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## **Standing Committee on Natural Resources**

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**EVIDENCE**

**Monday, October 2, 2017**

**Chair**

**Mr. James Maloney**



## Standing Committee on Natural Resources

Monday, October 2, 2017

• (1535)

[English]

**The Chair (Mr. James Maloney (Etotobicoke—Lakeshore, Lib.)):** Good afternoon, everybody. Happy Monday. Thank you for coming back after the weekend.

We're going to get under way. We have three witnesses in the first hour.

We have Mr. Marc Brouillette, principal consultant for Strategic Policy Economics. I also learned today that he lives in my riding, which I didn't know, but more importantly, he didn't know I was his MP—

**Some hon. members:** Oh, oh!

**The Chair:** I have some work to do, clearly.

Nicholas Martin is a policy analyst with Canada West Foundation, and Tom Adams, who is principal at Tom Adams Energy, is joining us by video conference.

Thank you, gentlemen, for taking the time to be here today.

If you don't know the process, we give each of you up to 10 minutes to make a presentation. You will all make your presentations, following which the floor will be open to members around the table to put questions to any or all of you. We run a tight clock here. It's up to 10 minutes and then the question periods are timed as well, so if you see me waving, that's my polite way of saying, "Please try to wrap it up".

Without any further ado, I'll start with Mr. Brouillette.

**Mr. Marc Brouillette (Principal Consultant, Strategic Policy Economics):** Thank you, Mr. Maloney.

I was told to give a brief write-up of what I'm going to say. I don't know if it's been distributed or not. I've entitled it "Enhancing Canada's Energy Endowments with Interties: A National Competitive Advantage in a Decarbonizing World". I'm going to give you some perspectives that I hope you may not have heard.

**Ms. Kim Rudd (Northumberland—Peterborough South, Lib.):** Do we have that?

**The Chair:** We have only the speaking notes and they're in English only. They're not bilingual so they weren't circulated.

If there is consent, we can distribute the English version.

**An hon. member:** Yes.

**Mr. Marc Brouillette:** Shall I roll on?

**The Chair:** You'd better keep going, yes.

**Mr. Marc Brouillette:** On the overview, in making investment decisions on interties, the main consideration is whether electricity will flow through those interties and how much of the intertie capacity will get used. It's essentially a demand-and-supply question.

In the context of this committee, the demand question, I think, involves a lot of crystal-ball gazing to a future where we expect decarbonization and fuel switching to impact on electricity. The supply question is what kind of generation should or will get built, and more importantly for interties, where. I think the cost question is paramount in that.

The concept I'm bringing to the committee is that eastern Canada, which in my view includes Manitoba, has three distinct energy endowments. These endowments could represent a national competitive advantage for this country. Interties could augment this competitive advantage, and this opportunity is predicated on three factors.

The first is the demand and the associated impact on the economics of interties. Today, demand for electricity has a daily and a seasonal profile that inherently reduces the transmission and distribution asset utilization and hence their economic use. Today the interprovincial intertie investments are not warranted for Ontario. I've written about that. However, in the future, demand will not only grow but will also change the daily and seasonal load profile that is presented to those transmission assets and the requirements on new supply. That's factor number one.

Factor number two is the energy assets that eastern Canada has. That's hydro and natural gas storage, and it equates to electricity—in a minute, I'll explain—and they're both akin to grid-scale seasonal batteries. Ontario's nuclear advantage could be the generation that supplies the batteries and cost-effectively optimizes the development and/or leverage of those batteries with the interties.

The third factor is the U.S. Demand in the northeastern U.S. will rise with emission reduction, much as Ontario's will, and the U.S. has fewer supply options than what we have up here. Collectively viewing the requirements of new supply, the transmission asset optimization, and the U.S. need for clean energy could enable a unique low-cost source of electricity both for domestic use and for exporting electricity and gas-from-electricity to the U.S., if Canada is smart about it.

Now I'm going to talk about each of those factors in a little more detail. The nature of the existent demand and supply balance can dramatically shape whether an investment in interties makes economic sense. My study showed that after the next eight years, due to surpluses in both Ontario and Quebec, there was no domestic energy cost advantage for intertie development or even enhancing any trade agreements between those two provinces.

I agree with climate analysts that fuel switching will lead to electrification. My analysis shows meeting Ontario's 2030 targets will require 60% more electricity than it currently has, even while taking advantage of all the efficiencies that come out of innovation. Much of this demand is in winter.

Demand for electricity has two inherent characteristics that are counter to optimizing value-added interties. One is a daily demand. The IESO in Ontario has stated that because of the daily demand profile, the value of interties for emission reduction purposes is limited to only a few hours a day, and that is only 25% of that capacity of the interties productively used for GHG reduction. At such low utilization rates, that can add up to 60 bucks a megawatt hour, almost doubling the cost of power that will go across those interties. That's challenge number one.

Challenge number two is seasonal demand. In an electrified world, seasonal variation in demand for electricity is significant. In Quebec, where most buildings are electrically heated, you can see that the winter demand for electricity is approximately 65% higher than in the summer. The only clean electricity supply that matches this new winter heating, which will happen in Ontario at some point, is the large reservoir of hydro, which Quebec has. However, Quebec does not have enough capacity to supply the new winter heating that Ontario will require by 2030, so the issue is going to come down to who's going to build it. Are you going to build it in Quebec, where you need interties, or in Ontario, where you won't need interties?

The supply choices could hurt or help interties being a good idea, and whether interties make sense in the future depends on whether the new demand to the grid will justify the acceptable utilization of assets. If the grid demand says fill up the transmission pipes, it will be a good idea; otherwise, it might not be.

Two of the most talked about clean energy alternatives have opposing benefits with regard to interties. One is wind, and one is the solar-battery distributed energy concept you've heard about.

● (1540)

The intermittent supplies that have been and are being built are counter to the efficient use of an intertie because of their intermittency. Wind generation also needs a backup capacity. That backup capacity extends into the nature of the interties as well. The wind in Ontario has reduced the utilization of the interties between Ontario and Quebec by 15% to 20%, but it still needs the full size of the pipe.

Distributed energy resources alter the daily demand profile. That's a good thing. The most significant advantage of DERs is that they can be managed in concert with controllers from a local distribution company. That can peak shave. It can flatten the demand. It can smooth everything out and increase the utilization of all the transmission and distribution assets.

Most studies on decarbonization include a significant amount of new hydro and nuclear in the supply mix. I'm referring to the ones in Canada's mid-century report. The model in the Troffier report was around picking the lowest costs. Their model was built over the next 20 years: all the economically feasible hydro, and then following that up with nuclear. In their view, the nuclear was a bit more expensive. Whether hydro is a lower cost to nuclear remains to be seen. We have the Muskrat Falls, Site C, and Keeyask dam issues that have increased costs.

The public acceptance of nuclear in this country is an endowment. Canada's energy endowments of hydro and the natural gas storage systems all provide a potential competitive advantage to our economy.

In terms of hydro, it's well understood that potential remains for further development of hydro capacity in eastern Canada. Large hydro's ability to respond to both daily demand with fast ramping as well as the winter season peak makes it extremely highly desirable.

In terms of nuclear, Canada's nuclear advantage includes two significant factors. One that I've mentioned already is the public acceptance that allows us to build it out quickly, more quickly than other jurisdictions, and Canada's nuclear supply chain is large. It's actively engaged in a megaproject. It's a well-oiled machine today.

In terms of natural gas storage, which is less widely discussed, it is an important role that Ontario's natural gas capacity can play in decarbonization. The large storage caverns accumulate natural gas all year. We use it in the winter for heat. Those assets also feed Michigan, so we have an export channel for those natural gas assets. These storage assets can be used to collect renewable natural gas and/or hydrogen, both of which require electricity.

Combined, hydro, nuclear, and natural gas assets are a unique capability. Hydro is a battery that can provide daily and seasonal flexibility. Natural gas is a battery that can address the winter season. Nuclear could be the thing that charges them all up. When you have a future-flattened demand with distributed energy resources, you can flatten the system immensely and get the utilization of those interties up very high. That drives out to low cost.

The last factor is the U.S. I believe the topic that's most relevant to the intertie decision is whether there will be an export opportunity. The U.S. will be challenged to find supply options to meet the long-term emission reduction objectives that they're going to have.

The northeastern U.S. and the Great Lakes region have far fewer options at their disposal than has eastern Canada. Their options are mostly around wind, solar, and batteries. The high latitude makes the solar option far less economic in the northeastern U.S. than in the south. To meet their climate objectives, they're going to need some baseload solutions. Baseload solutions that fill up transmission pipes are a good idea.

Canada's hydro, nuclear, and gas advantage is likely a lower cost and perhaps even the only option for these U.S. jurisdictions. How Canada's assets get developed to provide a competitive advantage for us to export to them should be a key consideration in how you strategize around interties.

In closing, eastern Canada has a unique triad of energy endowments. If we plan in a holistic manner to optimize the demand on the grid, this can create an energy advantage to Canada both domestically and as an export of energy to the United States.

**The Chair:** Excellent. Thank you very much.

Mr. Adams, why don't we move on to you?

• (1545)

**Mr. Tom Adams (Principal, Tom Adams Energy):** Thank you, Mr. Chairman, and members of the committee.

Federal electricity policy must be grounded in Canada's Constitution. Electricity is provincial jurisdiction, not federal. Historically, electricity policy oversteps of the federal government beyond its constitutional authority have almost always harmed our prosperity. I'll address an ongoing example, the federal loan guarantee subsidizing the Muskrat Falls project in Labrador, in a moment.

There are positive actions the federal government can and should take to enhance the long-term efficiency of electricity service to Canadians. The federal government ought to exercise its authority to promote interprovincial trade so that we can have free trade in electricity within Canada, with fair rules around transmission pricing and open access. The federal government ought to end the current discriminatory effect of the federal income tax rules that favour government-owned utilities over privately owned utilities by restoring something called the Public Utilities Income Tax Transfer Act repealed by the Chrétien government in its 1995 budget. The federal government should also commit to enhancing the availability, timeliness, and quality of economic data on the energy sector generally across Canada. This is an area where Canada lags badly behind the U.S. and the EU.

The committee asked for input on regional electricity independence. There's already significant regional electricity interdependence, mostly between provinces and the respective U.S. neighbouring states, but also between provinces where opportunities exist. Policies forcing increased east-west electricity exchange run the risk of reducing the efficiency of overall electricity trade. The major trends now in electricity generation technology are toward smaller-scale distributed generation. Power supply is naturally a local business. Where inter-regional power transmission is justified, it's mostly for reliability reasons.

Canada has massive transmission investments, but has experienced a long period of declining consumption. Canada's emphasis with respect to transmission should focus on extracting best value

from existing assets. There is no need for the federal government to spend any money on transmission.

What about greenhouse gases? The overall greenhouse gas intensity of Canada's electricity sector is low by international comparison. Ontario's coal phase-out program, which turned out to be a much greater net economic penalty than expected, provides a cautionary tale. All of the major capital projects in the power sector in recent years, justified substantially on the basis of their green credentials—I'm talking of B.C.'s Site C, Manitoba's Keeyask Bipole III, Ontario's FIT and nuclear refurbishment programs, Alberta's off-coal program, and Newfoundland and Labrador's Muskrat Falls—will all have punishing impacts on consumers.

With Newfoundland and Labrador's Muskrat Falls there is much harm to be mitigated. Former prime minister Steven Harper's justification for offering the federal loan guarantee, without which this project could never have started, was largely tied to greenhouse gas reductions. Even if the project can be completed on its current officially estimated cost and schedule, the province will require a federal bailout, perhaps as much as forgiving the entire amount of the federal loan guarantee recently topped up by the Trudeau government to \$7.9 billion. Without a federal bailout, Muskrat Falls will cause severe energy poverty in Newfoundland and Labrador, and all the social and economic consequences that entails.

• (1550)

In addition, the federal government should act quickly to broker a power storage agreement between Newfoundland and Labrador and Quebec, without which the Muskrat generator will be substantially inoperable. The longer Muskrat proceeds without an energy storage agreement, the greater the risk of interprovincial conflict.

What are the opportunities for aligning federal policy with the Canadian energy strategy issued by the premiers? The CES calls for more federal research. While well-targeted and well-managed basic research would be positive, notice how unsuccessful federal government spending on energy research has been in the last many decades. The largest federal energy research project was, for 50 years and many tens of billions of dollars, the CANDU program, a technology now at its dead end. A smaller example is research on wind power to serve remote users. Decades of research have produced little beyond the need for more research.

What about Canada-U.S. electricity trade? The Canadian federal government appears to be vulnerable to NAFTA suits initiated by U.S. owners of power plants near our border who are forced to compete against subsidized exports from Canadian provincial governments hell-bent on overproducing electricity. Defending such suits would put the federal government in the awkward position of aligning against the interests of Canadian consumers.

In conclusion, in matters related to electricity, the federal government should stick to its constitutional knitting. In addition, it should mitigate the harm it is causing to the future of the people of Newfoundland and Labrador.

Thank you.

**The Chair:** Thank you, Mr. Adams.

Mr. Martin, we'll move over to you.

**Mr. Nicholas Martin (Policy Analyst, Canada West Foundation):** Good afternoon, and thank you, Mr. Chair and members of the committee, for inviting me to appear before you here today.

I'm here on behalf of the Canada West Foundation, where I'm a policy analyst specializing in energy and electricity issues. The Canada West Foundation is an independent, non-partisan public-policy think tank that focuses on policies that shape the west, and by extension, Canada. Our CEO, Martha Hall Findlay, also sends her regards.

We at the Canada West Foundation recognize that climate change is a real and significant threat to Canada and the rest of the world and that the cost of inaction is unacceptable. We also know the action we do take needs to be taken in the most cost-effective way possible. For this reason we are supportive of the essential component of the pan-Canadian framework in clean growth and climate change: a price on carbon, which is the most practical and cost-effective way to reduce greenhouse gas emissions.

We're also happy that the committee is undertaking the study on strategic electric interties. The Canada West Foundation recognizes that pricing carbon is not a catch-all solution to achieving Canada's greenhouse gas goals in the most cost-effective manner possible. Complementary measures need to be taken to harness cost-effective emission reductions in instances where a price on carbon is not appropriate or practical. As the committee has heard from witnesses during these hearings already, a more integrated grid to increase strategic electricity interties can be a strong tool in harnessing cost-effective emission reductions by helping to integrate and share Canada's vast clean-energy resources. Yet a carbon price does not mean interties will be built, so it's appropriate this committee is looking at it more closely.

With that said, I think it's important to point out that the idea of investing in a more integrated grid is not new here in Canada, especially in western Canada. There have been many discussions on this for at least the last 40 to 50 years, which is roughly how long Canada West Foundation has been around. There's long been a sense that this would be a good idea, but the question remains, why hasn't it happened yet? Provincial electricity grids are still relatively independent of each other.

There are numerous reasons for why this idea has never gone anywhere, but in talking to folks who have been in this industry much longer than I have, I've learned that over the decades the western provinces have looked at the idea only to reject it time and again. Many of the reasons are related to provincial fears of losing influence over their own electricity grids. At times it was rejected because some provinces feared cheap coal power from Alberta would flood into their markets and harm their own utilities. At other times Alberta rejected the idea because of fears that cheap hydro would put their coal power plants out of business.

Now, with a final twist of irony, we're talking about it again because we have to reduce emissions and phase out coal power plants. This highlights the fact that the climate change imperative has injected new life into the idea of an integrated grid. It is very evident that we need to make big changes to the way we produce and consume electricity to achieve our climate goals.

As Bryson Robertson, from the University of Victoria, and many other witnesses have already said, improving the connectivity of our provincial grids is the key to taking advantage of the diverse energy resources we have across this country, and potentially, a very valuable tool in meeting our climate goals in a cost-effective way. This is particularly true in western Canada, where some of the country's best wind and solar resources reside between some of its best hydro resources—and we include Manitoba as the west for the Canada West Foundation,

For this reason the Canada West Foundation believes an integrated western grid should be pursued in the west, but as the past has shown, the provinces will need to work closely together if an integrated grid is to become a reality. A sustained conversation needs to be held between the provinces to figure out how to share the benefits that an integrated grid can offer. Fears that an integrated grid may wreak havoc on a province's electricity market will need to be addressed, and the full costs and benefits of increasing the trade of electricity will need to be understood and communicated.

The federal government has an important role to play in this. First, it can help provide valuable information in evaluating the costs and benefits of an integrated grid. While a more integrated grid can offer many benefits as Canada works to achieve its climate goals, these benefits are not guaranteed. Transmission infrastructure is expensive, and it gets more expensive over longer distances. Any investment in strategic interties should be made only if the benefits will outweigh the costs of building that infrastructure.

Natural Resources Canada and others are already working to address this information gap. We look forward to seeing the results of the regional electricity co-operation and strategic infrastructure initiative established by NRCan, which is evaluating the costs and benefits of a subset of infrastructure projects, including improved interties between the western provinces.

• (1555)

The second role government can play is with funding. Where strategic interties do make sense, the federal government may have a role in financially supporting the project to the extent the interconnection will drive greenhouse gas reductions. Such projects would be good candidates for the newly created Canada infrastructure bank, which seeks to leverage private and institutional capital to fund green infrastructure. Early indications from conversations I and others at the Canada West Foundation have had suggests there's a good degree of interest from private investors in strategic interties.

In conclusion, in conjunction with a price on carbon, strategic electricity interties and a more integrated grid can be a powerful tool to help achieve Canada's climate goals. The idea is not new, but the climate change imperative makes it all the more important now and the federal government has a key role to play.

With that I conclude my opening remarks. I thank you very much and look forward to your questions.

**The Chair:** Thank you very much, Mr. Martin, and thanks to all of you.

You're going to be asked questions in French, so if you need the earpieces the translation is there for you and available. We'll be starting with Mr. Lemieux, so you will need them.

[Translation]

**Mr. Denis Lemieux (Chicoutimi—Le Fjord, Lib.):** Thank you, Mr. Chair.

My thanks to the three witnesses for their presentations today.

First of all, I would like to know what Mr. Brouillette and Mr. Martin think about the following.

As you know, despite the increase in the volume of exports, electricity values and prices have declined in most of Canada's usual electricity export markets. Volume weighted average export prices peaked at \$64 per megawatt-hour in 2008, but averaged \$38 per megawatt-hour in 2016.

How do you explain this price reduction of 40% over an eight-year period in our U.S. electricity export markets?

[English]

**Mr. Marc Brouillette:** The reason that price has dropped is all about the price of natural gas and the price of fossil fuel. The markets in North America—and this might be something that Canada might want to dig into—are not set up to make clean, renewable, nuclear, fixed-cost assets competitive in the market. They're based around the price of natural gas right now.

In order to address exports from Canada to the U.S., that pricing mechanism is going to need to be talked about because you won't be able to trade at anything other than the price of natural gas. That's the

reason, and that needs to change. Once gas is out of the system, and it won't ever be completely out of the system, there's a market dysfunction. That would need to be addressed.

• (1600)

[Translation]

**Mr. Denis Lemieux:** Mr. Martin, do you agree with that?

[English]

**Mr. Nicholas Martin:** Yes, I do. Natural gas is the main driver of prices. Down in the U.S. it's very cheap. They do not price in emissions in the United States and that has caused a number of problems down there. We're seeing in New York they are implementing large subsidy programs to keep their nuclear power plants from retiring early because of depressed prices based on natural gas.

When it comes to trade between Canada and the U.S., at least at the moment, the differential is a lot less. But I think it is important to remember, as has already been said today, most analyses are showing that as we move toward these climate goals globally, and in Canada in particular, there's going to be a lot of electrification, a lot of fuel switching, and a lot of other changes that will need to be made where those dynamics won't necessarily be the price-setting unit in the long term.

**Mr. Marc Brouillette:** Can I add one clarification to that? One of the reasons is that the fixed cost of gas plants in the United States is paid for outside the market. Similarly in Ontario, we have fixed costs being paid for outside of the market under contract, and then the only thing that's traded is the actual electricity produced from natural gas. When people talk about a subsidy for another supply, like nuclear, it's not really a subsidy. It's allowing them to not only compete with the variable cost of natural gas, but it's allowing them to compete with the full cost of natural gas.

[Translation]

**Mr. Denis Lemieux:** Since the situation is quite set when it comes to interconnections, do you think that the NAFTA renegotiations will have an impact on our electricity trade with the U.S.? If so, how could it affect the development of our electrical energy and our interconnections here in Canada?

My question is for both of you.

[English]

**Mr. Marc Brouillette:** I'm not qualified to talk about NAFTA. There is a negotiation, though, on the subject of interties and electricity exchange that I imagine has to take place because the U.S. will have needs. They will need stuff from Canada, and there will need to be a mechanism.

New England has put forth RFPs that Quebec is bidding into. Maybe that's the mechanism that goes forward. I don't know, but there needs to be something.

**Mr. Nicholas Martin:** I'm also not an expert on NAFTA, so I won't comment on that, but I will say that based on some of my research there definitely needs to be some conversations.

Right now a lot of the provinces have open access transmission tariffs or OATTs that are based on the model that FERC in the United States has set up. There's still a lot of work and thought that needs to go into this, but there has been some research out there.

I think there's an article from the C.D. Howe Institute from maybe 10 years ago—I said this is not a new idea—that argues that we need to relook at these transmission tariffs and the way that FERC has set them up. It is impacting the ability for interprovincial trade because we're setting up our tariffs based on what is required for us to trade with the United States, and rules that aren't necessarily within NAFTA but could be discussed there.

Beyond that, I haven't heard anyone actually discussing that idea.

[Translation]

**Mr. Denis Lemieux:** Are you suggesting that we wait for the outcome of the NAFTA negotiations to take a position on our new vision for interconnections in Canada?

[English]

**Mr. Marc Brouillette:** Personally, I hope that the NAFTA negotiation team is considering this as a topic, and that the right experts are doing the right thing.

**Mr. Nicholas Martin:** I will echo that comment.

[Translation]

**Mr. Denis Lemieux:** My last question is for Mr. Brouillette.

You talked about an increase in electricity consumption. Since the electrification of transportation is going to become more and more popular, would you have any figures to share with the committee on the increase in electricity consumption in Canada over the next few years?

[English]

**Mr. Marc Brouillette:** I have done the analysis for Ontario. I can say that to get to the 2030 targets, we must consider the electrification of transport, which includes the trucking system, the rail systems, electric vehicles, hydrogen-powered options, and all sorts of stuff like that; as well as winter heating. Between all of that, Ontario is going to need 60% more electricity than it currently has. To get to 2050 you can double that again, so it's a lot.

That equates to 14 new nuclear plants in the next 15 years if you want to meet 2030 targets. That's how much electricity is needed. It's a lot.

● (1605)

**The Chair:** Thank you, Mr. Lemieux.

Mr. Falk.

**Mr. Ted Falk (Provencher, CPC):** Thank you, Mr. Chairman, and thank you to all of our guests at committee here today.

Mr. Brouillette, I would like to start with you. You said, "If Canada is smart...." Can you finish that?

**Mr. Marc Brouillette:** The smart part has to do with actually doing the analysis related to the engineering implementation, looking at the costs, looking at the demand, and optimizing the system. The hard part of smart is playing those three assets I talked about in conjunction with one another.

There's a nuclear advantage; presumably Canada can build these things faster and cheaper than anybody else. There's a hydro advantage, which has a limitation because there's only so much water that can be built, and we need more electricity than that can provide. We do have natural gas assets that can play a significant role for quite some time, particularly when we start putting in those additional "hydrogen into the gas system" ideas.

To make all that work does involve the provinces, it does involve interties, and it does involve thinking this through. As a citizen, I would like to see an emphasis on making this cheaper than the U.S. can and becoming an energy superpower exporting electricity to the eastern U.S. It's there. I'm doing a study right now to put the facts behind that. That would be a smart thing for Canada.

**Mr. Ted Falk:** Do you see the interties we have right now as being a bottleneck to exporting power? Do we have sufficient interties?

**Mr. Marc Brouillette:** If you wear the lens of today, we don't need any more. If you wear the lens of tomorrow, it depends if you believe there's going to be a lot more electricity required. I believe that. Depending on where you build the new supply, it affects whether you need to build interties.

If we're not smart about it, we might build expensive stuff in Ontario that may have been better built in Quebec and vice versa, and take away an opportunity. As long as the economics are looked at and decision-making around that is properly considered in a collaborative manner, we can end up with something that's unique and a gift to future Canadians.

**Mr. Ted Falk:** When it comes to interties, what does the construction of a typical intertie cost?

**Mr. Marc Brouillette:** The last time Quebec and Ontario got together to build an intertie, which was about eight years ago, I think it was \$3.5 billion to \$4 billion to put those things in place. That's the equivalent of two nuclear plants, 1.2 gigawatts of capacity.

**Mr. Ted Falk:** Mr. Martin, what is your opinion on that?

**Mr. Nicholas Martin:** On the cost of interties...?



**Mr. Ted Falk:** Yes.

**Mr. Nicholas Martin:** I don't have too many numbers in the back of my head. We are more on the policy side, but we definitely think that you have to weigh the costs versus the benefits that will come about from these interties. There is a reason why we are not talking about strategic interties to Iceland, for example. It would be really expensive, even though there would be benefits from integrating those grids. You have to look at both.

**Mr. Ted Falk:** You stated in your comments that we do not have an integrated grid at the moment.

**Mr. Nicholas Martin:** We could have a much more integrated grid. There are limited interties between the provinces. In western Canada, I believe, there is a small intertie between Saskatchewan and Manitoba, and a small one between B.C. and Alberta, but if you look at the map, it's more north-south, between the United States and Canada, than east-west.

**Mr. Ted Falk:** Okay.

Mr. Adams, I'd like to ask you some questions, if I may.

**Mr. Tom Adams:** Please do.

**Mr. Ted Falk:** You made a comment about there being interprovincial trade barriers with the transmission of electricity. Can you talk a bit more about that?

**Mr. Tom Adams:** Historically, electricity has been a guarded fiefdom of the provinces. Where there have been opportunities for interties, we have exploited some and not others.

One example is the long, decades-old conversation around further Atlantic Canadian electricity integration. Following on the comments of Mr. Martin, I would say that a barrier that prevented the maritime provinces from further integrating their power systems was purely a protectionist notion. They were trying to avoid job losses, which means efficiency gains, within their own jurisdictions. As a consequence, although there is electricity trade among the maritime provinces, it is not nearly as beneficial as it could be if looked at from the perspective of the customer, rather than the interest groups that feed off the customer's money.

The federal government could go a long way in encouraging the provinces, where there are efficient opportunities, to put customers first and encourage the kind of integration that could reduce the inefficiency of power systems. I am thinking particularly of Atlantic Canada, and also the B.C.-Alberta interconnection.

In the case of the Ontario-Quebec interconnection, Quebec's best customer for electricity, historically, was the U.S., and that's certainly the case today. Ontario has very extensive electricity interties with Quebec, but they are mostly underutilized. They are utilized primarily for reliability purposes.

•(1610)

**Mr. Ted Falk:** Are most interprovincial interties tariff-free or barrier-free?

**Mr. Tom Adams:** They are tariff-free. We don't have tax measures or rate measures that interfere with these interconnections. What we have, primarily, is policy measures. For example, the 1995 federal review of interprovincial trade had a chapter on energy. It was left blank. This is an illustration of the kinds of things that have

interfered historically with better electricity interconnection among provinces.

**Mr. Ted Falk:** Thank you very much.

**The Chair:** Thanks very much.

Mr. Cannings.

**Mr. Richard Cannings (South Okanagan—West Kootenay, NDP):** Thank you all for being here.

Mr. Brouillette, you briefly mentioned distributed energy sources, and I think you said that as those grow, they would increase the value of interties and balancing the grid. I wonder if you could expand on that.

**Mr. Marc Brouillette:** In general, the idea of distributed energy resources is to keep energy local—I think you mentioned that—which basically would argue against building the infrastructure between provinces, because you're trying to get the solutions together.

What distributed energy resources are going to be really good at is, as they throw solar in with battery, they'll take the peak out and flatten the load required from the distribution system, creating, from a grid perspective, a smoother profile. That is great when you want to start optimizing the use of distribution and transmission assets. They do that because solar comes on during the day, and when you don't need the solar, you can dump it into the battery. The battery can round out the corners in the morning and at night, and you can kind of level off the demand. At the moment, that, from my analysis, is one of the most cost-effective ways to take advantage of distributed energy. Flattening the demand will actually allow the bulk system, which will always have cheaper electricity—I think so, anyway—to be more efficient.

**Mr. Richard Cannings:** I just wonder, when you say “battery”.... Right now we have, say, hydro or nuclear, which is that baseload energy. Would the interties facilitate using wind and solar with those baseloads if we have provinces that have one but not the other? For instance, we've had witnesses here from the maritime provinces and the Atlantic provinces talking about interties that could bring in hydro from Labrador and use it to balance the wind energy they're producing elsewhere.

**Mr. Marc Brouillette:** One of the big challenges with the renewables and Canada is that winters are cold and dark, and the solar thing is just not built to work in northern climates. This is one of the reasons I suggest that the northeastern U.S. has fewer options to electrify and that the benefit of having Canada right beside them is that we can send hydro power down to the U.S. Equally, it can go east-west, because the renewable options will be less effective up here than they will down there.

If we try to build a system based around solar battery in Canada, our electricity will be higher in price than the electricity from the same solar battery system down in California. We get less sun. That's the way it works.

**Mr. Richard Cannings:** Mr. Adams, you briefly mentioned how important it was for Newfoundland and Quebec to have some sort of agreement. I just wonder if you could expand on that as well.

•(1615)

**Mr. Tom Adams:** Yes. Thank you for the opportunity.

The Government of Newfoundland and Labrador is constructing a hydroelectric facility that has no storage capacity on the Lower Churchill at Muskrat Falls near Happy Valley-Goose Bay. The associated transmission links that Newfoundland is constructing from Labrador to the island and from the island to Cape Breton are insufficient to carry the peak generation capacity of the Muskrat Falls generator. If Newfoundland and Labrador cannot come to a storage agreement with Quebec around storage of energy, the Muskrat project is going to dump almost all of its production in the springtime, which is the one time of the year when it has a full flow of water, enabling full production.

Newfoundland proceeded with the construction of the Muskrat Falls project, notwithstanding the fact that, subject to the 1969 contract with them, Hydro-Québec owns and controls the assets at Upper Churchill. Newfoundland has always planned on using Upper Churchill generation in order to balance the seasonal flow problem of Muskrat Falls, but they don't have the contractual rights to do this.

The further Newfoundland goes into the project, spending billions after billions on a project they don't have the contractual rights to operate, the worse off Newfoundland's going to be. Very urgently, Newfoundland and Labrador need to make an agreement with Hydro-Québec. Since the federal government is so deeply responsible for causing the Muskrat Falls project in the first place, by virtue of its loan guarantees by first the Harper government and now the Trudeau government, the federal government needs to play a brokerage role. They need to bring these parties together, so that they can come to a fair and reasonable storage agreement for the excess production of Muskrat Falls in the springtime.

**Mr. Richard Cannings:** Okay, I'll just ask a quick question of Mr. Martin.

I believe that you mentioned using the Canada infrastructure bank as a possible source of funding for interties and how there are private financing firms that might be interested. We've also heard a lot about costs and things like that. I just wondered if you could comment on how that would compare with the typical costs we have in British Columbia or wherever we have provincial, public utilities whose profits go to those provinces and how that would affect the cost of using a more private infrastructure bank.

**Mr. Nicholas Martin:** I can't say too much about how much it's going to cost each utility to build, but the point was mainly that this isn't something that the federal government needs to pay for 100% or anything like that. However, if it's actually worthwhile and if this would be a good decision to make, then there is money to make, whether it's a private investor or it could be a utility that would make that economic decision as well, depending on the jurisdiction. From our conversations, we know there are private investors who are willing to put their capital at risk because they think this is a worthwhile idea that would make economic sense. That was the point I was trying to make.

•(1620)

**Mr. Richard Cannings:** If it would make economic sense, why not have the government pay for it?

**Mr. Nicholas Martin:** Then it becomes a question of where you put that risk, as well. There's a lot of instances where the government does make the decision. It's not to say that these are 100% guaranteed investments, but someone has put some due diligence in there. If they're willing to shoulder that risk, where the ratepayers or the taxpayers don't necessarily have to, it's generally a good thing to do.

**Mr. Richard Cannings:** But they would—

**The Chair:** I'm going to have to stop you there. Sorry, Mr. Cannings.

Mr. Harvey, I believe you're next.

**Mr. T.J. Harvey (Tobique—Mactaquac, Lib.):** I want to thank you all for being here today, but Mr. Adams, I guess my questions are for you.

You spent a considerable amount of time during your presentation talking about the sovereignty of the provinces and their independence. You said that should be not only recognized but also reinforced, and you mentioned the importance of local generation from within each province. What do you feel is the best way for provinces across the country to achieve that energy independence, especially for the ones that have an energy deficiency? I guess that's my question.

How do you feel the baseload issue can best be addressed, given the intermittent nature of wind and solar in our northern climate?

**Mr. Tom Adams:** Constitutionally speaking, Canada's 10 provinces are really their own separate jurisdictions. We have 10 different stories about electricity across the country. The electricity situation of P.E.I. is as remote from the electricity situation of Alberta or B.C., or even its neighbouring provinces, as it is from many U.S. states. Each province has to find its own way. Some have public utilities. Some have private utilities. Some have hybrid markets.

One factor we all have in common is that the forces of technology change that are going on in the energy space are global forces. They're not restricted to individual jurisdictions.

I'm very optimistic about the future for a small, compact, distributed generation from natural gas-fired cogeneration, an opportunity that has a significant potential to bring electricity supply to a more local dimension, and which has the economic potential to really blow away future centralized generation.

You spoke specifically about provinces that have energy deficiencies. One example is P.E.I. They're not self-sufficient in electricity supply. It's far more cost-effective for them to trade extensively with their neighbours and to obtain the bulk of their electricity supply from their neighbours. There's a situation where interties are just a critical resource.

Again, what is the federal government's role in all of this? Bringing parties together and encouraging them to find efficiencies to assist their local ratepayers is an appropriate role, but building their transmission systems goes far beyond an appropriate role for the federal government.

**Mr. T.J. Harvey:** Further to my point, in terms of more localized generation, I agree that P.E.I. is an excellent example of a province that's energy deficient and reliant on interconnections and energy produced by other sources. You were very critical of hydro generation, especially Muskrat Falls, but also in general. With cogenerated natural gas and SMRs, do you believe that SMRs will be a viable alternative for more localized generation in the future?

• (1625)

**Mr. Tom Adams:** There's a very recent interesting report on SMR technology in the United States. They've invested vast amounts of money over more than 50 years. The conclusion this research team came to was that there really is little future for the technologies they've been pursuing.

There are some very exciting private initiatives to pursue SMR technology, but in terms of currently available solutions off the shelf, it's a long way away.

**Mr. T.J. Harvey:** In jurisdictions that don't have hydro or cost-effective hydro readily available, would you say natural gas is really the leading alternative?

**Mr. Tom Adams:** Absolutely. If you look at all the hydroelectric projects under way in Canada now or in recent years, they're all at a marginal cost far above the economic value of that generation. That includes Quebec, by the way. The Romaine project is a huge money loser. If looked at from a marginal cost point of view, all of Canada's electricity exports are money losers.

**Mr. T.J. Harvey:** I recognize the significant upfront cost for hydro, but given its cleanliness over the long-term viability of these projects, I can see why jurisdictions have chosen to go with it as a baseload technology.

Taking that all into context, I agree that it's probably not the federal government's responsibility to be building interconnections. However, I do think it's the government's responsibility to start the conversation with provinces about how they can utilize interconnections to better secure their energy network and work collaboratively to lower the long-term economic impacts that the ratepayer is going to pay for their electricity. Would you agree with that?

**Mr. Tom Adams:** Absolutely. You've said it more articulately than I could, but I soundly agree.

**Mr. T.J. Harvey:** Thank you.

**The Chair:** There's a little more time, Marc, but very little.

[*Translation*]

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

Mr. Brouillette, you said that the interconnections between the provinces would not be necessary over the next eight years because there is a surplus now. At the same time, you said that we have to worry about the future. So I have some trouble understanding your reasoning that we do not have to worry about interconnections.

We are talking about exporting electricity to the United States. The Hydro-Québec report I quoted compares electricity prices per kilowatt-hour. In Ontario, the price varies between 16¢ and 17¢, but it is 27¢ in Boston. We are talking about 29¢ for New York, 31¢ for San Francisco and 20¢ for Detroit. Since prices are much higher in the United States than in Canada, I wonder why you are not

recommending that we invest in interconnections, either now or in the future.

[*English*]

**The Chair:** You're going to have to answer that question very quickly.

**Mr. Marc Brouillette:** There are two things: present and future. In the present, the reason that interties between Ontario and Quebec don't need any additional work at the moment is that there's so much power on both sides that they can't get rid of. Why spend money? We have too much power and we can't get rid of it. Right now they're trying to dump it. Ontario is dumping a lot of power. Quebec is trying to dump a lot of power. The pricing situation in the United States has very little to do with having too much up here.

Interprovincial is one thing. North-south U.S. is another thing. We have interconnections being built in Lake Erie, and we have Quebec bidding on a lot of stuff to feed down to New England. They're all good ideas.

**The Chair:** I'm going to have to stop you there.

Gentlemen, thank you, all three of you, for joining us today and helping us with this important study. We're going to have suspend the meeting in order to move on to our next set of witnesses. I appreciate your taking the time to be here today.

• (1625)

(Pause)

• (1635)

**The Chair:** Order. We will now resume. We have three witnesses, all joining us via video conference.

Gentlemen, thank you for joining us today. The process is that each of you will be given the floor to make a presentation of up to a maximum of 10 minutes. When the three of you have completed your statements, we will open the floor to questions from committee members.

Let us start with Mr. Shaffer, who is a professor at Simon Fraser University.

**Professor Marvin Shaffer (Adjunct Professor, Simon Fraser University):** First, I'd like to thank you for inviting me to speak to you today. Greater integration, like provincial electricity markets, is an area I've been interested in for a long time.

I'm an adjunct professor in Simon Fraser's public policy school and I have been a consultant for many years. One of my first major assignments was to participate in a comprehensive study of the technical, economic, and contractual aspects of a western electric power grid. The study was undertaken in accordance with a 1980 agreement among the three prairie provinces to investigate the feasibility and desirability of a 1,000 megawatts sale of firm power from Manitoba to Alberta and 500 megawatts to Saskatchewan.

The study identified and assessed alternative intertie configurations. It analyzed economic impacts, benefits and costs, and pricing and ownership arrangements. The study did identify a preferred high voltage B.C. link. It studied the economic impacts that would be redistributed within the region and it did estimate the benefits and costs. Overall, the study concluded that there would be utility cost savings, and in terms of the social benefits and costs, there would be net benefits for the region as a whole.

Notwithstanding the finding of overall net benefits, as you know, the western electric power grid did not proceed. The different jurisdictions could not get beyond narrow provincial considerations. Manitoba Hydro was clearly focused on north-south trade and Alberta and Saskatchewan were interested in their own resources and power potential. Here we are 35 years later and I'm not sure how much has changed. There are significant opportunities in potential net benefits from stronger interprovincial ties, but the lesson from the western electric power grid is that it isn't enough to identify opportunities that offer economic and environmental benefits. It's essential to align narrow provincial with broader regional and national interests.

I'm in Vancouver at Simon Fraser University and I'm most familiar with the circumstances of British Columbia and Alberta right now, having left the prairie provinces some time ago. There have always been synergies and opportunities for mutually beneficial trade between the predominantly hydro system in British Columbia and the thermal system in Alberta. These opportunities have been explored to some degree but not to their full potential because of constraints in intertie capacity, planning criteria—and the self-sufficiency criteria in British Columbia stands out in this regard—and the dominance of provincial perspectives that give rise to divisive concerns about equitable access to markets and transmission in each other's jurisdiction.

With developments that have taken place and are planned in British Columbia, and the phase-out of coal and the emphasis on wind and renewables in Alberta, the opportunities are, if anything, much greater today.

As a result of reduced growth in requirements for electric-intensive industry, combined with the possible development of the Site C hydroelectric project, B.C. Hydro will have considerable surplus energy in the short to medium term that could serve to displace coal and other federal production in Alberta. More importantly, over the longer run, with the development or possible development of Site C, the addition of generating capacity at Revelstoke, and the refurbishment and upgrade of existing facilities, B.C. Hydro will have flexible capacity that could support and enhance the rapid expansion of wind energy in Alberta. It could provide the system backup that Alberta would most likely have to otherwise get from single-cycle gas turbines, with the economic costs and GHG emissions that would entail.

Displacement of thermal generation and the provision of hydro backup to support more wind production are two obvious opportunities that could be pursued with stronger ties and coordination. There are other opportunities as well. The thermal and other resources in Alberta could provide the backup energy capability that B.C.'s hydro system needs for low-water years, and generally it could enable British Columbia to ensure a reliable

supply without the costly self-sufficiency criterion it currently has in place.

• (1640)

More intertie capacity and access to U.S. markets through British Columbia for surplus Alberta wind production could improve the economics and incentive to develop more wind in that province. It could mitigate the price collapse that otherwise can take place during wind events.

There is no shortage of opportunities. One way to think about all of the opportunities is to ask yourself the question: how would the systems develop without a border if it were one jurisdiction, one integrated or combined system? A politically unconstrained view of that hypothetical combined system would identify the opportunities, and with some analysis, identify the opportunity cost or what we're foregoing by not pursuing them. The challenge would then be to consider how to get there institutionally, with a planned system in British Columbia, and politically, with the need for both provinces to perceive a fair sharing of the benefits that greater intertie capacity and coordination can provide.

The federal government, in my view, can play an important role in bringing the parties together to analyze the opportunities in the context of an integrated system, what that might look like, and to address the institutional and political constraints. The federal government has important interests here as well. More efficient development and operation of the electric systems will be increasingly important for competitiveness and efficiency in the national economy with the shift away from thermal production and the electrification trends in transport and other sectors that we can expect in the near term and certainly longer term. More rapid displacement of thermal production and reduced need for and reliance on thermal backup capacity for renewables will be important in meeting GHG reduction targets in the most cost-effective ways.

Finally, and not insignificantly I believe, strengthening east-west trade in electricity can reduce the dependence on U.S. markets and the energy trade surpluses that, for political reasons in the United States, may be used to limit economic trade in manufacturing and other areas.

Thank you.

• (1645)

**The Chair:** Thank you very much.

Mr. Hinds, why don't we move on to you?

**Mr. James Hinds (As an Individual):** Thank you, Mr. Chair.

I have a couple of things quickly at the outset. Was there a map circulated that looks something like this?

**The Chair:** Yes.

**Mr. James Hinds:** Excellent. I'll speak to that. Secondly, I'll make a public service announcement. The various organizations with which I've spent time have asked me to make sure that you understand that these are my views, and not necessarily the views of Hydro One or the Independent Electricity System Operator in Ontario.

With that out of the way, I really just have two quick points to make.

The first is in relation to the map. When you ask an electricity person how they see the world, this is how we see the world. There are three big pieces: the eastern interconnect, which includes Quebec; Texas; and the western interconnect. This is what North America looks like to us. It probably looks strange to you because, really, our system is interconnected on the eastern interconnect between Attawapiskat in the north and Key West in the south. Since electrons travel at the speed of light, anything that happens on the way through, whether it's some squirrel getting into a generator in Miami or whether it's a snow event up in Canada's far north, will be instantly seen by a whole bunch of control room operators as it happens. They may not find out what happened for another three months. It's really quite a marvel of engineering.

In that view of the world—eastern interconnect, western interconnect, and Texas—you'll notice the geographic boundaries that you're used to seeing for political geography, the states, the provinces, and that. Electricity is carried over those boundaries by interties. Just a fundamental principle is that most of these systems are built to be self-sufficient within a sovereign entity, but are interconnected through interties.

I thought today part of the discussion that you wanted to have was about the value of the interties. I'm not going to drone on and on because there seemed to be a lot of different topics and a lot of different manifestations about that, but I will make two obvious points about this map. The first is that the eastern interconnect is not interconnected with the western interconnect, neither in the United States nor in Canada. That's a glaring observation. Marvin addressed it a little bit, but we've never really looked seriously as a country at interconnecting our own country.

That would have advantages for Canada. It would also be an interesting market play because if we interconnected, Canada that would be the only route of interconnection between the eastern and the western United States. Texas is down doing its own thing for a lot of interesting and amusing historical reasons, which we can get into in question period if you care, but it's kind of glaring. Maybe what I will do at this point is just stop with the map, and then if people have questions on it we can get into it.

Let me make a second point. The electrons themselves that move around at the speed of light and power our lights and power everything that we do are actually technology agnostic. They're technology neutral. They don't care whether they were made in a nuclear reactor, a photovoltaic cell, even a chemical interaction in a battery. The commodity is utterly fungible. I know of no other commodity that can be made so many different ways. Steel can't be made this many different ways. It's quite remarkable.

But the electrons themselves are technology neutral. We all have different endowments in our jurisdictions. We all have different biases in terms of public policy about the way those electrons are manufactured. Once that happens, the interties and the system don't care how they were manufactured. They flow at the speed of light over copper wire and end up where they're supposed to end up.

Most of the tension that happens between the political jurisdictions and the electrical countries that those jurisdictions live in, from a policy point of view, whether it's clean energy, whether it's wind, solar, thermal, coal, gas, biomass, hydraulic, whatever the technology that makes it is, happens within the sovereign realms of, oftentimes, provinces and states. In the United States, there is a more federal jurisdiction than there is in Canada, but all these things overlay on that. Fuel mix is really quite diverse even within these jurisdictions, but once an electron is made, it moves, and it moves over the interties.

Maybe, Mr. Chair, having made those two points, I'll just wait until question period.

• (1650)

**The Chair:** Great. Thank you very much.

Mr. Burpee, we'll move over to you.

**Mr. Jim Burpee (As an Individual):** Thank you, Mr. Chair, and members of the committee.

Thank you for inviting me here to speak to you as an individual Canadian, albeit one who has spent 40 years in the electricity sector, not only in Ontario but in Canada, North America, and globally.

For me, the overarching context for today's discussion is Canada's long-term targets for climate change mitigation, specifically 2050. Many studies and reports have been released in the past few years, all identifying the need to displace the combustion of fossil fuels with electricity and biofuels. The most rigorous modelling I am aware of was done in the Trottier energy futures project, whose report was released in April 2016. From my perspective, it has done the best job of recognizing the need for a reliable electricity system; that is, customers who expect the lights to go on when they flip the switch regardless of the outside weather conditions.

A key finding of Trottier is the resultant growth in electricity demand under a wide variety of decarbonization pathways. Currently, electricity provides about 22% of Canada's end-use energy demand. This is expected to grow to 60%, necessitating close to tripling the current electricity supply infrastructure over the next 30 to 40 years. We are not talking about tweaking the electricity sector, but a major transformation of the Canadian and global energy sector, and this is after factoring in aggressive energy conservation results.

In today's discussion on strategic electricity interties, I want to go back a bit in time, well over 100 years ago. We did not start out with an integrated electricity grid. We started out with microgrids in each major city. Over time, we started linking those microgrids to improve both reliability and economics.

Today, we have a strong North American grid. It is an eastern interconnect, western interconnect, and Texas. Although perhaps the orientation of those markets and interties is greater north-south than east-west, the driving force for these interties has always revolved around reliability and economics, which means it has been in the interest of the customer.

Each province has developed its electricity sector around the resources available in that province, whether it's coal and gas, hydroelectric, nuclear, or a combination of them. Recently, there has been expansion of hydroelectric and other renewables, such as wind and solar. The opportunities are different for each province, largely because resources are where they are. Decisions have also taken into consideration self-sufficiency, not being reliant on other provinces except on an emergency basis. Given the need to expand the electricity system with non-GHG-emitting generation, this notion of self-sufficiency needs to be critically challenged to decarbonize the economy over time at the lowest cost while keeping the lights on.

There is one example in the recent past of two provinces taking a different approach through the utilities in those provinces. I'm referring to Newfoundland and Labrador and Nova Scotia, and the development of Muskrat Falls and the maritime link project, which will connect the two provinces. When completed, it will not only facilitate large GHG emission reductions in Nova Scotia, but by connecting Newfoundland and Labrador to the North American grid, it will improve reliability in Newfoundland and Labrador. What was different about this approach was that it went forward more as a partnership than a traditional buy-sell relationship, with both parties having capital at risk. It was also supported by a federal loan guarantee that reduced borrowing costs, and those savings will be passed on to the customer.

Provinces working together as partners, with capital at risk, is key in my mind. It is not simple nor easy to do, but it needs to be the way forward.

It is also necessary to talk about who pays and how infrastructure is funded. The old regulated utility model was simple. The utility, regardless of ownership, got approval from an economic regulator, and based on the approval, raised financing, usually via debt and some equity. Recently merchant transmission lines have also been proposed and built, such as the Montana-Alberta tie-line. A merchant line has shippers wanting to access the market and sign contracts with the transmitter, who raises financing—again debt and equity—on the strength of the contracts. Both are valid models, although the merchant model typically has only been used in connecting jurisdictions with open electricity markets.

Beyond the issue of financing the building of infrastructure, there is the question of who ultimately pays for it. In the electricity sector, it has virtually always been the customer on a user-pay basis. In other words, the customer pays in accordance with how much they use.

• (1655)

Of course, there is also the possibility of a taxpayer-pay model either directly, in other words the government would provide a level of funding for the infrastructure, or by subsidies.

While the customer and taxpayer are usually the same person, where you start to blur the lines between the two and move away from a pure user-pay system is most notably in Ontario. Ontario provides another cautionary tale as we go forward. The electricity sector is a very capital-intensive sector with long-lived assets, but the math is very simple. Make large investments over a relatively short time and electricity prices rise rapidly as those investments are made and the costs start to flow to the customer. This fact must be understood with each capital decision being made. There will also be local impacts from all these decisions, whether it is large hydroelectric, wind, solar farms, transmission, urban densification, public transit, and so forth.

Lastly, there is Canada-U.S. trade. While over the course of the year the flow is biased from Canada to the U.S., there are times when the flow has been northwards. The relationship between Canada and the U.S. markets has been positive and beneficial on both sides of the border. Notwithstanding the current U.S. administration's position on climate action, there continues to be very positive signals from many U.S. states to increase trade, particularly with respect to non-GHG-emitting supply.

I spoke earlier of developing the interprovincial partnerships with respect to infrastructure. Enhanced sales of clean electricity in the U.S. market is another developing opportunity for interprovincial partnerships.

That concludes my remarks and I look forward to your questions.

**The Chair:** Thank you very much.

All right, Ms. Ng, over to you to start the questions.

**Ms. Mary Ng (Markham—Thornhill, Lib.):** Thank you very much, gentlemen, for joining us today and sharing with us your comments.

I'm going to address my first question to Mr. Burpee.

Can you give us a point of view? There are choices the country has to make going forward about the priority that we give to increasing supply, if you will. What's your view about how much we do around modernizing or upgrading our electricity system versus the investments that we ought to be making around interprovincial interties. Where would those strategic ones be the most advantageous?

**Mr. Jim Burpee:** In terms of modernizing, there is no question in my mind going forward that, in any decarbonization scenario, the distribution grid is going to become far more complex than it is today. The consumer will get more involved in the electricity system through variable demand, how electric vehicles are charged, and what not. The transmission system, which overlays that and has to connect that, is also going to get more complicated than it is today. Any time we do renewal and upgrade, the way forward and how things are going have to be factored in.

In terms of strategic interties, whenever I look at a map of Canada, I always hear talk of the east-west grid. I have lived in northwestern Ontario for a period of time and flown over there a lot. There's not a lot of empty space up there, but if you look of our opportunities, I always think of Ontario-east, and Manitoba-west. There was some reference to that before. Manitoba and B.C. still have hydro resources to develop, and clearly, there are needs to reduce the use of coal and fossil fuels in Saskatchewan and Alberta.

It's a little different in Ontario in terms of there not being as much to displace now that coal is out. There is still some gas, but if we look at the use of electricity to displace transportation fuels and space heating, we see that we're going to need more. It's a question of how Ontario and Quebec will do a better job of working together, whether.... I'm not sure "competing" is the right term, but it's a different relationship in terms of where investments are made and how they're made. It's different from the past, but I always like to say Ontario-east and Manitoba-west are where the big opportunities are.

• (1700)

**Ms. Mary Ng:** Thank you.

I'm going to turn my next question to Mr. Hinds, and thank you for sharing the map.

I have a similar kind of question to you about the opportunities around interprovincial interties and where you think there may be some good advantages for us to do it here in Canada.

**Mr. James Hinds:** In the sense that this has been looked at a lot of different times, I think the most recent iteration of a full east-west tie was back in 2005. TransCanada had done a study and was trying to rally some support for a full trans-Canada tie. We're not that far away.

Ontario is interconnected with a 115-kilovolt line into Manitoba, and I believe Alberta is interconnected up north with Saskatchewan. In theory, it's not difficult to create one. The question is how big the thing should be if you want to do a trans-Canada tie. I think to meaningfully affect the electrical flows, it would have to be quite big. The other gentlemen will have a valid opinion. I'd throw a number of 4,000 megawatts on it. The opportunity for us to do things interprovincially as opposed to doing them north-south, like we've been doing, is to try to follow our peak load across the country as dinnertime moves across the country, because that's when our electrical peak is.

I'll assume that there are no ringers in the room there, but the systems really do expand and contract depending on the time of day. I'll speak to the Ontario system because I know it the best. At night we're consuming about 10,000 megawatts. On a hot air conditioner day this past summer, we were at 21,000 megawatts. That pulse of doubling our effective capacity every single day continues all the way through the seasons. In Quebec it's even more dramatic because in the middle of winter they have most of their heating on baseboards, so their electrical peak is very high. I don't know the characteristics of the western system as well as I should. Certainly Marvin would be able to tell us what goes on in B.C.

I think the opportunity, if we're going to do it, has to be a significant opportunity to move it east-west. We know our interconnection is north-south, both in the western part of the

country and the eastern part of the country, which are very big, and we know we have generally a ready market for our electrons down in the United States. The question would be, is it worth interconnecting in a meaningful way east-west?

**Ms. Mary Ng:** Is it?

**Mr. James Hinds:** There's a lot of math and a lot of electricity, and there are a lot of things that have to go on here, not the least of which is siting, which is huge problem for transmission. Any time you build something new, it takes forever to get transmission approved. It can take decades.

Perhaps the best thing that was done in Ontario was the setting aside of corridors 25 and 30 years ago in urban planning, which didn't deal with all the issues but certainly made it a viable alternative for us to build new transmission in Ontario to move generation around the province. Again, it's a question for study. My instinct, as a business person, tells me in the next... These are very long-life assets, too.

Let me abstract away from the political cycle, which is three years or four years. These assets live forever. The transmission corridors live forever. The generation assets live, in many cases, 50 or 100 years in the hydraulic case, and certainly in the nuclear case, 50 years, and in the gas case, 20 years easily, but we can repurpose them for at least another 10. These are very long-lived assets, so answering the question in the context of multiple decades is a business proposition that's worth looking at.

**Ms. Mary Ng:** Does that business proposition, if done well and strategically into strategic regions, also enable a greater north-south intertie that is economically advantageous for Canada?

**Mr. James Hinds:** We're doing our own north-south interties right now more or less bilaterally. We keep augmenting our interties with the United States, in Ontario's case. I know Quebec has a line proposed in through Vermont and New Hampshire. I know that this intertie that's going down as a result of the Muskrat Falls coming out of Nova Scotia is going to tie into the New Brunswick interties. Presumably they're going to enhance that. Bilaterally the provinces tend to be working on a lot of different intertie options at any given time. Right now—correct me if I'm wrong, Marvin—I think they're twinning the intertie between Alberta and B.C. through Banff.

These things have always—

**The Chair:** I'm going to have to stop you there.

**Ms. Mary Ng:** Thank you very much.

**The Chair:** All right, thank you.

Mr. Deltell.

• (1705)

**Mr. Gérard Deltell (Louis-Saint-Laurent, CPC):** Thank you, Chair.

Thank you, colleagues and gentlemen. It's quite interesting.

My question will go directly to Mr. Hinds.

I was very interested in your diagram, especially because I'm from Quebec. As you know, Quebec is the most powerful partner in hydroelectricity, to say the least. What we can see now is that there is something to do about that. Following the questions of all my colleagues on this issue, do you have any indication how much it would cost if one day we had the same link coast to coast in electricity and hydroelectricity?

**Mr. James Hinds:** By the way, we fully respect Quebec—and this is not my map. This is the way the Americans look at this. From the point of view of a colleague, Quebec's interconnection with the eastern interconnect is seamless. I think the jurisdictional boundary that they draw in their map is only because Quebec has a different form of electricity system than the rest of us do. They have direct current, as opposed to alternating current.

**Mr. Gérard Deltell:** Is that why we cannot sell our Quebec electricity directly to other provinces and to the United States, and why we have to build our own electricity transmission line?

**Mr. James Hinds:** That's not completely true. You sell a lot to the Americans through our transmission system. At any given point in time, you'll be selling to Ontario, and wheeling through Ontario and selling into the United States' grid. Right now I just checked, and we're probably wheeling about 400 megawatts of power from Quebec to New York for you.

**Mr. Gérard Deltell:** If we can sell it—

**Mr. James Hinds:** You pay for the privilege, and the transmission system is open. The Hydro-Québec marketing arm deals with all the niceties involved in selling the power through whatever interconnection is the most viable at the lowest cost to the buyer, so that all works quite well.

The only challenge with it is that we need to take your DC power and change it on the way through the interties, but we have big investments in that at the interties that do that. So yes, that does increase the cost a little bit for Quebec to export its power, but by the same token, Quebec makes a fair amount of money. They've never told me how much they make, but I think Hydro-Québec does very well, thank you very much, selling power to all the rest of us.

**Some hon. members:** Oh, oh!

**Mr. Gérard Deltell:** Never enough.

Do you have any indication of how much it would cost to have a coast-to-coast unified system to sell hydroelectricity?

**Mr. James Hinds:** I do not have an idea on the cost of that. I think the way I would get it, if you would like an answer, is I'd call the TransCanada Energy Ltd. people and find out what their idea was back in 2005 when they costed it then. I think they tried to put together a consortium to do it, but they found the economic case didn't work. A whole bunch of things have changed since 2005, not the least important of which is climate change, so all of sudden the cost of carbon on the alternative fuels has increased relative to the cost of electricity, so maybe the economics are different.

**Mr. Gérard Deltell:** Thank you, sir. That's quite interesting.

**The Chair:** You have about three and a half minutes left, if you want to go ahead.

**Mr. Jamie Schmale (Haliburton—Kawartha Lakes—Brock, CPC):** Thank you very much.

I'll open the floor to whoever wants to answer the next question.

Based on what we just heard in the last line of questioning, and looking at the current connections, the current provincial consumption, the production, as well as what we heard about interties and the complexity with that, where do each of you stand—if you all want to answer—on where we should be focusing our efforts, assuming we cannot build or upgrade everywhere at once?

**Prof. Marvin Shaffer:** Maybe I could start on that. I'm thinking of that in relation to an earlier question and in relation to the title of this strategic interties study. I think it may be too big to think about what it would take to connect the whole country all in one swoop, but there are tremendous opportunities regionally within the country.

I think Mr. Burpee spoke to this too, but wherever you see an emphasis on getting off of thermal and you shift into renewables in a neighbouring jurisdiction with hydro, and potentially surplus capacity in short-term energy, there will be tremendous advantages in ensuring that the capacity is there to enable efficient trade between the hydro resource—particularly the capacity in storage it can offer to back up the renewables—and the surplus energy it can provide to more rapidly displace thermal. I see, between B.C. and Alberta, important opportunities to strengthen the tie. I'm not sure that the twinning that Mr. Hinds spoke about is taking place. Someone mentioned earlier that they put in a tie from Montana to Alberta, but that actually reduced the transmission capability across from British Columbia, so there are significant limitations right now.

I think the same would be true between Manitoba and Saskatchewan, where you have the hydro potential and the hydro resource neighbouring a predominantly thermal system. We're not talking about the traditional synergies between thermal and hydro. We're talking about the new synergies when you're moving to renewables, a lot of wind that needs backup on an hourly and longer-term basis. I can't speak to eastern Canada as well, but I think there's a lot of work to be done to move to broader regions in the country and broader systems that are fully integrated and optimizing within those regions.

● (1710)

**Mr. Jamie Schmale:** Does anyone else have anything?

**Mr. Jim Burpee:** I'll go back to what I said before, which is from Manitoba through to B.C. From an electricity-supply perspective, we're already one of the cleanest systems in terms of low carbon emissions, but if you look at 2030 and beyond, part of the country that really doesn't have a complete plan yet, other than closing some more coal units, of how to get even cleaner would be Alberta and Saskatchewan.

There's an opportunity for developments, whether from B.C. or from Manitoba or from both, to go into Saskatchewan and Alberta. I would say especially Alberta, because beyond just their current electricity system, they are also looking at how to further reduce the carbon intensity of the oil sands operations through the use of more electricity.



It's not just about replacing what exists. It could be about bringing even more electricity into that area to reduce the carbon intensity of the fuel they produce to make it more similar to other forms of oil and gas.

**The Chair:** Thank you. I have to stop you there.

Mr. Cannings.

**Mr. Richard Cannings:** Thank you all for joining us here. I'm going to start with Mr. Shaffer.

Could you perhaps expand on what you think the timelines on any strategic intertie projects should be? When we think of the present surplus we have in British Columbia—that's an area that you know well, and I'm also from there—when should we be thinking of building these interties? Should we be waiting for a time when that surplus is less, or should we start thinking of building them between the provinces now?

**Prof. Marvin Shaffer:** With respect to British Columbia and its connection with Alberta, we should first be thinking about optimizing the transmission capacity that's in place, because it's constrained now in ways that possibly could be relieved without major capital investment and I think we should be starting the process to expand capacity in the near term for a variety of reasons.

We do have surplus in British Columbia right now, which could be used to displace thermal, and longer term it's that synergy between the hydro resource and the wind resource. It isn't as if you're saying we should move development to British Columbia. I think this could enhance development of renewals in Alberta as well. I think there could be gains on both sides, but you need the strong interconnection, and you need, as I said earlier, the institutional arrangements to make that possible. It's complex. You have a market system in Alberta. You have a centrally planned B.C. Hydro. It's not like just a bilateral utility deal here. It's much more complex. To answer your question, I think we have to start now, right away.

• (1715)

**Mr. Richard Cannings:** On another thing about timelines, looking to the future and crystal-ball gazing, you quickly mentioned how British Columbia sometimes needs power during low-water years.

I'm wondering how much study has been done, or how much modelling, with regard to climate change over the next 30, 50, or 100 years of reducing water flows, especially out of the Rockies as glaciers recede. I hear a lot of stories of reduced water flow.

**Prof. Marvin Shaffer:** I'm not an expert, by any means—and you may have some B.C. Hydro people coming to your committee—but there are concerns about the snowpack. There will be water, but it may not be stored in the same way it is now in the snowpack. That can cause some problems with your hydro capability in the future, out of the same facilities.

**Mr. Richard Cannings:** You quickly mentioned something that I wanted you to expand on, and that is about how something was limiting manufacturing. It was something about American trade in electricity.

**Prof. Marvin Shaffer:** If you look at Manitoba and British Columbia and the hydro surpluses they typically always have, even if it's just non-firm because of water conditions, they are moving

predominantly north-south. That is creating significant energy surpluses, at least in the trade from those two provinces.

If I could say, for mindless economic reasons in the United States, there's this notion that there should be no trade imbalance between two countries, clearly if you have trade surpluses in energy, you're going to have less room for trade in other areas. That's why I think there's a strategic value in enhancing our capability to trade east-west, so that surpluses don't have to be sold just north-south.

**Mr. Richard Cannings:** I'll move on to Mr. Burpee.

You mentioned Muskrat Falls and how it will be working as we go ahead. We heard from a previous witness about the need for a storage agreement between Newfoundland and Quebec around that, to handle the fact that Muskrat Falls doesn't have storage in the usual sense. There would be this big peak in the spring.

Can you comment on that?

**Mr. Jim Burpee:** No, I can't. I'm not aware of the details of whether storage would impact the ability to flow.

It was my understanding that the surplus to Newfoundland's needs, beyond what's committed to Nova Scotia Power and Emera, would probably find its way into the U.S. market. I don't know if there's a time at which the supply at Muskrat Falls would exceed the capability of the maritime link, which I think is 500 megawatts.

I think there are still some, how should I put this, complexities of the issues between Newfoundland and Labrador and Quebec when it comes to management of an almost common resource of water where it starts. If you're in Newfoundland and Labrador, I think it will get resolved in 2041.

To one of your earlier questions, though, something that has not been mentioned yet but that I need to stress is that if we're really considering further enhancement of ties between provinces and where they'd likely be, it needs the early engagement of first nations and aboriginal communities. It involves their territories, whether it's development of hydro resources or the transmission itself. These are conversations with Canadians that really need to start now.

I don't think there's really an understanding. Everyone might endorse the idea of enhancing east-west trade, but when they think of the transmission towers near their backyards, they get upset. These conversations need to start now on how it ties into our long-term climate objectives, which, as I said at the beginning, is the overarching objective here.

**The Chair:** Mr. Serré.

**Mr. Marc Serré:** Thank you, Mr. Chair.

Thank you to all the witnesses for your presentations. They were good, very insightful. Thank you so much for the work you're doing.

My first question is for Mr. Burpee.

You indicated that we should look at how to work better on the expansion of the agreements between Ontario and Quebec. Can you expand and give some examples of that?

• (1720)

**Mr. Jim Burpee:** On part of it, I can. My comments really are what I read in the media, what I've seen released, and agreements that get around. It's a complex time because not only is Ontario trying to sort out its future requirements—the long-term energy plan is due out I think this month maybe, Jim?—but they're also entering into or competing for supply into the U.S. for renewable resources and others.

There's a lot happening commercially, but it appears to me that there's an element of Quebec versus Ontario, where's one's trying to sell to the other. If you're doing a buy-sell relationship, you're not sure who's trying to get the better deal, as opposed to whether there is an opportunity to partner. Partnering, in my mind, means that if we're looking to Quebec for part of the answer to Ontario's long-term electricity requirements, it means a capital investment potentially from Ontario wind, and it means developing resources jointly.

I disagree a bit with the idea that we should only focus east-west. I still think that in the long term on climate objectives we can do quite well by working together and focusing on displacing carbon south, because in the grand scheme of things we want carbon reductions at the lowest cost.

**Mr. Marc Serré:** Thank you.

My next question is for Mr. Hinds. Thank you so much for the diagram. Also, just as a side note, your father would be really proud of the work that you're doing right now in electricity.

**Voices:** Oh, oh!

**Mr. Marc Serré:** He was very passionate and loved the electricity file. I just wanted to make sure that I passed that on to you.

**Mr. James Hinds:** There are maybe 10 people in the world who know about my dad, so thank you for that.

**Mr. Marc Serré:** There you go.

Mr. Hinds, in terms of Canada's priority as a federal government, do you believe that we should focus more on increasing clean electricity exports to the U.S., or should we be focusing more on the interties with the provinces? Can you comment on that?

**Mr. James Hinds:** That's a very good question. In doing what I do—and perhaps unlike Jim—I have to be technology agnostic, because my job is to make sure people's lights go on. I can't fall in love with any particular flavour of the way these things are made. I have a very “technical system operator” point of view on the variety of different sources. The general answer I'm going to give you is completely evasive, but it's true. Every form of power generation has advantages, and every form of power generation has disadvantages.

There I will stop, although perhaps not for the rest of this meeting, as I would like to revisit a couple of things.

Perhaps first is the question on Quebec. Ontario and Quebec get along extremely well. We are heavily interconnected. Quebec is generally an exporter of electrons. They use their own transmission system to do so through the United States. They use our transmission

system. It's open. They're free to do that. We have a number of bilateral deals with Quebec on particular power usage things, including a swap with them at their winter peak versus a swap with us at our summer peak. We make emergency arrangements with each other to support each other's systems in times of bad weather events and other things. Ontario and Quebec are perhaps the least of the worries here. We do a tremendous amount of business with them, and the systems are heavily interconnected.

I would like to cycle back to the question that was asked previously and that might pertain to this too.

There are three glaring holes in the map right now.

The first glaring hole in the map is western. Alberta is not directly connected to the western interties. In order to connect to the western interties, Alberta has to go through B.C., and that is a source that's probably worth half an hour of the committee's time at some point in order to understand the electrical issues behind that, and the friction. It means that Alberta is hostage, to some extent, in its ability to get electrons from the western intertie to whatever is going on in B.C.

There's a whole bunch of other initiatives that are currently under way. I won't comment on them, but the other glaring gap is that Ontario and Manitoba are not really interconnected very well. There's tremendous hydraulic potential in Manitoba. Manitoba is spending a whole pile of money on transmission enhancement up and down either side of Lake Winnipeg in order to enable new generation to come online, and really, there's largely an extension cord that exists between Jim's old stomping grounds in the northwest and Manitoba. It's a 115-kilovolt tie-line. In the long-term energy plan that we're about to release, Ontario has been gradually enhancing its ability on the transmission system to Thunder Bay and west. I would expect to see that enhanced in a couple of weeks when this plan comes out.

The third glaring one on this map is that, in fact, Saskatchewan is not really interconnected with anybody. Again, my third major observation would be that, other than work that's already under way, there are no real interconnections of any significance between Saskatchewan and anybody else.

In terms of thinking about how your committee can make a difference and how the federal government can make a difference, I would focus on the three areas where work is not being done, and those are the three areas.

• (1725)

**Mr. Marc Serré:** Mr. Hinds, you mentioned the important link that Ontario has with Quebec. How has the nuclear sector played a role in that, and in your opinion is there any role for SMRs in northwestern Ontario as far as expanding the electrical grid goes?

**Mr. James Hinds:** Northwest Ontario is our own issue right now because of the potential development of the Ring of Fire up there, and also electrifying some of the communities that are currently on diesel. That's a long conversation.

In terms of Quebec, the interplay between nuclear and Quebec, essentially the marginal cost of an electron made by nuclear reactor is close to zero. The marginal cost of an electron made by Quebec's water system is next to zero. Those two electrons fight it out with each other in the market. I think Quebec has experimented with the CANDU reactor. I don't think it's ever been synchronized with the grid. I think they decided to put the reactor in abeyance and decided not to pursue the technology, and given what their hydrology is I can completely understand that. I doubt that there's a future for nuclear power generation in Quebec.

In Ontario we're refurbishing our reactors, which is going to be a five-decade project, and we're trying to keep them alive. Pickering will be shut down but Darlington and Bruce will be refurbished, and I think they finally got the refurbishment in New Brunswick done of

Lepreau. I think it's working fairly well. But I don't think there are many people around who think that nuclear has any new built capability in Canada in the near term.

**Mr. Marc Serré:** Thank you.

**The Chair:** We're going have to stop there. Don't everybody rush off as we have some committee business and we'll have to go in camera for a couple of minutes.

Gentlemen, thank all three of you for joining us today and taking time out of your schedule. Your evidence has been very helpful to what we're trying to achieve here. On behalf of the committee I just want to express our gratitude and wish you well for the rest of the day. We're going to let you go and we're going to carry on.

We'll suspend for two minutes and then come back once the room has been cleared.

*[Proceedings continue in camera]*

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