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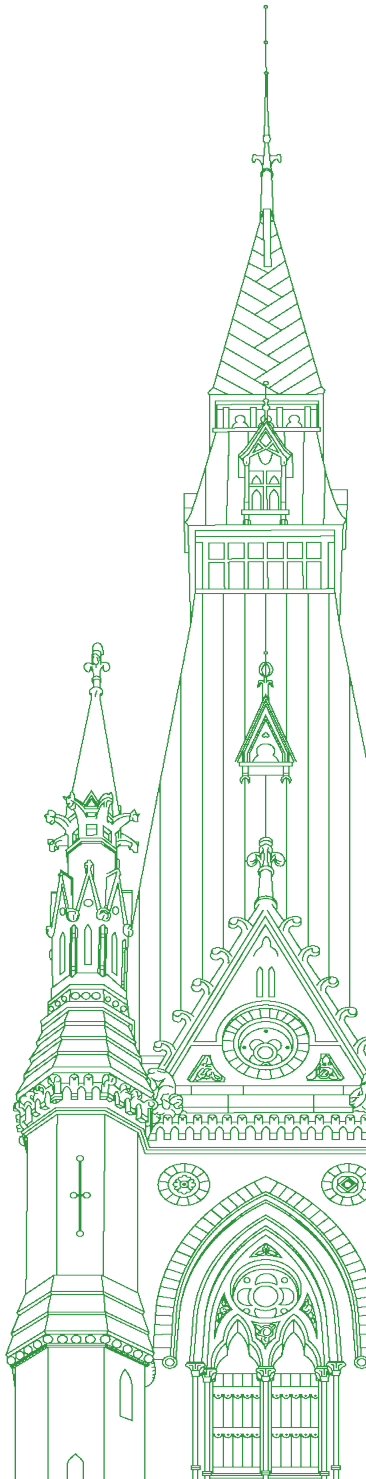

Chair: Mr. James Maloney

Standing Committee on Natural Resources

Monday, June 14, 2021

● (1105)

[*English*]

The Chair (Mr. James Maloney (Etobicoke—Lakeshore, Lib.)): I call this meeting to order.

Good morning, everybody. Welcome to meeting number 33 of the Standing Committee on Natural Resources.

I'd like to welcome our members and our guests, particularly those who are on the west coast and who are up bright and early to attend the meeting. We are very grateful. We have another great panel this morning to continue our study.

I believe all our panel members are familiar with the process, but I'll go through it quickly.

We're doing this by Zoom, so we have to be a little patient and not talk over each other. Speaking slowly is not a bad thing; it helps our translators.

You have translation services available to you on your screen. You are welcome and encouraged to speak in either of our official languages. You will be asked questions in both, I'm sure, and thank you for coming.

Each presenter will be given up to five minutes to make their opening remarks, and once all of them are completed, they will be followed by questions from the members.

We have four witnesses today. We have Air Products Inc., Dr. Jacques Roy, Ballard Power Systems Inc. and Hyundai Auto Canada Corp.

Thank you for joining us.

I will go through the opening remarks in that order, so why don't we start with Mr. Simon Moore, who is the vice president, investor relations, government relations and sustainability from Air Products Inc.?

The floor is yours, sir.

Mr. Simon Moore (Vice-President, Investor Relations, Government Relations and Sustainability, Air Products Inc.): Thank you.

Good morning, Mr. Chair and honourable members of the committee. On behalf of the employees of Air Products globally and in Canada, thank you for the invitation to appear before your committee today.

Air Products is a global corporation with a market cap of over $65 billion and operates in over 50 countries. Our 19,000 employees work hard every day supplying critical products to customers in a variety of industries. Our products enable our customers to be more productive and more efficient. For example, last year our products allowed our customers to avoid the equivalent of 72 million metric tonnes of equivalent carbon dioxide emissions.

At Air Products, our higher purpose is to bring people together to collaborate and innovate solutions to the world's most significant energy and environmental sustainability challenges. Obviously we consider the energy transition one of the greatest challenges of our time.

We are the leading global supplier of hydrogen. Every day we produce and safely transport over 9,000 tonnes of hydrogen via pipeline and trucks. We were a pioneer in the hydrogen for mobility market—we've been involved in over 250 projects over the last 15 years—and we participate in over one and a half million hydrogen fills every year.

We have a strong presence in Canada as the leading supplier of hydrogen. Our Alberta Heartland Hydrogen system began operations in 2006. Today we have three world-scale plants connected by an over 50-kilometre pipeline network supplying the refining and petrochemical sectors. We also have a hydrogen system, including liquefaction, in Sarnia.

Our sustainability-driven offerings for gasification, carbon capture and hydrogen are essential and necessary components of any realistic energy transition plan to reduce carbon intensity while also meeting the world's growing energy demand.

A prime example of translating our vision into reality is our announcement just last week of a world-scale energy complex in Edmonton, which will begin with a transformative $1.3-billion net-zero hydrogen production and liquefaction facility to be on stream in 2024. This project is an example of what we can achieve when all three levels of government work to create a common solution, bring investment, and in this case provide over 2,500 good-paying construction jobs when they are desperately needed.

This first-of-its-kind investment enabling the production of net-zero hydrogen from natural gas was made possible by Canada's clean energy diversification strategy and regulatory framework that made it clear that clean hydrogen will be a key enabler to Canada's being carbon-neutral by 2050.

During the announcement ceremony last week, which included Minister O'Regan and Minister Champagne, our chairman, Seifi Ghasemi, stated, “I can't think of a better place to invest our money for the long term than Canada. You are leading the world in the vision for energy transition.”

While we are clearly supportive of the federal government's leadership, I'd like to suggest a few overarching considerations.

First, with regard to hydrogen, consider focusing on carbon intensity, not colour. Much of the world still assumes that green hydrogen made from renewables is better than blue hydrogen derived from fossil fuels, mainly natural gas. We believe the net-zero complex we announced last week proves that blue hydrogen can be produced with a carbon intensity equal to green. Where that's the case, the policy should be agnostic to how the hydrogen is derived and focus on its carbon intensity. This will allow the market to determine the best option.

Second, in tax policy, focus on CO2 reduction efficiency, not capital investment. Finance Canada is currently conducting a consultation on tax policy to incent carbon capture and storage. We had hoped Canada would follow the U.S. lead with a tax incentive similar to the U.S. 45Q tax reduction tied to the volume of CO2 sequestered. Finance Canada's proposed capital investment tax credit approach runs the risk of prioritizing capital investment inefficiency over CO2 reduction efficiency. We hope this approach gets reconsidered.

Finally, address the historical bias against multi-facility solutions. For over 70 years, Air Products has been a pioneer in the outsource model of industrial gases and energy supply. For the refining sector, our outsource model is recognized as a global best practice for the safe, reliable and capital-efficient supply of critical gases like hydrogen. Unfortunately, federal tax and environmental policies have in the past created an unintentional bias against our multi-facility offerings. This bias has even made its way into the proposed clean fuel standard, which we're working hard to address with officials at Environment and Climate Change Canada. Given that every tonne of CO2 reduction matters, we urge you to avoid the flaw everywhere you can.

● (1110)

Thank you again for the opportunity to come before the committee today. I look forward to answering any questions you may have.

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

Next up we have Dr. Jacques Roy.

[*Translation*]

Dr. Jacques Roy (Professor, HEC Montréal, As an Individual): Thank you, Mr. Chair.

Respected committee members, thank you for the invitation. I am happy to be joining you today to share the results of my research on hydrogen's potential.

I am a professor of operations and transportation management. I am not a chemist or an expert on hydrogen. What I am particularly interested in are its applications to various modes of transportation.

My interest in hydrogen is actually pretty recent. It goes back to 2019, when I carried out a study on the use of hydrogen around the world. That was a study I carried out for the Hydrogène Québec coalition, which is made up of automobile manufacturers, including Hyundai and Toyota, gas producers, such as Air Liquide and Messer, and energy distributors. The study was essentially based on a fairly comprehensive literature review and on a few interviews with experts in the field. In less than five minutes, I would like to provide you with a few highlights of the study, which will soon be available to you.

As we all know, the use of electric zero-emission vehicles is a growing global trend. There are actually two types of electric vehicles. The best known are of course battery-powered vehicles, which are becoming increasingly available on the market. There are also vehicles that use hydrogen fuel cells. Batteries are more appropriate for small vehicles travelling short distances, while hydrogen fuel cells are better suited for use in heavy vehicles travelling long distances. We could be talking about class 8 trucks, for example, or even about less heavy vehicles that need to operate for many hours in a day. Under those circumstances, hydrogen becomes a more worthwhile option. Between the two types, there is a whole slew of hybrid vehicles, either plug-in or not.

Hydrogen vehicles are becoming increasingly popular around the world. We estimated in our study that there were about 13,000 of them at the end of 2018. One year later, the number reached 25,000, so it nearly doubled.

Hydrogen vehicles are everywhere—for example in the United States, especially in California; in Asia, especially in Japan, China and South Korea; and in Europe, such as in Germany, France, Norway, the United Kingdom, and so on. Of course, there must be enough charging stations for that many vehicles. So the number of charging stations has also increased. It went from 376 stations at the end of 2018 to more than 470 stations one year later. That growth has mostly been happening in Asia and in Germany.

Concerning vehicles, an increasing number of buses are also being converted to hydrogen or are using hydrogen as their source of energy. Hydrogen buses are commercialized around the world, but very little in Canada. Sales are skyrocketing. In the past year, over 4,000 orders have been placed in China and another 4,000 orders in South Korea. I am sure the Ballard Power Systems representatives will be able to talk to you about this. In fact, we have in Canada vehicle and equipment manufacturers such as Ballard or Hydrogenics, which is now owned by Cummins. We have very active manufacturing businesses in that sector.

I will say a word about the transportation of goods. I think that hydrogen is especially appropriate for heavy trucks, which are, as you know, the main source of pollution in transportation. I am talking about heavy-duty trucks, which travel long distances. Canadian winters are harsh, and battery-powered trucks are less efficient in those conditions.

There are a number of hydrogen truck manufacturers in the world. I will not name them all, but some are Hyundai, Cummings and Toyota.

Someone talked earlier about Alberta and the production of hydrogen from natural gas. It is interesting to note that testing is currently being done in Alberta as part of the AZETEC project, which brings together transport companies such as Trimac and Bison. Researchers will essentially test hydrogen trucks travelling between Calgary and Edmonton. I think that experiment should be followed very closely. The same experiment should even be replicated in Quebec and in Ontario. The same kind of a test could be carried out in the Montreal-Toronto corridor.

Those trucks have been commercialized around the world, including in the United States, by Anheuser-Busch, in France, by Carrefour, and in China and Japan.

The advantage of hydrogen trucks over battery-powered trucks is clearly the recharge time. It takes about the same time to recharge with hydrogen as to fill a diesel fuel tank. The weight of batteries is also an important downside for trucks with electric batteries. Transporters want to transport goods, not batteries. What is more, the range is significant. When hydrogen is used, there is no loss due to the cold. There is enough power to transport goods between Abitibi and Montreal, for example.

However, there is currently a considerable downside, over the short term, and that is the high cost. I am here talking about the cost of equipment, of hydrogen and of transportation.

That said, every study I have looked at—

● (1115)

[*English*]

The Chair: Doctor, I'm going to have to ask you to wrap up quickly, if you could, please.

[*Translation*]

Dr. Jacques Roy: Okay.

We expect the costs to drop quickly.

It is also possible to convert passenger trains to hydrogen. There are several projects of that kind, including in Germany and in France.

Hydrogen can also be used for other purposes—for example, forklifts, industrial applications or even aircraft projects. Airbus plans to use hydrogen in its future aircraft.

I will summarize everything with a few recommendations for you.

[*English*]

The Chair: You'll have to do it very quickly, please, Doctor.

[*Translation*]

Dr. Jacques Roy: Okay.

Governments should develop a roadmap and encourage initiatives involving hydrogen. It must be said that, in countries that are successfully using hydrogen, governments are involved. We also recommend stimulating research and development. Incentives for purchasing hydrogen vehicles should also be implemented, especially for vehicle fleets. In addition, the use of hydrogen must be encouraged in new projects. I am here thinking of the Quebec City tramway and the VIA Rail high-frequency train.

As my time is up, I will stop here. I could answer any questions you may have about other hydrogen applications.

I apologize. We, professors, usually have three hours.

[*English*]

The Chair: You're going to have to stop now.

[*Translation*]

Dr. Jacques Roy: That is what I have to say.

[*English*]

Sorry.

The Chair: Thanks, Doctor.

We'll go over to Mr. Pocard from Ballard Power for five minutes, please.

[*Translation*]

Mr. Nicolas Pocard (Vice-President Marketing , Ballard Power Systems Inc.): Good morning, everyone.

[*English*]

Mr. Chairman and members of the committee, thank you very much for allowing me to be a witness on your panel today.

I am very happy to be representing Ballard Power Systems. Ballard is a Canadian company, based in British Columbia. Today, globally, we employ over 950 people, with more than 760 in Canada. We have been developing fuel cell technology for the past 40 years, and we put on the road the first-ever fuel cell buses in Vancouver in the late 1990s. Today we export almost 100% of our production, and last year we produced over 100 megawatts of fuel cell products.

The hydrogen strategy, which was published in 2020 by NRCan, highlighted the critical role of hydrogen in the decarbonization of the Canadian economy in order to reach carbon neutrality by 2050, especially for the hard-to-abate sectors like heavy-duty transportation. This has been highlighted by previous speakers.

Fuel cell electric buses, trucks, trains and ships benefit from the high energy density of hydrogen as a fuel to match the performance of diesel vehicles, but with zero emission and without any compromise in operation, enabling long-range operation in harsh climates like we have in Canada.

The use of green hydrogen produced from renewable energy, as recently announced by some projects in Quebec, will reduce GHG emissions by 89% for heavy-duty trucks, compared to the diesel equivalent. Such a reduction can also be achieved by using blue hydrogen produced from natural gas with carbon capture and sequestration.

As an example, a transit bus using such low-carbon blue hydrogen in Alberta will reduce its GHG emissions by 83%, compared to a diesel bus. To compare, a battery electric bus will only reduce emissions by 50% in Alberta due to the higher carbon intensity of the electric grid.

The use of hydrogen as a low-carbon fuel is also an economic opportunity for Canada. With a unique, strong and world-leading hydrogen and fuel cell industry, Canada is very well positioned to benefit from this transition.

At Ballard alone, we have created over 200 high-paying jobs in the past two years. According to the NRCan hydrogen strategy document, up to 350,000 jobs can be created in Canada with the growth of the hydrogen economy in the next three decades.

We believe now is the time to act and the time to start. Supporting the production of hydrogen as a low-carbon fuel in Canada with regulations such as clean fuel standards and providing financial incentives for vehicle operators will accelerate the adoption of zero-emission fuel cell vehicles such as transit buses and trucks. We are demonstrating these vehicles now in Alberta with the 60-tonne fuel cell truck, as part of the AZETEC project, or in trains, as was recently announced by CP Rail, which has its first freight locomotive using hydrogen as a fuel. All those vehicles disproportionally contribute the most to GHG emissions, compared to other modes of transportation.

Thank you very much.

● (1120)

The Chair: Thank you very much.

Next, from Hyundai Auto Canada Corp, we have Don Romano, president and CEO.

Mr. Don Romano (President and Chief Executive Officer, Hyundai Auto Canada Corp.): Thank you very much.

[*Translation*]

Good morning, everyone. Thank you for having me.

[*English*]

I'll start by saying the auto industry is past the inflection point of change when it comes to electrification, having invested to date over $300 billion in zero-emission vehicle development and production, which is already resulting in a substantial supply, with much more to come. You could confidently say that our industry is at the point of no return when it comes down to zero-emission vehicles in the future.

I'm proud that Hyundai is an industry leader. We presently are the second-largest retailer of zero-emission vehicles, next to Tesla, and one of the only brands to offer hydrogen fuel cell cars in Canada.

While we offer hybrids and plug-in hybrids, our primary focus is a zero-emissions future with pure EV and fuel cell vehicles. We believe in fuel cell vehicles for a number of reasons, which have already been discussed. In addition to being zero emission, they're more consumer-friendly. As I think Mr. Roy had mentioned, the vehicles charge rapidly, in five minutes, and they have a substantially longer range than traditional all-electric vehicles. This addresses the two biggest consumer issues that we face, the two biggest pain points: the charge time and the range.

In addition, fuel cell vehicles require substantially fewer batteries. Really, regardless of whether a consumer chooses an electric vehicle or a fuel cell vehicle, as long as it's zero emissions, the real challenge we face is the infrastructure for charging. Both electric charging stations and hydrogen fuel cell pumps in our country are too few in number to accommodate the current and forthcoming supply of zero-emission vehicles. To change the situation, we need commitments—commitments from gas stations, retail outlets, home builders and parking operators to install the charging systems that will give all Canadians the peace of mind that zero-emission vehicles will accommodate all their transportation needs. In other words, it's going to take a village for our country to make zero emissions part of our future and turn that into a reality.

If we all pull together, I believe a zero-emission future is not just possible but inevitable, and when I say “all”, I mean everybody. It cannot be just the people who are speaking today and it cannot just be auto manufacturers. Everybody is going to have to carry their weight and get involved in this movement.

Thank you very much for your time.

● (1125)

The Chair: Thank you very much.

We'll move to the first round of questions for six minutes each, starting with Mr. Lloyd.

Mr. Dane Lloyd (Sturgeon River—Parkland, CPC): Thank you, Mr. Chair; and thank you to all the witnesses for coming out today.

I'm most interested in starting with our friends from Air Products Inc. I'm very excited to see your $1.3-billion announcement in the Alberta industrial heartland, which is partially in my riding of Sturgeon River—Parkland.

Why did your company believe the Alberta industrial heartland was the best place to make this investment? What were the factors that played into that decision?

Mr. Simon Moore: Thank you very much. I appreciate the recognition of the very exciting announcement.

There were a number of factors. To be frank, we've had a very successful hydrogen production and pipeline network operation in the area for more than 15 years, so we have experience in executing projects there. We've had the support of various government authorities, as well as a very qualified workforce in the area, so quite frankly, we know it's a good place to do business. That's one thing.

The second thing is the ability to effectively capture and sequester the CO2, taking advantage of the Alberta carbon trunk line, the CO2 pipeline. Obviously it is very beneficial to carry out this project where you can take natural gas and capture over 95% of the CO2 to be sequestered, and then generate hydrogen-based electric power to offset the rest. Of course, this project, in addition to making zero-carbon hydrogen for our pipeline network, is also going to feed hydrogen into a liquid hydrogen plant that will make liquid hydrogen for the mobility market.

Finally, I must say that we were very excited to see the significant support coming from various levels of the Canadian government, including a number of officials who joined us on our announcement call last week.

That's a combination of factors that helped us make this the right decision for us.

Mr. Dane Lloyd: Drilling down into that, one thing in this part of the country is that we do have some renewable power, such as windmills and solar panels, but Alberta is very well known for its natural gas resources and those energy sources. We've been debating and talking with witnesses about the merits of blue hydrogen and grey hydrogen versus green hydrogen.

I presume you're using blue hydrogen. Did the blue hydrogen play a role in your investment decision?

Mr. Simon Moore: Yes, and as I said in my remarks, I think we are all familiar with the colours, but I think, honestly, that occasionally assigning these products colours can confuse things. I'll just expand on that for a second.

Obviously, everybody is aware that blue hydrogen is produced from hydrocarbons, but what matters is its carbon intensity. In a different type of process, you might only be able to capture half of the CO2 from a hydrogen plant. We chose a different process that helps us capture more than 95% of the CO2. Quite frankly, the carbon footprint of the hydrogen from this project is very similar to that of so-called green hydrogen produced from a project using renewable energy, so again I think it's important to keep focused on the actual carbon intensity, as opposed to what colour it is assigned.

We've certainly looked at different opportunities. Not to get off track, but we're building a $7-billion renewable, carbon-free, green hydrogen facility in Saudi Arabia for exporting hydrogen around the world. I share that with you to provide some credence behind the idea that we have the capability to do both hydrocarbon-based zero-carbon hydrogen and renewable energy-driven carbon-free hydrogen, and we saw again, with the opportunity to deploy this technology and leverage the CO2 pipeline, that this looked like the right solution here to create net-zero hydrogen.

● (1130)

Mr. Dane Lloyd: Thank you.

Something that you remarked on interested me. You were talking about the Q45 tax credit. That's something I've brought up numerous times in this committee.

Can you describe to us, with regard to the United States Q45 tax credit, the differences that concern you between that and what has been proposed in the recent budget? What would you propose that would be more helpful for your industry?

Mr. Simon Moore: Yes. I realize this is an oversimplification, but at the end of the day, we want this policy to reduce CO2. If the policy is set up to be a credit for investment, that is indirect. If the policy is set up to create value for actual volume of CO2 sequestered, that seems to be a lot more direct.

A concern would be a policy that, again, is tied to the amount of capital spent. It might result in inefficient use of capital. What would be a more direct approach would be to directly incent putting the CO2 in the ground, which is what this is focused on.

Mr. Dane Lloyd: Thank you.

My next question is for our friends from Ballard Power. I seem to be getting a theme here with this trucking job that's coming out of Alberta.

I was wondering if you could talk about how many years we are looking at before we see a significant market share for hydrogen fuel cells in large trucks in Canada. How many years do you think we are away from that?

Mr. Nicolas Pocard: It's a really good question. I wish I had an answer for you.

I think it's going to depend on the ability of the industry, like Ballard on the fuel cell side or the engine side, to drive the cost, and I think for that we are on the right track. We have been reducing a lot of costs for the technology in the past five years. Accelerating now, we are in really aggressive cost reduction, so we should be able, by the end of the decade globally, to be at parity with diesel trucks. On the fuel cell side, I think we're making really good progress.

I think, though, the challenge would be the deployment of the hydrogen infrastructure. If we want to be able to have a significant market share of trucks operating with hydrogen, we need to bring that heavy-duty station infrastructure across Canada.

Initially we can start with trucks operating as a fleet base—home and return, or operating between two points—to minimize the requirement in terms of hydrogen infrastructure by focusing on those fleets of vehicles. We fully believe that by the second part of this decade, we can start to see a significant part of those vehicles being fuelled by hydrogen.

Mr. Dane Lloyd: Thank you.

One more quick—

The Chair: Thank you, Mr. Lloyd.

Mr. Weiler, we go over to you.

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 for a very interesting meeting today.

My first question is for Air Products.

Mr. Moore, you mentioned a few things that I thought were quite interesting. You mentioned not only the important announcement last week in Canada but also that you're pursuing a hydrogen production facility focused on green hydrogen.

I know there's—not to get too much into the debate over colours—sometimes a disagreement on whether it makes sense to produce blue hydrogen when there are estimates that over time, green hydrogen is going to be cheaper to produce.

I'm curious to hear what made you decide to pursue blue hydrogen in Alberta but then focus on producing green hydrogen in Saudi Arabia, just in terms of the cost profile of producing it.

Mr. Simon Moore: Thank you very much.

I think in general we see this energy transition driven very much by hydrogen. It's going to have to be an “and” solution, not an “or” solution. There are going to be sets of circumstances in different places in the world that create the right incentive to do a renewable energy-driven electrolysis project, and then there are going to be other parts of the world where it makes sense to do a hydrocarbon-based project. The technology magic is to have a hydrocarbon-based hydrogen solution that has the lowest CO2 footprint. I think there is a different set of circumstances in different cases. We want to be a provider of all of these types of solutions to our customers and/or countries around the world that are looking for it.

As I mentioned earlier, there are some very strong and strategic reasons that we think this project makes sense, which we announced last week. I would also add that we hope this is not our last investment in this space in Canada. We are open to additional hydrocarbon-based investments as well as renewable energy-based hydrogen investments.

● (1135)

Mr. Patrick Weiler: Thank you.

To follow up on that, I'm just curious if you could explain a little bit about how you see the announcement from last week fitting into the federal government's wider hydrogen strategy. What do you see as potential next steps in terms of your own company's projects, and also what you're hearing from some of your competitors in this market on what that might mean in terms of creating a hub?

Mr. Simon Moore: Great. Again, our project not only provides pipeline hydrogen at net zero but also creates 30 tonnes a day of net-zero liquid hydrogen that can be used for the transportation market.

One of the reasons we have the witnesses we have here today is that they all represent one of the key pieces of making this happen. We can't do it alone. The auto companies can't do it alone and the fuel cell companies can't do it alone.

One of the things we're proud of now is that we can say, without a doubt, that in 2024 there will be 30 tonnes a day of net-zero liquid hydrogen available from this project. Again, we hope this is just a start.

That's one of the key elements. From that, then, as was mentioned a few times, the actual fuelling infrastructure needs to be created. I very much agree with the earlier witness who talked about heavy trucks and buses being the right market for hydrogen in the short term.

One thing is that each of us, in our own way, has to take bold steps. We have to move this forward, and we have to move it forward in a way that ends up with the right vehicles, the right incentives, and quite frankly, the right hydrogen when it's needed.

Mr. Patrick Weiler: Thank you.

That's actually a great segue to my next questions for Ballard Power.

I also hail from British Columbia, and we do have some hydrogen fuelling stations here. One is not far away from where I live. I am always quite impressed with the breadth of markets that Ballard is selling into and the range of products that your fuel cells are being used for, whether that's buses, trains, trucks, ships, cars, forklifts and more.

I was hoping you could discuss where you see the greatest opportunity for your products globally. What are the factors leading to that interest that we may be able to emulate in Canada to create that market here?

Mr. Nicolas Pocard: Thank you for your question.

I believe, as I mentioned earlier, that heavy-duty mobility is really where hydrogen provides one of the most attractive value propositions. I think the high energy density of hydrogen enables a lot of energy to be packed on those vehicles.

If a vehicle operates for long hours, such as a transit bus that is on the road from 5 a.m. to sometimes 11 p.m. or a truck that covers a very long distance, or a train, those vehicles need a lot of energy. Hydrogen provides the energy storage that is required and delivers the range that vehicle operators need.

As well, as was highlighted earlier, the quick refuelling enables those vehicles to be.... Those vehicles are more expensive than a regular vehicle, so you want to utilize those vehicles as much as possible. You want to operate them in multiple shifts. Hydrogen allows you to do that. This is really where we are focusing today. It's in that heavy-duty mobility segment. Those vehicles produce more emissions proportionately than a car that might be used only one hour per day. I think if you want to have the biggest impact on vehicle operation to enable the transition to zero emissions, as well as address GHG emissions, this is where the sweet spot is. It's what is recognized. If you look at every hydrogen strategy published by more than 30 countries in the past 18 months, you see that they all highlight that for transportation—and there are other sectors—heavy-duty mobility is one of the sweet spots.

The Chair: Thanks, Mr. Weiler.

We'll move on to Mr. Simard.

[*Translation*]

Mr. Mario Simard (Jonquière, BQ): Thank you very much, Mr. Chair.

My question is for Mr. Moore.

I am a little confused. To get my head around the hydrogen issue, I got in touch with Karim Zaghib, who holds a Ph.D. in electrochemistry and now works for Investissement Québec. He was telling me that producing 1 tonne of blue or gray hydrogen could generate between 10 tonnes and 11 tonnes of CO_2.

You are saying that colours need not be taken into account, but I am rather under the impression that they are quite important.

I would like to know whether you have any numbers concerning the amount of carbon 1 tonne of blue hydrogen produces. If so, could you provide them to the committee?

● (1140)

[*English*]

Mr. Simon Moore: Thank you very much.

If I did not understand the question, please ask again.

When we speak of hydrogen produced from natural gas, the typical process today around the world is a steam methane reformer. If there is no carbon capture on that system, I might have said it's going to produce nine tonnes of CO2 per tonne of hydrogen, but it's essentially the same number. It's eight or nine tonnes, so it's a significant amount of CO2.

Now, when we turn to blue hydrogen, blue hydrogen still has to be produced. The CO2 is still produced by chemistry. The question is, how much of it can you capture? If you take a conventional hydrogen plant and retrofit a carbon capture system, at best you can get approximately 50% of the CO2, so perhaps then you would have 5 tonnes of CO2 per tonne of hydrogen.

We have chosen a new technology for this project, called an autothermal reformer, which allows us to capture more than 95% of the CO2 produced in this process. In addition, we create no-carbon electricity, which offsets the rest, so in this project that is producing hydrogen from natural gas, we view this as net zero. In other words, on a net basis there are no CO2 emissions for the production of the hydrogen.

I hope that answers the question.

[*Translation*]

Mr. Mario Simard: Yes, thank you.

Since I am a neophyte, I am wondering about certain things. Finally, given the entire process of capturing carbon, isn't the cost of producing that type of hydrogen nearly equal to the cost of producing green hydrogen, which is said to be a bit higher?

[*English*]

Mr. Simon Moore: You are exactly correct, but our view is that these are different products. They have a different place in the marketplace.

Comparing hydrogen produced from natural gas, where there is no penalty for the CO2 emissions and there's no CO2 capture, to the cost of producing net-zero hydrogen from this facility, we view that comparison, quite frankly, as apples and oranges. The reason we're here today and the reason that the world is so focused on this is that we want to reduce the CO2 footprint.

Yes, we believe that the products from this facility will be more expensive than if they were made from a facility that had no carbon capture, emitted all the CO2, and received no penalty for doing so, but that's not, as you very well know and as the committee knows, where the world is going. The world wants and needs its energy produced with a lower carbon intensity, and that's what's exciting about this project: being able to prove that we can do this and produce that net-zero hydrogen.

[*Translation*]

Mr. Mario Simard: However, I do have a concern, Mr. Moore, but don't take it personally. I am under the impression that, in its hydrogen strategy, the federal government is trying to decarbonize the fossil-based industry by finding an alternative to it, which is hydrogen. However, so far, we have not had much information on those carbon capturing strategies. I don't see why a business would get involved in this sector where costs are higher. Fundamentally, pretty big government support is expected to develop this sector.

Are you reading the situation the same way I am?

[*English*]

Mr. Simon Moore: I want to make sure my comments did not come across incorrectly.

When we compare to so-called grey hydrogen, any of the solutions—blue hydrogen or green hydrogen—are likely to be more expensive. Effectively, that's the reason nobody was producing blue or green hydrogen over the last 10 years. I do think, as I mentioned earlier, that in different parts of the world there will be places for hydrocarbon-based net-zero hydrogen or renewable energy-based net-zero hydrogen to fit.

Let me say it this way. From our view, I would suggest that the world is very focused on reducing the carbon intensity of its energy. One of the great ways to do that, as we've heard today, is hydrogen—as long as you can reduce the CO2 footprint. There are really a couple of different options here, and as I mentioned, we're doing projects in both areas. We view this project opportunity as creating the framework whereby the world can have these carbon-free hydrogen molecules it wants for its energy transition.

● (1145)

The Chair: Thank you, Mr. Simard.

Next we have Mr. Cannings.

Mr. Richard Cannings (South Okanagan—West Kootenay, NDP): Thank you, and thank you to the witnesses for being here today.

I'm going to pick up on something. I'll start with Mr. Romano from Hyundai.

You mentioned that the challenge for hydrogen and fuel cells is the charging infrastructure. It's like the pain point you mentioned for electric vehicles: having a charging station. The challenge for hydrogen is having that recharging.

If we're going to look to a future, and hopefully it's sometime in the near future, when we can have semi-trailers travelling across Canada and trains and cars using hydrogen fuel cells, as we've heard from witnesses, we need that infrastructure in hubs across the country. We've heard from other witnesses that this is where the government could really play a role, just as it has started to play a role in expanding the EV charging infrastructure, in building those hubs and building that infrastructure to move hydrogen to those hubs where they can be used by the trucks, trains, or whoever is using them.

I wonder if you would like to comment on that. What role could the government play in building that infrastructure as part of this team that we need?

Mr. Don Romano: First of all, when it came down to electrification, the government was instrumental in working with the auto manufacturers to build the infrastructure and to bring EVs forward. I can tell you right now we have more EVs than we have demand. Supply is outstripping demand right now. That's a problem. That's a big problem. We're equally concerned with fuel cells. We're on our second version of fuel cells, the Nexo, which is available to you right now, but unfortunately, if you look at the infrastructure for charging, you'll see that outside of Vancouver, there are one or two stations. There are 12,000 gas stations out there. We have a lot of work to do.

However, the first place I would focus is on heavy-duty trucks. I think all my colleagues have said the exact same thing. It just makes sense. We produce heavy-duty trucks, in addition to cars. We sell them into Europe right now. We're actually selling them in California today. Amazon is our first client.

I have been personally in contact with Canadian Tire. We can envision a time when from Quebec City all the way down to Windsor and into Detroit, we could set up a hydrogen highway at the ON-routes all the way through. Simply putting our fuel stations in those locations will create demand for hydrogen trucks, because they just make sense.

They make sense from a brand perspective. You can imagine a Canadian Tire able to explain that they are delivering all their goods and services through hydrogen trucks. We, as well as my competitors, can produce the hydrogen heavy-duty trucks. We simply need that infrastructure, and I think it's just a matter of producing the same requirements for those people who currently provide the gas stations and the retail outlets.

The government came to us and said they had a mandate for us that meant we needed to produce so many electric vehicles, that we needed to reduce GHG by a certain level. If we do the same thing for those that currently provide the fossil fuels and ask them to come together as a village and begin to provide that infrastructure, it's just a matter of time. We'll build it and the customers will come, and we'll see a much better future.

Mr. Richard Cannings: Thank you.

I'd like to put that same question to Monsieur Pocard from Ballard. What role can the federal government play to help in building that hydrogen infrastructure? As Mr. Romano said, we have to do this at the same time or we'll get problems with supply and demand.

Monsieur Pocard, could you comment on the role the federal government can play in helping to build that infrastructure?

Mr. Nicolas Pocard: I think I would echo the comments made by Mr. Romano. I think we need to start looking at those freight corridors and at investing in heavy-duty hydrogen refuelling stations in those freight corridors that are the most important and contribute the most to emissions. I think that's really where the federal government can help.

Also, the building of those hubs is important. If you do a hub for the production of low-carbon hydrogen, it enables you to then generate demand for the application. It's not only for trucks. It can be for buses in the cities. It can also be for rail, at a yard for locomotives.

From that perspective, I think the government could invest in developing those hubs for the production of low-carbon hydrogen, as well as the infrastructure around selected freight corridors, which would really help decarbonization. Ports are another area where you can put together applications using hydrogen and have hydrogen refuelling, like some of the projects we've been developing now at the port of Vancouver.

● (1150)

Mr. Richard Cannings: Thank you, Mr. Chair.

How much time do I have?

The Chair: You have about 25 seconds.

Mr. Richard Cannings: Okay.

Mr. Pocard, we've heard about competition with China around critical minerals. Maybe you could spend a few seconds talking about competition with China around hydrogen infrastructure and vehicles and that sort of thing.

Mr. Nicolas Pocard: Yes. China is rising as one of the big competitors that is interested in Canada. It has been leading the fuel cell industry for a long time. We've seen massive investments in technology in China to bring up their knowledge and their know-how, with investments in IP development and investments in R and D.

We're now starting to see Chinese competitors. They are in China mainly, but some of them are starting to come out of China. A lot of investment is being made in China to complement what they have done in batteries, but it's now in hydrogen and fuel cell technology.

Mr. Richard Cannings: Thank you.

The Chair: Thank you, Mr. Cannings.

Mr. Patzer, we'll go over to you to start the five-minute round.

Mr. Jeremy Patzer (Cypress Hills—Grasslands, CPC): Thank you, Mr. Chair.

I'm going to go to you, Mr. Romano. You mentioned in your opening remarks that your EV vehicles are zero emission. When we look at the life-cycle footprint of your vehicles, where are you sourcing your batteries? Where's the mining of these minerals? How is that being done in a zero-emission way?

Mr. Don Romano: It isn't, and that's a challenge, which is why hydrogen fuel cells make so much more sense. Unfortunately, there are very few battery manufacturers right now, but that footprint will grow over time. We will see more and more batteries being developed here in North America.

Until then, you're going to find that the lithium, the cobalt and the zinc—all of the materials that go into those batteries—are coming from all over the world, and I would not say that they are coming to us in an ecologically friendly manner. That is an area that has incredible opportunity for improvement, but at the same time, there are limited resources in anything that we produce, other than hydrogen.

The battery size in hydrogen vehicles isn't a whole lot larger than what you're going to find in your car. Because hydrogen is flowing over a membrane and creating electricity while you're on the move, it's constantly charging the battery that's being used to run the engine. It makes a lot of sense from a number of aspects. One, obviously, is that less battery means less mining of minerals across different areas where we have less control over the way those products are being mined—

Mr. Jeremy Patzer: Okay. Are you going to correct your statement from earlier, though? You said your EV vehicles are zero emission—not even net-zero emission, but just zero emission. I'm wondering if you could make that distinction quickly here.

Mr. Don Romano: I would say that the production of anything.... Nothing is zero emission. There is no such thing as zero emissions in the production of anything. For those vehicles that are driving right now, my point is that there's nothing coming out of the tailpipe. That was my point in saying that these vehicles are zero emission. I'm not including the production of them. I'm not including the production of the batteries or the vehicles themselves. I'm just talking about the vehicles themselves on the road.

Mr. Jeremy Patzer: Has your company done a life-cycle emissions review of the process from the beginning of the mining and manufacturing process to the end-of-life analysis of what's going to happen to these vehicles and these batteries when they're expired?

Mr. Don Romano: We were the first company in Canada to make a statement that we have actually contracted with two battery recycling companies to handle the end of life of our batteries. One is here in Ontario, in Kingston, and the other is up in Quebec.

In fact, we are replacing batteries today that we don't feel are operating at an optimal level. Those batteries are now currently going to Canadian factories that are managing the recycling.

Mr. Jeremy Patzer: Thank you.

My next question would be this: On average, how much heavier are your EV cars compared to a standard car that you would have bought prior to an EV car?

● (1155)

Mr. Don Romano: I couldn't answer that question. I'm sorry, but I don't know the actual weight of an EV.

Mr. Jeremy Patzer: Has your company done any studies on the impacts it's going to have on our highway infrastructure? The reason I'm asking is that I'm from a rural riding where there are some primary weight highways, but there are a lot of secondary weight highways and a ton of gravel grid road infrastructure out there, and the heavier load is going to have a huge impact overall, especially over time, on our infrastructure.

Has your company looked into any of that?

Mr. Don Romano: No, I'm sorry, it has not, and I couldn't answer the question on that.

That is something I'd be glad to get back to you on. On the difference in weight between an electric vehicle and a non-electric combustion engine ICE vehicle, there are many different variations, but most of our electric vehicles are relatively small and most of our combustion engine vehicles are relatively large.

Canadians are buying, for the most part, big trucks as well as big SUVs when it comes to combustion engines. When they buy electric vehicles, they buy smaller cars, smaller SUVs. I think if you were to look at it from that perspective.... I'd have to do the analysis and get back to you.

Mr. Jeremy Patzer: I just saw something about how the Ford F-150 truck is going to be 1,600 pounds, on average, heavier than their regular F-150. I think there's a Volvo—an XC60, I think it is, and I might have the wrong model—that's about a 1,000 pounds heavier on average. I'm just wondering what your thoughts are on the impacts that's going to have.

Mr. Don Romano: We produce a Kona EV, which is relatively small, and we're also coming out with an IONIQ 5, but it's a good question and I apologize for not having the answer.

Mr. Jeremy Patzer: Thank you.

The Chair: Thanks, Mr. Patzer.

We go now to Mr. Lefebvre for five minutes.

Mr. Paul Lefebvre (Sudbury, Lib.): Thanks, Mr. Chair.

[*Translation*]

My first question is for Mr. Roy.

At the end of your presentation, you started listing your recommendations, and then you were asked to wrap up quickly. Could you tell us about them briefly, in a few minutes?

You have examined the situation. In addition, you have heard the excellent testimony we have had today. We are doing some very worthwhile work.

Could you quickly talk to us about solutions you are foreseeing for this transition?

Dr. Jacques Roy: Like the other witnesses, I think emphasis should be placed on heavy trucks over the short term. That is sort of my favourite subject. I can volunteer to carry out a prefeasibility study. It is very well to say that focus will be placed on heavy trucks, but how can that be done?

I am very familiar with the trucking industry. I think conversations must be had with key industry players to understand their needs and their reservations about electric trucks. They must be convinced that hydrogen is a solution. All this will not happen on its own. Demonstration projects must be developed, like the one carried out in Alberta. I have spoken to the president of Trimac, and he would be more than happy to carry out the same kind of an experiment in the Montreal–Toronto corridor. I think that is where we should start.

The government can play a role, along with other industry partners, to encourage those kinds of experiments and demonstration projects. It must be understood that people naturally have reservations about hydrogen. They think it is dangerous and don't believe in it. That is why these kinds of projects must be carried out.

Mr. Paul Lefebvre: The investment risk must clearly be minimized. The government has a role to play in that regard.

[*English*]

Mr. Moore, you talked about hydrogen pipelines.

We heard from a lot of witnesses about the importance of having hubs because of the challenges of transporting hydrogen.

Can you explain to us your infrastructure that exists in Alberta right now on the hydrogen pipeline side, and how you're moving hydrogen around?

Mr. Simon Moore: Could I just confirm that the question was for me?

Mr. Paul Lefebvre: Yes, Mr. Moore.

Mr. Simon Moore: Great.

Every day we move hydrogen via pipelines. We move liquid hydrogen via trucks. We move gaseous hydrogen via trucks. Again, I don't believe we see a single answer being the right answer for every situation. Our existing infrastructure today moves very significant quantities of hydrogen from our three production plants to our customers in the refining, chemical and petrochemical industries—

Mr. Paul Lefebvre: Sorry, but I have very little time. I just want to understand that infrastructure.

You said they were around 50 kilometres in distance. How long can you go? Can you go 500 kilometres? What are the challenges, and are there any opportunities there?

Mr. Simon Moore: In the U.S. gulf coast we operate an almost 1,000-kilometre hydrogen pipeline. There's no magic limit to it. It's economically driven. You need to have customers in order for it to make sense to run that pipeline. There's no practical limitation to it. That's what we do today. Of course, there's a network of customers there to support that length of hydrogen pipeline.

● (1200)

Mr. Paul Lefebvre: Thank you for that.

Mr. Romano, I would like to discuss with you the cost of a battery vehicle versus a fuel cell vehicle.

We talk about being agnostic, I guess, as we move forward. Certainly we have combustion engines and battery vehicles and fuel cell vehicles. We're not agnostic yet, but I would like to hear how you as a carbon manufacturer would see the challenge. Do you see that in five to 10 years it will become more agnostic?

Mr. Don Romano: No, I think your question is exactly right. Five to 10 years versus today has to do with economies of scale.

Right now the cost of a fuel cell vehicle is far greater than the cost of an EV. The cost of an EV is greater than the cost of a combustion engine vehicle, but when you look at the components required to build an EV, long term it is going to be more cost-effective. It's going to be priced lower than a combustion engine vehicle if it's the same content, item for item,.

When you take a look at electric vehicles, you see that they have a lot of other features that are being put into them, especially the safety features right now that are coming in, or the ability to create a sound so people know the car is coming up on them. We continue to make advancements in that area.

For hydrogen vehicles, it's the same. Right now hydrogen vehicles are extremely expensive to manufacture because right now we sell 10 hydrogen vehicles a year. We sell 4,000 to 5,000 EVs and we sell 120,000 gas vehicles. When you put that together, there's quite a difference.

If we put the infrastructure in place to overcome the concerns that consumers have over range and over charging, whether it's fuel cell or electric vehicle, we're going to find that the cost is going to go right back to the same level that we see for cars today. There will be no difference over a long period of time, but we have had a lot of support from the government to provide incentives to get people into zero-emission vehicles, and that's what's bridging the gap right now.

The Chair: Thank you, Mr. Lefebvre.

It's over to Mr. Simard for two and a half minutes.

[*Translation*]

Mr. Mario Simard: Thank you, Mr. Chair.

I'm sorry, Mr. Moore, you will find me annoying, but I have another simple short question for you.

I recently read in an article that the strategy used for decarbonizing the production of blue and green hydrogen consisted in burying the carbon, but that there was no guarantee, technically speaking, that carbon leakage would not occur sooner or later.

To your knowledge, is the technology used to sequester carbon now efficient?

[*English*]

Mr. Simon Moore: Thank you for the question.

We absolutely believe that sequestering CO2 is indeed safe when it's done in the right way and in the right geological formations. It has been done for many years in different places, so yes, the short answer is that we do think it's safe when it's done the right way.

[*Translation*]

Mr. Mario Simard: I would like to put a question to Mr. Romano.

I own an IONIQ, which I really like, and I recently learned that the battery used in the IONIQ 5 model will be able to charge to 80% in 15 minutes. You mentioned earlier that the lack of charging infrastructure was a challenge, and that it led us to believe that hydrogen was a good solution.

However, don't you think that, within five or six years, it will be possible to charge an electric vehicle to 80% in less than 15 minutes?

[*English*]

Mr. Don Romano: That's a good question. I believe that is going to happen if we commit ourselves to requiring the fast-charging DC infrastructure that's necessary. For instance, today in Ontario we have only 94 fast chargers versus thousands of gas stations. If you consider everybody is moving in that direction, if every gas station had a fast charger, then yes, 15 minutes is not a ridiculous time to wait to get an 80% charge.

I would also say that I don't think there is going to be one solution to our zero-emissions problems. We are going to find that there will be multiple solutions, especially, as my colleagues have talked about, with the heavy-duty truck industry, the bus industry and even the train industry being able to run more efficiently on hydrogen. With a hydrogen vehicle, with our Nexo, which you can buy today here in Canada, if you have a place to refuel, you can charge that in five minutes. It's no different from filling up a vehicle with gas. It provides you the ultimate fast charging, plus you get over 600 kilometres on that charge.

Even though we're getting closer to 500 kilometres and although I do believe battery technology will improve, my main point is that whether it's a battery or a fuel cell, without the infrastructure moving faster and even with our industry already investing $300 billion in zero-emission vehicles, we have a problem coming up, which is that we have too much supply compared to the demand.

● (1205)

The Chair: Thank you. Thanks, Mr. Simard.

Mr. Cannings, we will go over to you.

Mr. Richard Cannings: Thank you. I'm going to turn to Mr. Moore.

You talked about a project in Saudi Arabia where you're producing hydrogen, I believe you said, for export. This is something I've heard from other sources. I was at a G20 meeting where the German minister talked about investing in green hydrogen projects in Chile with massive solar panels—I assume this is what's going on in Saudi Arabia—and then capturing that energy as hydrogen and exporting it around the world. The Japanese minister indicated the same sort of thing.

I've asked this of other witnesses in this study. I'm wondering if you could comment on the future of that global market in hydrogen, how it could play a role over the next 30 years as we go to net zero globally, and what opportunities there are for Canada, especially in green hydrogen and perhaps also in blue hydrogen. I might get to more on that later, but what are the opportunities for Canada to play a role in that global hydrogen export-import market?

Mr. Simon Moore: That's exactly right. Just to very briefly describe this project, it's solar power and a wind farm creating renewable electricity using an electrolyzer to create carbon-free hydrogen. We then turn that into ammonia to simplify the transportation around the world, and then dissociate that ammonia back to hydrogen at or near the point of use to provide carbon-free hydrogen fuel mobility.

The reason the project is in Saudi, and I know this sounds incredibly simple, is that the sun shines a lot and the wind blows a lot in the northeast part of Saudi Arabia.

As you mentioned, for places like Chile, obviously what it comes down to is that the cost of renewable energy is a huge part of a carbon-free project that is driven by an electrolyzer. You obviously have capital downstream, but the cost of the renewable energy is very important. Places in the world where renewable energy is available at a very competitive price have the potential to be locations for exporting hydrogen to places around the world where it's not economical to produce that renewable energy.

You mentioned Germany. Some of you may be familiar with this. Throughout Europe and particularly in Germany, they are embracing the idea that they're going to need to import hydrogen, because it's not practical to produce hydrogen economically within Germany. Obviously, as everybody knows very well, Canada is blessed with some very attractive costs of renewable electricity, and that absolutely is a potential to be leveraged to produce electrolyzer-driven carbon-free hydrogen, either for use in Canada and/or to be exported.

The Chair: Thank you, Mr. Cannings. Mr. Zimmer, we'll go over to you for five minutes.

Mr. Bob Zimmer (Prince George—Peace River—Northern Rockies, CPC): Thank you, Mr. Chair. Thank you, guests.

I have just one question, Mr. Romano. You talked about incentives, mainly around infrastructure around renewable energy. I have a big question, which I'm sure you understand affects a lot of Canadians. It is about the term “affordability”. We've heard the term many times before when talking about the taxpayer not wanting to subsidize certain sectors and certain industries. We've certainly heard that around the natural resource side of things.

When do you see renewables becoming self-sufficient to the point they don't need a big government subsidy, either via insurance or for purchasing the vehicle or by providing funds for infrastructure? When do you see our getting to the tipping point where the taxpayer isn't paying the bill?

Mr. Don Romano: I think it really has to do with the infrastructure. Again, we have more supply than we have demand. I can deliver an electric vehicle today, and with subsidies, I can deliver it in Quebec for under $30,000. Affordability isn't the issue.

The concern comes down to the charging infrastructure and the range. We're able to tackle the range. With our Kona EV, we now get over 400 kilometres, so range is becoming less of an issue. However, the charging is a concern. Over three million Canadians still live in apartments and don't have that infrastructure. Once we have that in place and we start getting our volume over the 50% mark—when over half of the vehicles we're producing are electric—I believe we'll be at the inflection point and we will have bridged the gap between the cost of an electric vehicle and that of an ICE vehicle. We're probably five years away.

● (1210)

Mr. Bob Zimmer: Maybe I'll be more specific.

You talked about the necessary infrastructure. I'm in British Columbia and I often go to Vancouver, where I see a lot of charging stations. However, I live in Fort St. John, where the charging stations are few and far between. Even thinking about an electric vehicle, for me.... My destination is usually Prince George or somewhere in between in my riding. It's around five hours. In the winter, it would be impossible to use an EV in my job.

This is spitballing it, and I don't know if your industry has looked at this aspect. You talked about $300 billion in the industry around EVs. How much does the industry see is necessary in terms of dollars to set up the necessary infrastructure? You were talking about the shortfall.

Mr. Don Romano: When you talk about the infrastructure, do you mean infrastructure for building the vehicles or building the charging—

Mr. Bob Zimmer: No, I am talking about the charging infrastructure.

Mr. Don Romano: If you put the charging infrastructure on top of the cost of the vehicles and require the manufacturers to supply it, I don't know how long it's going to take to make an affordable EV. Right now we make vehicles that don't require us to pay gas stations to produce and distribute gasoline.

Mr. Bob Zimmer: Right.

Mr. Don Romano: I think there are people in better positions to provide the electricity, while we provide the cars. Does that make sense?

Mr. Bob Zimmer: Yes, but I wasn't asking you as an industry to set up that infrastructure.

What is the cost, or has your industry costed to other sectors the amount required to build that infrastructure? Esso is an example. They set up an electric charging station. To meet the demand, how much infrastructure is required?

Mr. Don Romano: I got it.

I would ask, "What's the cost of not doing it?" I don't know what all these 12,000 gas station operators are going to do for a living when we are committed to an electric future, and it's not just me. I'm the former chairman of the Global Automakers of Canada. This is not just Hyundai; this is the industry that's committed to going in this direction. I don't know what they're going to do. What are we going to do with all the people who are employed by the gas stations? Are people going to shop at stores that don't have EV charging available to them? We're going to see a whole change in the dynamics.

I don't know what that cost is going to be. I just know that the cost of not doing it is that there will be a lot of empty gas stations on a lot of corners.

Mr. Bob Zimmer: How much time do I have, Mr. Chair?

The Chair: You have 50 seconds.

Mr. Bob Zimmer: One topic that I'll bring up, just because it's in my backyard and it's a way to reduce emissions dramatically—we see this around the world—is natural gas. I remember talking to the Canadian Gas Association many years ago about setting up filling stations at your home. You could simply attach to the natural gas line that comes to your home. Why don't we don't hear more about natural gas as a better way to reduce emissions in Canada?

I'll throw that out there for anybody.

The Chair: Anyone?

[*Translation*]

Dr. Jacques Roy: In the trucking industry, efforts have been made in that area. Although natural gas helps reduce greenhouse gas emissions, it is not a zero-emission technology. So it does not help reach that goal. What is more, as far as I understand the trucking industry's experience, natural gas leads to other problems, including in terms of engine maintenance.

At first glance, it is an attractive solution, but, in practice, the zero-emission energy objective is not being reached, and the use of natural gas leads to other difficulties in terms of maintenance.

[*English*]

The Chair: Thank you. Thanks, Mr. Zimmer.

Ms. Jones, we'll go over to you.

Ms. Yvonne Jones (Labrador, Lib.): Thank you, Mr. Chair.

I want to thank our panellists this morning for some wonderful presentations.

I have a couple of things.

As you know, with respect to the hydrogen strategy for Canada, we've already put it out there. The objective is both to ensure there is more development and also to have the right regulatory measures and so on.

Mr. Moore, I appreciate the suggestions you made in your presentation. I would ask that you follow those up in more detail so that our committee can look at them as we move into preparing our final report and putting forward our recommendations.

● (1215)

Mr. Simon Moore: Thank you. We'd be happy to do that.

Ms. Yvonne Jones: Okay. That's great. Thanks.

We talked a lot about the infrastructure and the availability of infrastructure to support hydrogen. Is this something that private companies would be taking on and doing more of themselves, or is it profitable for them to be investing right now into the hydrogen industry?

I know it's a direction we have to go. I'm just concerned about the ability for some of these companies to do this and to meet the potential that is out there for this development and the investment that's required. What would be your thoughts on it?

Mr. Don Romano: I can take a shot at that, if you don't mind.

Ms. Yvonne Jones: Yes.

Mr. Don Romano: In terms of one of the issues, right now we're giving the heavy-duty trucks away in Europe just to get them on the road to get people familiar with them.

I think the question you're asking is, if you build it, will they come? There's going to be a loss for everybody at a certain point; then there's going to be a break-even point, and then there is going to be an opportunity for everybody to make a reasonable profit on the systems.

I think everybody should expect that short-term losses are going to be a requirement for long-term gains. That's just our perspective at Hyundai.

Ms. Yvonne Jones: One of the things we've been hearing is the economic profitability of doing this for some Canadian energy companies, and that's where my question is going, maybe in terms of Hydrogène Québec.

Dr. Roy, in your case, when you were presenting, you alluded to this. With the hydrogen that you guys are producing right now, how much energy is used to produce, for example, a tonne of hydrogen?

With regard to transportation of the product, how have you developed that network and been able to make it work from an economic perspective for your company?

Mr. Simon Moore: I apologize. Was that question directed to me?

Ms. Yvonne Jones: It was to Dr. Roy.

Dr. Jacques Roy: Thanks.

I don't run gas stations, but there is one in Quebec. It's operated by a distributor called Harnois Énergies. In terms of cost efficiency, it's a very expensive investment. The only reason they did it was that there were partners who actually invested and helped reduce not only the cost of the infrastructure but also the cost of the hydrogen sold at the pump. Also, to be clear, this station actually produces its own hydrogen, so the electrolysis is done on site, which is one way to do it if you have enough volume, enough scale, but it's not the only way, actually, to operate. Eventually you could have gas distributors who would deliver hydrogen through stations, but at this time it was felt that producing on site was the better solution.

In terms of profitability, we are very far from that. It's like an act of faith right now. You have to actually demonstrate the use of hydrogen, and for that you need those refuelling stations, like a chicken and egg situation. If you don't have the stations, then people will simply not buy the products.

At this time in Quebec, the provincial government has acquired 50 fuel-cell cars produced by Toyota, and the demonstration is being carried out, trying to understand how the cars are operating and doing a cost-benefit analysis of using those cars at this time.

● (1220)

The Chair: Thank you very much.

Thanks, Ms. Jones.

Next up is Mr. McLean, for five minutes.

Mr. Greg McLean (Calgary Centre, CPC): Thank you, Mr. Chair, and thanks to all our witnesses.

The main thing I'm hearing, which I really enjoy today, is that we are talking about decarbonizing and not just shifting one polluting mechanism to another.

I'm going to drill into some of the data that Mr. Romano provided here.

First of all, Mr. Romano, how much net profit has Hyundai made in Canada these past two years?

Mr. Don Romano: We're not public. We don't disclose our profitability numbers.

Mr. Greg McLean: Okay. Can you share them with the committee?

Mr. Don Romano: No. I'm not at liberty to share.

Mr. Greg McLean: Okay, thank you. Would it be more or less than $25 million per year, Canada and international?

Mr. Don Romano: I'm not at liberty to discuss our—

Mr. Greg McLean: The reason I ask, of course, is that you've taken $50 million in subsidies from the Canadian government in getting your vehicles on the road. I'm just trying to put this in a relevance perspective in terms of what you're contributing to your bottom line and what you're actually receiving in contribution from the Canadian government.

Mr. Don Romano: I understand. We've had years of losses and years of profit.

Mr. Greg McLean: Okay. Thank you very much. It's much appreciated.

There's an issue around CAFE standards, which of course were stalled by many administrations in the United States, and Canada follows the U.S. on these CAFE standards. Twenty years ago, if we'd stuck to our CAFE standards, would the industry have moved towards more of a hybrid model, as Toyota has in Canada, as opposed to this rapid shift, such as GM is making right now, and this virtue signalling to go to zero-emission vehicles directly, as opposed to steadily reducing the amount of fuel required in the automobile fleet in North America?

Mr. Don Romano: I would say that right now the focus.... We need to do both. We need to make hybrids. We need to make plug-in hybrids, but that's from a consumer perspective, because some people don't have charging infrastructure. They don't have the ability, if they live in an apartment or a condo, to get the charge.

If we did—

Mr. Greg McLean: Yes, I hear you.

Mr. Don Romano: Go ahead, please.

Mr. Greg McLean: The issue, I'm saying, is if your own industry had actually abided by CAFE standards, we would not be in the position we're in right now. Effectively, your industry is becoming much more of a rent seeker from government than a profitable industry in Canada. You can challenge that if you want, but I do see a lot of money flowing from the government for your agenda.

Let's go into what you talked about. You just mentioned the whole issue of getting these chargers in all these equations, everywhere they need to be delivered. Who's going to pay for those chargers?

Mr. Don Romano: I would hope that the people paying for them would be the people who would benefit from them. Those would be the places that currently provide the charging infrastructure for the population today. I would hope that we would be able to evolve as a community, as a society, to the point where the charging infrastructure would be profitable for the people who provide the infrastructure, the charging today, and that the vehicles would also be as profitable.

Mr. Greg McLean: I've talked to gas stations. Usually they talk about the issue around getting these chargers put into their stations in, let's say, Red Deer, which is halfway between Edmonton and Calgary, and it makes zero economic sense. I know the “if you build it, they will come” scenario. However, everybody who is looking at it is saying that the only reason this makes sense is that somebody else is going to pay for it.

That being the case, or that being the situation that's been presented, at what point in time do we start recognizing that the cost of these chargers is actually being borne by the taxpayer? Also, if I can drill down a little further, every bit of this infrastructure has a CO2 footprint that we're duplicating, and it is additional to the CO2 that the variable part of the equation is actually producing as well.

Can you comment on that at all?

Mr. Don Romano: No, I'm not sure I understand the point about the CO2.

Mr. Greg McLean: When you produce this charger, when it's going through the production process, you have copper, you have aluminum. You have all kinds of building that happens. You have construction. You have cables. Everything has to be built. All of these have a CO2 footprint to get towards the location. It's the front-end CO2 expense, if you will.

Do you have any comment on that?

Mr. Don Romano: Understood. Yes, I think it's short term. I think that in the long term, the net impact of putting infrastructure together is going to be a lower carbon footprint and eventually no carbon footprint.

You're absolutely right that in the short term trucks running on gas will be delivering the material necessary to put those chargers in place, but over time those chargers are going to be producing electricity, hopefully from clean energy, that is going to result in a better, lower-carbon footprint for the country.

● (1225)

Mr. Greg McLean: Okay. I have one last question.

How much does your—

The Chair: You only have 10 seconds left, Mr. McLean.

Mr. Greg McLean: Okay.

How much does your electric vehicle weigh compared to comparable non-electric vehicles?

Mr. Don Romano: I will get that information. I was asked that question earlier and I will provide that to you as well. I do not have that at my disposal right now. Sorry.

Mr. Greg McLean: Thank you.

The Chair: Thank you.

Next up we have Mr. May.

Mr. Bryan May (Cambridge, Lib.): Thank you, Mr. Chair.

I'm going to go back to Mr. Romano for part of my question time.

First of all, it's good to see you. As many on this call know, I co-chair the Liberal auto caucus, and it's great to see a manufacturer on this study, because I think it's an important perspective that we need to address.

I think you're right: I think we have seen a massive evolution in automaking in just the past five years. I remember in my early days as an elected member of Parliament listening to manufacturers explain to us in the auto caucus why this isn't going to work and why electric vehicles are not the future. How quickly that has changed. A lot of that is market driven, but a lot of it is also the reality that we have to do our part to manage climate change.

One of the big issues that we had early on with electric vehicles—and it comes back to infrastructure—was the proprietary nature of charging stations. I know there's been some work to help alleviate that situation, but I'll pose this question as a hypothetical. Imagine having a gas engine vehicle and pulling up to a gas station and realizing that you can't pump gas at that gas station because it has a triangular nozzle versus a hexagonal nozzle. To me, that's how silly this problem is.

Can you speak to that a bit? Has the industry solved that problem? When it comes to hydrogen, is that also going to be a problem, or have we learned from that issue?

Mr. Don Romano: We have a standard for hydrogen. We do not have a standard for electric vehicles that has been adopted by all manufacturers, but there are adapters that are bridging that problem.

I think the bigger issue right now is that we don't.... The people providing the charging infrastructure all require sign-ups. People have to enrol, which means that if you're driving down the highway and you want to use a ChargePoint, you have to be a ChargePoint customer. You can't take a Visa card and swipe it and get your charge. That becomes just one more obstacle limiting the adoption of EVs. Eventually, we need to have all chargers operate in a fashion similar to a gas station pump, where any credit card we use, any bank card we use, can be utilized to charge those cars.

That just isn't the case today. Right now, there are no standards out there for that type of service. I think part of the building of the infrastructure will require those standards to be put in place.

Mr. Bryan May: Is this something that the industry needs to solve, or do governments need to step in and say that they want to support the building of this infrastructure, but that there are barriers that seem to be an industry issue?

Mr. Don Romano: I believe the industry will solve those problems, but I think government support in encouraging greater utilization of chargers—fast chargers, DC chargers—throughout the country will accelerate the adoption of EVs in general by the population.

Mr. Bryan May: Mr. Moore, I saw you nodding your head when I was asking the question. I was wondering if you had anything to add to that.

Mr. Simon Moore: No. I was just happy to hear the acknowledgement that the hydrogen industry has a standard for dispensing fuel into the vehicles, which is obviously very important.

Mr. Bryan May: Are there other issues—maybe awareness issues—that you guys are focusing on? I was looking at your website earlier, and one of the key messages is a focus on safety. In terms of reaching out to your customers, is that something that we've heard, that people are concerned about the safety of hydrogen?

● (1230)

Mr. Simon Moore: I would say that we have not heard that people are particularly concerned about the safety of hydrogen.

I think everybody should bring a respect to using any type of energy source, whether that be gasoline, diesel, a battery or hydrogen, and we're very comfortable that when hydrogen is handled by people who have experience, they follow the safety protocols. It's a very safe product, and we handle and transport it every day.

Mr. Bryan May: Thank you.

The Chair: Thank you, Mr. May.

We're moving on to Mr. Simard for two and a half minutes.

[*Translation*]

Mr. Mario Simard: Thank you, Mr. Chair.

I would like to make a quick comment to my friend Mr. McLean. The activity sector that wastes taxpayer's money may not be transportation electrification, but rather oil. The oil industry has been given $24 billion over the past four years. Just in the budget we studied, $560 million is earmarked for the oil sector. I don't think the transportation electrification industry is receiving that kind of money.

I have a question for Mr. Roy.

I took note of a statistic Mr. Pocard brought up. He was telling us that a bus using blue hydrogen as fuel had an 83% reduction in emissions, compared with diesel, and that, if that same bus was electric, the emissions reduction would be only 50%. That may apply in Alberta, but it certainly does not apply in Quebec. Given the transportation electrification in Quebec and Lion Electric's bus project, let's say that our emissions are well below those that may have been calculated for Alberta.

Would you agree in saying that calculating emissions certainly depends on the available and usable sources of energy? In that sense, Quebec is at a different level than the other Canadian provinces.

Dr. Jacques Roy: A distinction must be made.

In terms of emissions from vehicle operations, all vehicles with an electric engine are zero emission.

In terms of the source of energy, in Quebec, hydrogen is produced using electricity—the green hydrogen we are familiar with. When the hydrogen is blue, Mr. Moore says that it is possible to produce hydrogen where 95% of the CO_2 would be captured. So that is within 5% of the zero-emission goal.

Those are the two aspects we can comment on. As for the rest, such as the manufacturing of vehicles, battery recycling and that entire cycle, extensive studies are clearly required.

Mr. Mario Simard: If—

[*English*]

The Chair: Thank you, Mr. Simard. I'm going to have to stop you there, unfortunately.

Mr. Cannings, we're going over to you.

Mr. Richard Cannings: Thank you.

I'd like to go back to Mr. Moore.

Earlier Monsieur Simard was talking about the differences between green and blue hydrogen and whether we want to use those colours or not. I know your project in Alberta involves carbon capture and storage, but I'm not sure if I heard you mention whether that project involves storage that uses enhanced oil recovery, as most carbon capture and storage projects do in North America.

The fact is that projects using enhanced oil recovery start out as carbon negative because they're storing carbon, but over a period of years, six to 10—I forget the exact number of studies in the United States—they turn carbon positive. I'm wondering if your industry has factored that in or whether you're not using enhanced oil recovery.

Mr. Simon Moore: Thank you very much.

Again, for this net-zero project, we expect the CO2 to be sequestered, not used for enhanced oil recovery.

Mr. Richard Cannings: Thank you. That's the main question I had, because I do have concerns, and a lot of people have concerns, about carbon capture that does involve enhanced oil recovery. In fact, most of the 45Q investments in the United States are used for those kinds of projects, and that's the concern I had with Mr. McLean's bill.

I'll go back to Mr. Romano.

The Conservative narrative here seems to be that this can't work and that this shift to electric or hydrogen vehicles can't happen. Can you comment on the period of time when there is a carbon footprint of the production of the vehicles and when that footprint shifts to positive? How long is the period for an electric vehicle until it becomes truly carbon negative?

● (1235)

Mr. Don Romano: Let me verify the question. Are you talking about the production of the vehicle itself or the point at which our fleet will become carbon neutral?

Mr. Richard Cannings: The narrative we get is that there are a lot of carbon dioxide emissions in the production of the vehicle, but over time—and I don't want to lead the witness here—it seems to be a year or two when that is overcome and the vehicle becomes carbon negative, whereas an ICE vehicle just continues to be positive throughout the life of the vehicle.

The Chair: You have time for a very short answer.

Mr. Don Romano: I can't answer that. We're not into production at Hyundai Canada—we're into distribution—so I really don't know how long it will take. I just know that we are focused on reducing the carbon footprint in the production of the vehicles.

The Chair: Thank you, Mr. Cannings.

I believe Mr. Patzer is next.

Mr. Jeremy Patzer: Thank you very much.

Mr. Romano, I'm going to go back to you, but before I begin I want to read something here from a study by UC Davis down in California. They did a study regarding the impact of the additional weights on roads. It said:

> The damage analysis for an example waste facility access road modeled for only 500- to 2,000-lb. increases in the weights of waste-hauling trucks from conversion to natural gas indicated (a) that for fully loaded inbound trucks, the 500-lb. vehicle weight increase reduced the life of pavement overlays by approximately 5 percent and (b) that there was an approximately 13 percent reduction in life with the 2,000-lb. vehicle weight increase.

The reason I'm asking is that in Saskatchewan there is a tax now on EVs that people are all up in arms about. The reason they are doing that is to make up for the loss of fuel tax. We know the fuel tax is used for road maintenance and upkeep as well.

As we are shifting to EVs—industry is saying we're going this way—we know that there's going to be a disproportionate impact on the infrastructure, yet we're losing all this tax revenue. Who's going to pay for the road maintenance and infrastructure upkeep if we lose that tax base?

Mr. Don Romano: All I can tell you is that I believe we are at the eight-track tape phase of electrification. We're not even at the cassette, let alone the SiriusXM streaming phase.

The batteries are going to get smaller and lighter. Companies out there are currently working on solid-state batteries, which are significantly smaller and pack a lot more energy. I can't answer that question directly. I can just tell you that the direction we're headed at this point, as we do with all technology, is to become more efficient, smaller and lighter.

Today the EVs we produce are relatively small. In terms of the example you gave of one of my competitors, I just can't answer the question on that particular vehicle and the weight that it has relative to its combustion engine model.

Mr. Jeremy Patzer: With your vehicles, I mentioned earlier the impact there's going to be on rural infrastructure, but also just for rural Canadians. We've had a lot of vehicles over the years.... One example is the power sliding doors in minivans. They do not work on gravel after a period of time. They wear out. They get dusty and they just don't work.

Has your company done any review or checking to see what the impacts on EV performance are going to be from driving on country roads and gravel roads, and even from wintertime, when we start pounding through snowbanks and different things like that?

Mr. Don Romano: All I can tell you is that we do substantial studies in all weather conditions on all road types here in Canada. We do exhaustive studying by putting the vehicles through the rigours of the different climates and road conditions. In terms of the results, we wouldn't put it back into the marketplace if we felt it wasn't going to be able to maintain its lifespan. There's not much more information I can give you than that.

● (1240)

Mr. Jeremy Patzer: Thank you.

I'm going to switch over to the rep from Ballard.

There's a lot of agreement about the importance of free trade for the future of the Canadian auto sector, especially with the old NAFTA agreement. Back when CUSMA was negotiated, there were concerns about the new rules leading to rising auto prices. Would this not create another problem for these new types of vehicles?

Mr. Nicolas Pocard: Yes, it will.

I think at the stage today when we are trying to really drive cost reduction for technology, if barriers to trade, especially within North America—I think the buy America regulation is a good example—might force production sites to multiply across borders, increasing costs are not going in the right direction. We need to scale up the benefits of a global supply chain in order to reduce the cost of those technologies. Scaling up and industrialization are how we're going to be able to compete with diesel engines. Those trade barriers are going to go against this cost reduction.

Mr. Jeremy Patzer: Would you like to add a little more to how hydrogen is going to be able to compete with other industries, whether it be for vehicles, for example, or for batteries? What's the competition going to be like? Do you have a forecast of which one is going to win out or what the preferred one is going to be?

Mr. Nicolas Pocard: I think it depends on the scale of use. Are we going to need both technologies, both battery electric and fuel cell electric, depending on the use of the vehicle?

At the end of the day, a fuel cell engine is very similar to a diesel engine, but much less complex. There are many fewer parts operating at a high temperature and many fewer moving parts. The cost of producing a fuel cell engine at scale, when you reach 10,000 engines or 50,000 engines per year, will be at parity with a diesel engine. I think on the cost we'll get there.

The Chair: Okay. Thanks, Mr. Patzer.

Mr. Serré is next, but I see that the bells are ringing in the House. They are 30-minute bells.

With unanimous consent we can continue until one o'clock and finish this meeting and will still have plenty of time to vote.

I see that everyone is willing to provide their consent. We'll carry on. Thank you.

Mr. Serré, you have five minutes.

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

Thank you to all the witnesses. A lot of what you were saying will be really useful for our study.

For my first questions I'll go to Mr. Moore and Mr. Roy.

You heard earlier from Mr. McLean and Mr. Simard. On the transition and the challenges that the government is facing moving forward, I would like to hear your comments on what the government has done with the clean fuel regulations and the hydrogen strategy. Do you have additional recommendations for moving forward on the transition side?

Mr. Simon Moore: Perhaps I could comment. Thank you very much.

Again, we think there is a tremendous framework in place. Quite frankly, that's one of the reasons we were excited to announce our project last week.

I did make a couple of suggestions in my remarks about some things to keep focused on as you move forward and create additional opportunities. Blue is not better or worse than green; it's about the carbon intensity. Less carbon intensity is better, and I think the program should reflect and focus on that.

I think we definitely want to recognize and reward putting CO2 in the ground, not capital spent to recover CO2. Programs that support CO2 recovery are not necessarily spending capital, but then again, we have a nuance around the outsource model whereby we provide a lot of value to our customers in making sure that this is not negatively impacted by the regulations going forward.

Those would be a couple of suggestions that we would make for things to keep in mind.

[*Translation*]

Mr. Marc Serré: Mr. Roy, do you have anything to add?

Dr. Jacques Roy: I think the government can help, since hydrogen is a risky investment. I am thinking of the high–frequency train, for example, which will be pulled by a locomotive using diesel fuel, while in Europe, they are moving toward hydrogen trains. The same thing is happening in the Toronto region. The company Metronic recently announced it was backing off its hydrogen train project.

I think those projects need government encouragement, as decision–makers may not be ready to take the risk of being the first to have a hydrogen tramway or a hydrogen train in their region.

The same goes for buses. Many electric buses are being purchased around the country thanks to government assistance, while there are nearly no hydrogen buses. However, there are surely places where they would be more appropriate.

● (1245)

[*English*]

Mr. Marc Serré: Mr. Moore, we heard that the biggest challenge with hydrogen is its transportation. You addressed this issue a bit earlier.

When we look at pipelines and TMX and a project right now in Boucherville, Quebec, what kinds of recommendations do you see for us with regard to the transportation of hydrogen via pipelines and some of the standards around that?

Mr. Simon Moore: It's a great question.

I think pipeline and the transportation of liquid hydrogen and the transportation of gaseous hydrogen via truck will all be part of the answer in different places.

I think what's important is to make sure there is a level or an open playing field. You're not necessarily advantaging a certain type of company or existing companies in certain areas. The market will determine the best solution for transporting this hydrogen in a given situation.

Mr. Marc Serré: We talked a bit about the grades of hydrogen and about not looking at colours, but is what you have right now when you're talking about carbon density and the 95% capture rate patented? We heard some challenges in that regard from other witnesses. Is what you're doing something that you feel the industry will work on? I ask because the carbon capture element is really the problem we have out west with oil. What recommendations do you have for us and the industry on that?

Mr. Simon Moore: We're proud of our innovative project, but I can't say it's unique to Air Products. As we shared in our press release and our comments last week, we are very much looking forward to doing additional similar projects in the area.

As you pointed out, again this goes back to the ability to take hydrocarbon, in this case natural gas, and create zero-carbon hydrogen. I think it is very exciting.

I would just acknowledge, of course, that for this to be successful, no single company can do this alone. We will not be able to do all of the projects needed. Many others will need to participate as well.

The Chair: Thank you, Mr. Serré.

We're moving into the next round. It's a six-minute round. We have about 12 minutes left, so we have time for two more questioners. We'll have Mr. McLean, and then we'll finish with Mr. Weiler.

Mr. Greg McLean: Thank you very much, Mr. Chair.

Mr. Moore, thank you very much for all you've added here today. You talked about the carbon capture utilization credit needing to look like the 45Q in the States, and you know the government is going through some consultations on that process right now. Can you tell us what your investments in Canada will look like compared to those in the U.S. if we don't have a similar type of tax credit in Canada?

Mr. Simon Moore: Again, I think there are a lot of different ways to create the value for the sequestered CO2. I think if a program was based on the capital spent, I would unfortunately incent spending more capital. If the program is based on CO2 in the ground, then it's going to incent putting CO2 in the ground. I think that as we said, it works a little bit more efficiently to directly reward the activity that we're looking to do.

Mr. Greg McLean: Thank you.

I wanted to talk about the transportation of hydrogen. You're proposing to build a plant in Edmonton that is going to supply a vast area. Can you tell us about the economics of distribution of produced hydrogen?

Mr. Simon Moore: Can I just make sure I understand the question? When you say “distributed produced hydrogen”...? I apologize.

Mr. Greg McLean: You're going to be producing hydrogen in Edmonton and distributing it to obviously a vast area. When is it better to establish a plant in, say, Saskatoon? What are the economics of a local build versus a big build?

Mr. Simon Moore: Thank you. I apologize.

I don't think we would ever suggest that this exciting project we announced last week would support all of western Canada's transportation needs. I think just some rough numbers for an order of magnitude are that the liquid hydrogen from this facility could supply about a thousand city buses or large truck vehicles. It depends on their routes and those sorts of things. Clearly there will need to be additional investments, perhaps in our case very close to this one, or also on a more distributed basis. There will be, in our view, much more to come.

● (1250)

Mr. Greg McLean: Then it's $1.3 billion to support one thousand buses?

Mr. Simon Moore: I apologize. That's one part of the hydrogen coming out of this facility. A significant part of the hydrogen coming out of this facility is going into the pipeline network to support the refining, chemical and petrochemical market as well. I'm sorry about that.

Mr. Greg McLean: No worries. Thank you very much.

I'm going to move back to Mr. Romano.

Mr. Romano, one of the things about hydrocarbon consumption in vehicles is there is a big excise tax collection from government. It's billions of dollars per year, distributed between the federal government and municipal governments. When you're comparing apples to apples, how do you think this infrastructure money's going to be replaced when you go down the road and we replace these vehicles with zero-emission vehicles?

Mr. Don Romano: I don't have the answer to that.

I know that the whole transformation to a zero-emissions format is going to cause pain in some areas and gain in others, but I don't think there's a free ride to get there.

Mr. Greg McLean: It's safe to say that there's a social cost here that the hydrocarbon consumption industry is bearing right now that isn't built into the equation of what we're replacing it with. We're going to have to figure that out.

Mr. Don Romano: We have to, absolutely.

Mr. Greg McLean: Thank you. I appreciate that very much.

I have a question for Mr. Pocard.

I really appreciate that you understood that the battery buses reduce GHGs at different places, depending on the local source of power. You save 50% in Alberta. Is that life cycle, or is that just in the power that's produced in the bus alone?

Mr. Nicolas Pocard: No, it's just at the tailpipe during the operation of the bus. It doesn't consider the whole life cycle.

Maybe to that comment I'd highlight that producing a fuel cell from cradle to gate—from the components to the assembly and the shipping to the bus OEM—is much less carbon intense. It's probably 70% less than a battery, because it's a manufactured product and you use just material that is assembled and that doesn't have the same carbon intensity. Some studies have shown that in the overall life cycle of the product, manufacturing fuel cell engines probably has a carbon footprint similar to manufacturing another internal combustion engine.

Mr. Greg McLean: Thank you.

I hope I have enough time to squeeze one more question in for Mr. Moore.

Mr. Moore, you talked about the $7-billion export facility you're building in Saudi Arabia. The benefits there, of course, are the wind and the sun, which we have in abundance in western Canada as well, but for some reason....

Can you tell us what it would take to have an export facility of that magnitude built in Canada?

Mr. Simon Moore: Again, what these renewable energy-driven facilities come down to, of course, is the cost of renewable energy. Whether that be wind, solar, hydro, or perhaps in some parts of the world even nuclear, if there's low-cost electricity on a renewable basis available there, that would be a potential candidate for one of these projects. Again, that project can supply carbon-free hydrogen into that local market, but it can also be used to export as well.

Mr. Greg McLean: Mr. Chair, thank you very much. I've finished.

The Chair: Thanks, Mr. McLean.

We will wrap up with Mr. Weiler.

Mr. Patrick Weiler: Thank you, Mr. Chair. I'm happy to bring it home here.

I'd like to pick up on a line of questioning that my colleague brought up earlier.

Mr. Moore, you mentioned that you were transporting hydrogen a total of 1,000 kilometres by pipeline in the gulf coast. I'm curious. Is this transport being done by purpose-built pipeline infrastructure for hydrogen, or is it going by natural gas pipeline?

Mr. Simon Moore: This is a pipeline network that Air Products built, owns and operates, and it's only for moving hydrogen.

Mr. Patrick Weiler: Have you modelled the capacity of transporting hydrogen with natural gas as some type of blend or mix? Do you have plans to do that with your new facility that's being built, hopefully in a few years, in Alberta?

Mr. Simon Moore: That's a great question. That feels as though it could open up a long conversation.

In terms of the opportunity to perhaps blend hydrogen into a natural gas pipeline, I've seen various studies in which up to 10% hydrogen, or perhaps 20%, could be blended into the natural gas line and still be used as part of an energy source. Clearly that's a partial decarbonization, not a full decarbonization.

We've certainly had some conversations with various entities around the world about that concept. That's a possibility going forward, another opportunity for hydrogen, but to answer your specific question, at this time we don't have plans to do that with the project that we announced last week.

● (1255)

Mr. Patrick Weiler: Thank you.

The project announced last week was put together with support from several orders of government. At the federal level, we have brought in in a price on pollution so that the cost of polluting isn't externalized and we have reduced the carbon intensity of fuels through the clean fuel standard.

With these two measures steadily increasing in stringency over time, at what point do you see some of the projects, such as the one that was announced last week, being viable without having the additional government support?

Mr. Simon Moore: That's a great question, but to be honest with you about our ability predict exactly how this market is going to shake out over the next five to 10 to 20 years, I don't think we're capable of doing that. I would just say that obviously, as everybody has said today, these markets are becoming more competitive every day and coming down the cost curve, but as was also acknowledged, this is fundamentally recognizing the desire of the world to decarbonize its energy source.

Mr. Patrick Weiler: Thank you.

I'd like to ask the same question to Mr. Roy as well.

Dr. Jacques Roy: Could you repeat the question, please?

Mr. Patrick Weiler: When you see the increasing price on pollution and the clean fuel standard, when are projects like that going to be cost-competitive?

Dr. Jacques Roy: That's a very tough question.

We know the cost is diminishing—the cost of production, the cost of hydrogen, and so on. Nobody knows exactly when. Consultants claim it will be by 2030, but we'll have to wait and see.

If I may add, there was a survey in 1975 claiming that 10% of cars in the streets would be electric vehicles. That was a long time ago, and it was completely wrong. It's always difficult to make forecasts on energy for the future.

Mr. Patrick Weiler: Absolutely, and I appreciate that.

One of the areas we haven't talked much about is the marine side. Canada is, of course, a trading nation, and in many respects our ports are ideally located to ship to Asia and also to Europe.

I live near the busiest port in Canada, one of the busiest in North America. I was hoping to first ask Mr. Roy and then Mr. Pocard about some of the opportunities you see in that sector, as well as with drayage and doing freight in and around ports.

Dr. Jacques Roy: Yes, there are already drayage projects in Los Angeles, where both battery electric trucks and hydrogen trucks are in use as experiments.

In terms of marine use, there are ferries that run on hydrogen. They are built in Norway. This I see as a future.

When you talk about exports using marine, again, Germany is a big market. There was a conference on March 15, and they're begging for hydrogen. They are ready to import hydrogen from Canada. I think that as a federal government, you should really look into this as an opportunity for the Canadian economy.

Mr. Nicolas Pocard: I would like to add to that. Ports represent a really great opportunity to deploy hydrogen, because you have the drayage trucks. We are pushing our products in the port of Vancouver so we should see, hopefully, some drayage trucking operation shortly.

You have the yard trucks in the port. A lot of vehicles operate in the ports, and those vehicles are similarly operating on hydrogen in California ports and also in Europe.

The last are the vessels. The marine vessels are a bit more challenging because of their size and their certification.

What we have at Ballard today are six projects for ships that are being built using hydrogen, and solar ships. We are looking at ferries for passengers or barges for inland navigation. It's a beginning where we can see the growing role of hydrogen. Actually, we see more and more shipyard operators coming to us and saying, “We need to reduce our emissions. How can hydrogen play a role in that? What is the role of fuel cells?”

There is a really big change that we have noticed in that sector, I would say, in the past 18 months.

● (1300)

The Chair: Thank you. Thank you, Mr. Weiler.

Unfortunately, that's all the time we have today. All good things must come to an end, and this was a very good meeting with excellent witnesses and great information. Thank you to all of you. We really appreciate it.

We must conclude the meeting now and go to our other duties in the House of Commons. Thank you all.

We'll see you Friday.

The meeting is adjourned.