliminated. It

becomes zero. When we apply KLEENHEAT, the by-product is water. It is just water. There is no source of greenhouse gas emissions. Basically, the user will be able to save the cost of the fuel that he has been using over the year—that will also be zero—and he will also benefit from the credit system, the credits that he is going to generate by using our system.

• (1425)

Mr. Colin Carrie: You mentioned savings. Did you do a calculation? I read over your presentation. Did you do a calculation of return on investment? Do you have an estimated cost? I know that this is a new, innovative product, but what kind of savings are we looking at for the ma and pa who would change over their furnace?

Mr. Sam Soliman: Thank you for the question.

I can give you a simple example. As a house owner, I have a gas bill that comes to approximately \$1,800 to \$2,000 a year. This is the cost of natural gas delivered to our property. If we eliminate that, this is the number one saving. The homeowner would put zero dollars toward the fuel. Our fuel is water. The cost of having water on our property is very minimal compared with other fuels. There are also savings that will come from not producing any greenhouse gas emissions, so the pollution is zero. That's another saving.

Regarding the return on investment, if we take an example of saving approximately \$1,800 a year for five years, that's a saving of around \$6,000. Basically, the cost of our unit is within this range.

I will leave the cost and the details to Mr. Fairfull. He can elaborate more on that. I will leave him to answer more about the question of the cost of our technology.

Mr. Colin Carrie: I'm curious about that, and also about the engineering of it and the commercialization.

Mr. MacDonald is there; he's your manufacturing consultant. Is this something that could be manufactured and commercialized here in Canada? Are there any support programs that are available from the Government of Canada to help you on the commercialization side of things?

Mr. Doug MacDonald (Manufacturing Consultant, Kleen HY-DRO-GEN Inc.): Tom, would you like me to answer that?

A voice: Yes.

Mr. Doug MacDonald: Thanks very much for the question, Mr. Carrie.

There's no reason whatsoever that we could not produce this product in Canada, whether it be in the province of Ontario or elsewhere across the country. Regarding commercialization, the design is where the IP resides. As for the manufacturability of the product, it's highly manufacturable. Tom shared this with me several years ago. I've been keeping an eye on him from afar on his progress.

This is a highly disruptive technology. I've worked in the past with hydrogen fuel cells for storage, and I can assure you that from all the data that Kleen HY-DRO-GEN has shared with me, this is a very safe system.

Sam alluded to the fact that the by-product is water. The fact that it regenerates that water and that it is utilized in the actual furnace makes—

The Chair: That's perfect. Thanks very much.

We'll go to Ms. Thompson now for six minutes.

Ms. Joanne Thompson (St. John's East, Lib.): Thank you, Mr. Chair. I welcome the witnesses.

The conversations today are very interesting. As I am from Newfoundland and Labrador, anything to do with hydrogen and an actual application of clean resources is very important. I would be remiss if I didn't acknowledge that the weather system that's approaching Atlantic Canada is a real indication that we have to move quickly, so I'm delighted to be part of this conversation.

I'd like to start with Mr. Soliman and carry on quickly from the previous questions. Could you speak, please, to a couple of the practicalities around target timelines and availability, for example? How do you intend to scale to market objectives and demand? I'd be interested in that. What do you see as a cost for a homeowner for the unit?

Mr. Sam Soliman: Thank you for the question.

I would like to pass it to Mr. Tom Fairfull. He would answer more precisely.

Mr. Thomas Fairfull (President, Kleen HY-DRO-GEN Inc.): Thanks for the question.

We've been working on this project now for probably a good 20 years. It's been a long time in the working. We're working full time on it now. We're pushing ahead quickly with bringing people like Doug MacDonald on board, with his manufacturing experience.

It's anticipated that to convert your average house to burning clean hydrogen would come in, at the end of the day, at around \$9,000. You can see that the five-year money-back aspect is in the picture here. In the beginning, it might be six years, but as Doug ramps production up, the price will come down.

Doug, maybe you'd like to speak on production and ramping up. We're about to convert our first total green home here in Ajax very shortly and have it in full operation for demonstration by the end of November, I'd say.

Maybe you could elaborate on the manufacturing and whatnot, Doug.

• (1430)

Mr. Doug MacDonald: Thanks, Tom.

As far as production capacity goes, there are going to be a couple of factors that are going to play a major role, and it's really the supply and demand curve. We feel that with this technology, if there were any sort of an incentive or grant from the government to offset the initial costs for the homeowner the way we had in the photovoltaics industry a number of years ago.... I worked intimately in that space in Canada and Europe. When the German government had a subsidy for homeowners converting to PV, to solar panels, with a cost-per-watt incentive, it was amazing. We had to quadruple the supply overnight in order to meet the demand. As soon as that subsidy was taken away, the demand dropped overnight. Consequently, the German government reinstated it.

The reason I bring this up is that this is an opportunity for Canada to really help us drive to reach our greenhouse gas emission targets with this type of technology. Hydrogen hasn't been as in vogue as many other types or sources of fossil fuels, for sure; it doesn't mean that it's not very viable. From a manufacturing point of view, we could certainly ramp up in the Ontario marketplace to meet a reasonable demand. We obviously are not going to try to open a large facility without having some indication of what that pull-through is going to be. The government would have a huge impact on the way the marketplace embraces this technology.

As Mr. Fairfull said, with our operating unit, we'll be able to validate to the consumer and show them what it looks like and what the actual cost savings are.

For myself personally, with rural properties it would be just wonderful to have this type of system. It's particularly difficult in rural areas. We don't have natural gas in northern Ontario. We have to rely on propane. It's extremely expensive.

If you think about where we would be manufacturing-wise.... Certainly, Tom and I have spoken about our international rollout of this product. I think Canada could really lead the charge in distributing this technology globally. If we had this available in the U.K. right now, I wouldn't even want to guess what the magnitude of demand would be, given the situation in Europe with the cost of fossil fuels and the lack of natural gas.

The Chair: You have time for a comment, Mr. Fairfull.

Mr. Thomas Fairfull: We've also filed for global patents on this process. Ridout & Maybee is a very good patent firm. One of the senior partners is on our board of directors, so our patents are going to be very strong.

The Chair: Thank you. Now we're out of time.

Next is Monsieur Trudel.

[*Translation*]

Mr. Denis Trudel: Thank you, Mr. Chair.

My questions will be for Mr. Breton. Even though I know him very well, I'll avoid addressing him in an overfamiliar manner.

Thank you for being here, Mr. Breton.

You testified here in 2020 as part of a study on developing zero-emissions regulations. The committee at the time unanimously recommended introducing just such a federal standard, and the government made a commitment to introduce it. We'll see what happens.

I have two questions, and here's the first: what effect will that zero-emissions standard have on the ongoing transportation electrification issue?

Mr. Daniel Breton: That's a very important question because many people think we can achieve our objectives associated with the adoption of electric vehicles without regulating. Some automotive manufacturers—though not all—say the market should be allowed to operate on its own.

The problem with that point of view is that markets are increasingly being regulated around the world, in the United States, for example, where some 15 states have net-zero emissions standards, and in Quebec, British Columbia, Europe and China. If the federal government doesn't adopt a net-zero standard, the country will be headed for a deficit because automotive manufacturers will prioritize shipping their electric vehicles to regulated markets.

Here's another extremely important aspect. If we want to discuss the future of the transportation electrification economy in Canada, we'll have to introduce a net-zero emissions standard guaranteeing that we meet our electric vehicle adoption targets as established by the federal government, which call for sales of net-zero emissions vehicles to rise to 20% in 2026, 60% in 2030 and 100% in 2035. That would establish some market predictability. Automotive manufacturers, infrastructure providers, electricity suppliers, distribution channels, construction companies and people engaged in research and development will want to come to Canada for that simple reason.

And I can prove it. Six months ago, the federal government officially announced that it would adopt a net-zero emissions standard, and, since then, \$15 billion worth of funding has been announced for transportation electrification in Canada.

• (1435)

Mr. Denis Trudel: What priority is attached to accelerating the transition to and adoption of transportation electrification?

Mr. Daniel Breton: We talk about four pillars at Electric Mobility Canada. There's the whole regulatory aspect that we just discussed, particularly the net-zero emissions standard. There are also the Clean Fuels Regulations, which Ms. Stilborn discussed, because that concerns the oil sector as much as the transportation electrification sector. Then there's infrastructure deployment. The federal government announced \$900 million in spring to install charging and refuelling infrastructure for net-zero emissions vehicles.

I'd like to point out that zero-emissions vehicles include both battery electric vehicles and hydrogen electric vehicles.

Infrastructure deployment is extremely important. Just a few weeks ago, Natural Resources Canada published a report on charging infrastructure needs across Canada by 2025, 2030 and 2035

There's also the education aspect, which is fundamental. There's so much misinformation out there, and social media contributes to it. People have to be made to understand the need to switch to electric vehicles for environmental reasons, obviously, to reduce greenhouse gas emissions and air pollution. In that connection, I would note that Health Canada stated in a study published last year that the economic cost of air pollution was estimated at \$120 billion. Most of that air pollution comes from two sectors, transportation and oil and gas.

Consequently, by switching to electric vehicles, we'll save thousands of lives because 15,300 premature deaths can be attributed to air pollution. That's eight times the number of deaths caused by traffic accidents. We would be saving thousands of lives and billions of dollars.

Lastly, there's the training aspect. I have to talk about that. If any of you have considered buying a partly or fully electric vehicle in recent years, you've probably noticed, as I have, that an enormous amount of work has to be done at dealerships, not all of them, but many of them. You get the impression they've received a lot of new vehicles but haven't really understood the ecosystem. Given the amount of misinformation and half-truths conveyed when sales staff talk to customers, many people get the impression they're making a risky economic and environmental bet in buying those vehicles.

Mr. Denis Trudel: Some witnesses here have mentioned the red tape and delays involved with federal programs promoting the development of clean technologies.

Can you tell us a little about that?

Mr. Daniel Breton: Earlier we talked about developing a battery supply chain. The potential is extraordinary, and the U.S. government has understood that. The Chinese government also understood it 20 years ago. If we want to catch up to the countries that have taken the lead on transportation electrification, particularly in the battery sector, the mining sector will have to cooperate with the first nations, for example, to accelerate projects and do so in cooperation with their representatives. I've been in touch with some of those representatives to ensure that the electrification gamble is a winning one for all parties, both economically and environmentally, so everyone feels respected.

• (1440)

The Chair: Good.

Mr. Daniel Breton: Right now, the process is taking so long that we may miss major opportunities.

The Chair: Pardon me for interrupting, Mr. Breton, but we now have to give the floor to Ms. Collins.

[English]

Ms. Laurel Collins: Thank you so much, Mr. Chair.

Thanks to all the witnesses for being here.

My question is for Electric Mobility Canada.

You spoke about those four categories—regulatory, infrastructure, education, training. Can you speak a little more about the roadblocks right now that could slow down the adoption of electric vehicles in Canada in each of those areas and the recommendations you have to overcome those roadblocks?

Mr. Daniel Breton: I would say that the first roadblock has to be about lack of education or information regarding electric vehicles, because a lot of people seem to think that if you have an EV, you can't drive in the winter. I've been driving partial and full EVs for more than 20 years now. I regularly drive in the winter from Montreal to Quebec City, to Saguenay, to Ottawa, to Toronto.

Education is very important, and training as well.

Another part of the roadblock is that we need new qualified workers. We need to make that transition for workers who work in industries in decline to come and work in the electric mobility sector, because, as I mentioned, it's the fastest-growing sector in the world right now. From mining to assembly to R and D to sales and marketing, we are looking for workers. I even had someone mention to me that when the announcement was made that there would be a huge battery plant in Windsor, some business people were not happy because, as they said, "We're going to lose our workers."

We need to help those workers become qualified for those future jobs. They are going to be sustainable jobs in a sustainable industry, and they will be well-paying jobs.

Ms. Laurel Collins: You mentioned a new International Energy Agency report that shows approximately 50% of energy jobs are in clean energy. As the world shifts towards clean energy, there are going to be way more opportunities for these jobs in renewables and electric mobility. How do we help? How does the federal government help Canadian workers make the best of this transition?

Mr. Daniel Breton: It will be by helping put together programs from high school to colleges to universities. Two of our members are the FTQ—La Fédération de travailleurs et travailleuses du Québec—and Unifor, and these unions are worried about what's going to happen to their workers in those fields that are really in decline.

When I was young, I was brought up about two blocks away from eight refineries in Montreal East. There's one left, so I know how it is when you see an industry in decline. We are seeing that right now with many industries. Next week, I'm meeting with people from the FTQ and people from Unifor because we want to put together programs to help those workers make that transition, but we need to support colleges and we need to support high schools.

We have to make sure these people see that there's an opportunity, and not just an economic one. When you're talking to the younger generation, they want meaningful jobs. What we at EMC and people in the EV industry are offering them are meaningful and well-paid jobs, so that they feel that they're part of something bigger and something positive for the future of the planet and the future of Canada.

Ms. Laurel Collins: When you've been talking about electric mobility, you've shown that there are lots of different pieces that are important: batteries, manufacturing, supply and cost issues, charging infrastructure and grid capacity. In your opinion, does Canada have a comprehensive industrial strategy for electric mobility?

Mr. Daniel Breton: Well, I'll be honest with you. I've been talking about the electric mobility industry to the people in the federal government for almost 20 years, and things have really accelerated, I would say, in the past two years, with the great work that has been

done with Minister Champagne, Minister Wilkinson, Minister Guilbeault and Minister Alghabra. We are seeing that something is really happening.

That's why we are seeing more and more companies from around the world wanting to come to Canada. Is it perfect? No. We need to have the critical minerals strategy go faster than this, because the opportunities are now. In terms of what's happening south of the border, when we were having those discussions a year ago, if you remember, we were worried that Canada would not be part of a North American battery strategy plan. Now that this is going in the right direction, we have to advance right now.

I am not a patient man. Elon Musk is not a patient man either. Right now, we are seeing problems in Germany. I don't know if you've heard about that. The Gigafactory in Germany is having problems because of regulation. If a company like Tesla wants to come to Canada, we want to make sure that we can welcome them any way we can. If it were not for Tesla, we wouldn't be having this conversation.

Let's be honest about the future of electric mobility: Yes, we have other partners and manufacturers who are doing their share, but the leadership of a company like that is too important for us to ignore. That's why we have to find ways to move both environmentally and economically at a pace that's fast enough.

Things are so quick these days. It's surprising. Sometimes it's twice a day—

• (1445)

Ms. Laurel Collins: I'm sorry to interrupt you.

Mr. Daniel Breton: Oh, I'm sorry.

Ms. Laurel Collins: It's just that I only have 30 seconds left.

In terms of ensuring that we accelerate that pace but also make sure that we have this comprehensive industrial strategy, what are the key pieces?

The Chair: You have 10 seconds, please, Mr. Breton.

Mr. Daniel Breton: It's 10 seconds. Okay.

Well, sit everybody at the same table and get them out of the room only once the thing is done.

The Chair: That sounds like a good strategy.

We're going into the second round. So that we don't go over time too much, I'm going to have to shave the time allocation by 25%. I've done the calculations.

We'll start with Mr. Carrie for a little over three and a half minutes, please.

Mr. Colin Carrie: Okay. I'll try to be as fast as I can.

I do want to investigate the hydrogen side of things a little more. We talk about charging stations, and that's all good, but I believe we have around 2,000 charging stations in Canada and, in the estimate of the Canadian manufacturers, we'll need four million by 2050. These are going to be huge costs.

What I wanted to ask my friends on their clean hydrogen.... The last panel had the information that 40% of our reductions could be done just by looking at our retrofits and real estate. Could government actually drive demand? You hear of these federal government programs encouraging individuals to retrofit, but what if the federal government actually got involved? Instead of just private homeowners retrofitting, could the federal government drive demand by retrofitting their own buildings, for example, with an upgraded, more efficient hydrogen-type furnace?

This would be for Mr. Soliman, I think.

Mr. Sam Soliman: Thank you for the question.

When the government tries to implement this technology, it will drive the whole country to look at it very seriously. For example, if we look at the solar power system, we see how the government started driving people by putting solar panels in some of their facilities. At the time, in 2008, they came up with the FIT and microFIT programs. Those created a huge demand and drove many industries and workers to work in that field.

Similarly, we expect the government to adopt the technology and try to set an example so the public is aware of it. It drives many others to be partners, to be part of it as well.

For more elaboration, I will leave the rest of it to Mr. MacDonald.

Mr. Doug MacDonald: Absolutely, Sam. That's really what drove the PV industry. It was part of the Ontario FIT program when I was the vice-president of ATS Automation and we worked in the PV sector.

There's no question, Mr. Carrie, that if we saw any kind of support from the government to drive these programs.... Take a look at the real estate holdings of the federal government when it comes to the postal service. We think that all of these buildings are leased, but no, they're not. A lot of these facilities are owned, and if there were an incentive, the government could lead the charge by demonstrating huge cost savings with that infrastructure.

We can't get into the details today, but the greatest thing about this system is that it's disruptive because it is a retrofit. As a metaphor, if you could take your gasoline engine out and turn it into a fuel cell that ran on five gallons of water, that's what we're talking about, simplistically.

From an infrastructure point of view, we would not need the reserves and we wouldn't have to buy the storage facilities for the oil or have natural gas lines. You could basically shut them off.

• (1450)

Mr. Colin Carrie: Yes, it is disruptive—

The Chair: We have time for just a quick comment, Mr. Carrie.

Mr. Colin Carrie: We don't want to see it commercialized in the United States. Have you guys ever received a federal government grant?

The Chair: Answer yes or no, please. We have to move on to—

Mr. Doug MacDonald: No, we haven't. I've never had a grant from the government.

The Chair: Okay. Thank you.

Mr. Colin Carrie: There's no cost to taxpayers. I like that.

The Chair: Go ahead, Mr. Duguid.

Mr. Terry Duguid (Winnipeg South, Lib.): Thank you, Mr. Chair, and thanks to our witnesses.

I'm very interested in medium- and heavy-duty vehicles, so I think this question is directed to the Canadian Fuels Association.

I come from a trading province. About 87% of our goods go south of the border. There are a lot of trucks on the road, and our witnesses will know that a big part of our emissions profile is transportation, and that is increasing year over year.

I'm wondering if the Fuels Association might comment on our emissions reduction plan and some of the measures in it, such as the clean fuel standard and, of course, our price on carbon, the clean electricity regulation and other measures that I'm sure they have pored over. How important are those measures to drive innovation in the transportation sector?

Perhaps you could comment on your tax credit again and amplify what the challenges are from U.S. investment. We've heard that as a theme in some of the comments.

My major question is, what happens if these measures go away? As you know, when governments change, things can change, and one political party, as you know, does not believe in pollution pricing and would probably eliminate all of these measures. How important are continuity and certainty to the fuel sector in driving innovation?

The Chair: You have about a minute and a half, Ms. Stilborn.

Ms. Lisa Stilborn: Thank you very much, Mr. Duguid.

I'll start, but I'll hand the second part of the question over to my colleague Dave Schick.

Regulatory certainty is absolutely primordial for us. Investment decisions are not made on one- or two-year cycles; they're made on 10-, 20- or 25-year cycles. I'll give you an example. On the strength of the CFR, there are many investments, and planned investments, already *en train* to deal with that.

To your second question with respect to doing a deeper dive on incentives, I'd start that off for Dave by saying that the CFR dramatically increases the domestic demand for biofuels, as I said in my remarks, which we don't have right now. In fact, we're importing, and the trend toward importing is growing, even without the CFR. The two really go hand in hand—the opportunity with the incentives—to grow the domestic market, so that we're in a position where we're making and not buying.

I'll turn it over to Dave.

The Chair: Be very brief. You have 20 seconds. I'm sorry, Mr. Schick.

Mr. David Schick (Vice-President, Western Canada, Innovation and Regulatory Affairs, Canadian Fuels Association): The hard-to-decarbonize sectors are going to require a lot of different methodologies in order to make sure that aviation, long-haul transportation and rail are able to decarbonize. Liquid fuels are going to be fundamental to that. That requires the utilization of existing infrastructure to decarbonize, acknowledging that electrification is going to be very important over the longer term.

The Chair: Thank you very much.

[Translation]

Mr. Trudel, you have the floor for two minutes.

Mr. Denis Trudel: Thank you very much, Mr. Chair.

Mr. Raymond, you talked about geothermal energy, and that's a very interesting topic.

Could you give me an idea of the potential that geothermal energy, which is in fact energy from the earth, represents?

I'd like you to tell me about Sweden and, more specifically, about the experience of Kuujuaq.

• (1455)

Mr. Jasmin Raymond: There are various issues there. As regards potential, I think that we haven't achieved its full potential and that there's ample room to develop geothermal systems in Quebec, Canada and elsewhere.

Take Sweden, for example, which decided to invest in geothermal several decades ago. The country doesn't have a lot of choice in renewable energies and decided to invest in geothermal heat pumps. Now the residential market in Sweden is saturated, and virtually all houses that can be heated by geothermal energy are. It's mainly the commercial market that offers growth opportunities, particularly new construction.

Here geothermal heat pumps represent 1% or 2% of the heating market. So there's still major growth potential for that type of heating, which would help us replace the petroleum products, fuel oil and natural gas, that are still used to heat buildings.

The north is a special case. What's important in the north is to provide local resources. Northern communities need that independence if they want to achieve a certain degree of development. Geothermal energy is one option for providing those local resources. The example I often cite is the construction of high-voltage lines. The cost per kilometer of high-voltage line is approxi-

mately \$1 million, and the cost to drill is similar per kilometer of depth.

The Chair: That's very interesting, and the comparison's quite clear.

Ms. Collins, you also have two minutes.

[English]

Ms. Laurel Collins: Thank you, Mr. Chair.

I have two questions. The first is about the Inflation Reduction Act that was recently passed in the United States. It's the largest investment ever in the fight against the climate crisis. Part of this is investments in tax credits for electric vehicles in North America.

Mr. Breton, have you looked at how those measures could affect the electric mobility industry here in Canada?

Mr. Daniel Breton: Obviously, it's going to have an impact, but for some reason, the U.S. administration decided that for vehicles to be eligible, a certain percentage of the cars have to be built in North America now. What that means is that many vehicles are not eligible right now, which is not the case in Canada, unless they go over a certain threshold.

Yes, it has an impact, but let's face it: Some people say that we should....

By the way, I wanted to answer one comment, which is that—

Ms. Laurel Collins: Mr. Breton—

Mr. Daniel Breton: —we need four million public chargers between now and 2050—

Ms. Laurel Collins: —we've only got a minute left—

Mr. Daniel Breton: Okay. I'll make it very quick. We don't need four million public chargers. That data is wrong. There was public research published by NRCan a few days ago. It's much less than that.

Regarding the Inflation Reduction Act, what I wanted to say is that when you look at rebates for electric cars.... I'll give you an example. Where you live in B.C., the rebate is \$4,000. You were at 15.5% EV sales in the first quarter of 2022. In P.E.I. and New Brunswick, there was a \$5,000 rebate, but the sales were at less than 5%. What was the difference? It was the ZEV mandate: Because there was a ZEV mandate in B.C. and there was no ZEV mandate in Atlantic Canada, they could not get their hands on electric cars there.

The Chair: That's interesting. That's a very good point.

Mr. Daniel Breton: What happened is that people from Atlantic Canada had to go to Ontario, Quebec or B.C. to get their hands on one, and therefore they could not be eligible for the rebate from their province.

The Chair: Thank you.

Mr. Mazier is next, or was it somebody else?

I have you on the list. You have about three minutes and 30 seconds.

Mr. Dan Mazier: Ms. Stilborn, I spoke to Alberta Innovates a while back. They expressed concern over investment and intellectual property leaving Canada if we don't capitalize on clean technology. Can you tell the committee what will happen to the intellectual property if we don't commercialize technologies that we are developing in Canada?

Ms. Lisa Stilborn: Dave, I'll let you answer that.

Mr. David Schick: It's very critical that we make sure we move from the good R and D we're doing—particularly in Alberta, where there's a lot of energy innovation going on—and make sure that we're commercializing it here, so that we're able to take advantage of the economic benefits and the decarbonization potential we have from all of the resources and expertise that we have in the Canadian context.

I think that means ensuring that we have very clear support, as well as investment parity and regulatory certainty to allow these projects to move forward to the commercialization space in this country rather than being exported to other jurisdictions.

• (1500)

Mr. Dan Mazier: Mr. Seeback, I'll leave it up to you.

The Chair: We're going with Mr. Seeback.

Mr. Kyle Seeback: Thank you.

Mr. Breton, you seemed to indicate that you disagree with the number of charging stations that are required. The Canadian Vehicle Manufacturers' Association is very clear on this. They set out what the charging gap is across the country. They say that chargers needed to support a fleet at 50% ZEVs in the province of Ontario alone is 608,000, and they say the gap is 602,000. Across the country, they say the gap is actually 1,660,338. I would think they know what they're talking about.

Do you disagree with this?

Mr. Daniel Breton: They don't know what they're talking about.

I'm sorry to say this, but there were two studies published, one by ICCT and another one by NRCan, that stated that between now and 2025 we need about 52,000 public chargers and about 200,000—

Mr. Kyle Seeback: Is that across the entire country?

Mr. Daniel Breton: It's across the country:

Keep in mind that 80% to 90% of charging happens at home. That's why we don't need that many public chargers. I drive an electric car on a daily basis. I've been driving it for more than 20 years.

By 2030, according to the report released by NRCan, we're talking about 200,000 public chargers by 2030, 440,000 by 2035, 640,000 by 2040, 736,000 by 2045, and by 2050, about 727,000.

Keep in mind that the technology evolves really quickly. What happens is that we'll need fewer chargers, but more powerful ones, and the chemistry of batteries is going to change and make them more efficient. At one point, it's going to get more like having gas

stations. That's why the whole picture is going to change, and to say that we need four million public chargers between now and 2050 just doesn't make sense. I'm sorry.

We look at all the data from the scientists. I really don't know where they're getting that number from.

The Chair: You have time for a quick comment, Mr. Seeback.

Mr. Kyle Seeback: If I were going to choose who I'm going to trust with what's needed, I would trust the Canadian Vehicle Manufacturers' Association over a study from NRCan.

Mr. Daniel Breton: Or from people from Electric Mobility Canada, who have...? I have more than 20 years' experience in this.

The Chair: Okay. Thanks very much.

We'll go now to Mr. Weiler for the last question.

Mr. Patrick Weiler: Thank you.

I'd like to go back to Mr. Breton for a question.

You mentioned the recent report by Clean Energy Canada and the importance of Canada's critical minerals strategy in being able to fully take advantage of the opportunities in the electric vehicle supply chain. I was hoping you could comment on that piece, the upstream part with the mining sector that Canada really needs to advance on.

Mr. Daniel Breton: I'm sorry. I could hardly hear you. Could you repeat that, please?

Mr. Patrick Weiler: Sure.

You mentioned Clean Energy Canada's recent report on taking advantage of the opportunities in the electric vehicle supply chain. Earlier in your testimony, you also mentioned the importance of Canada's critical minerals strategy. I was hoping you could expand on that and on what Canada needs to do to be able to fully leverage its mineral resources to advance electrification in transport.

Mr. Daniel Breton: I would say that we need to make sure that we not only extract the resources but transform the resources here as well.

In the past, Canada was very good at extracting resources, whether it was wood or oil or anything else. The crude products would be sent outside the country. Then we would end up having value-added products come back to us. The best jobs and the best technologies would be developed elsewhere.

As I mentioned, when we're talking about battery technology that was developed in Quebec and Nova Scotia, it would make no sense if Canada had a critical minerals strategy whereby we would send our crude products, our minerals, to the U.S. for them to transform them and make them into packs and batteries. I think it's very important that we have an integrated strategy that will create as many jobs as we can in Canada.

That's why we need regulation that is ambitious enough and stringent enough for us to not let every mineral that comes out of the earth in Canada go directly to China, or anywhere else, for that matter. I think this is very important.

• (1505)

Mr. Patrick Weiler: Thank you.

I'd like to address my next question to the Canadian Fuels Association.

What opportunities do you see for Canada in the decarbonization of transport and shipping on the marine side?

Ms. Lisa Stilborn: Thank you very much for the question. I think my colleague Dave Schick is probably in the best position to answer that.

Mr. David Schick: I think it's multi-faceted. We have the opportunity to increase the amount of biofuels in the marine sector. Canada has an opportunity to take waste residue and create fuels in that regard. I think that's a significant opportunity. Our members have large projects that are planned to produce renewable diesel by

either coprocessing products or producing renewable diesel in that regard.

There's also the potential for ammonia from methane extraction as a marine fuel. That is an excellent one. I think liquefied natural gas over the near term is an opportunity for the marine sector as well. Some would say it's transitional, but it's also a very significant opportunity to leverage the resources through CCUS and have liquefied natural gas that's of a lower carbon intensity as well.

The Chair: Thank you so much.

That's all the time we have today. I want to thank the witnesses for a very informative and at times lively discussion. I'm sure the analysts very much appreciate the input we've received today, as do all the members. Thank you very much.

Have a good weekend, everyone. We'll see the members next week on Tuesday.

The meeting is adjourned.

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