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Chair

Mr. James Maloney

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● (1535)

[*English*]

The Chair (Mr. James Maloney (Etobicoke—Lakeshore, Lib.)): Good afternoon, everybody.

We have a bit of a quirky agenda today in terms of scheduling—not in terms of witnesses, just so I'm clear.

Our first witness, Mr. Stenclik from General Electric, is available until 4:15. Our second witness, Mr. Matthiesen, will be joining us at 3:45. I'm hoping we can transition from Mr. Stenclik's presentation right into the second one, and then deal with questions all at once. That may be wishful thinking on my part, but we'll do our best.

Mr. Stenclik, thank you very much for joining us today. We're grateful. I know you have a tight schedule, so we'll get moving quickly. Just so you know the process, we'll give you up to 10 minutes to make your presentation, and that will be followed by a series of questions from members around the table.

Before the questions come, we are hoping to transition quickly to the next witness so that we can pose the same questions to both of you at the same time. When you complete your presentation, we'll see where we are and go from there.

I'll open the floor to you now. Take us away.

Mr. Derek Stenclik (Manager, Power Systems Strategy, General Electric): Thank you to everybody on the committee today. I appreciate the invitation to speak about this topic of Canadian interties. It's an increasingly important and interesting topic.

To give you an introduction, my name is Derek Stenclik. I'm the manager of the power systems strategy team with GE energy consulting. My team and I are power system experts who simulate the transmission grid across North America and globally, and use our simulations and our modelling to evaluate long-term planning in the utility and grid industry. These simulations are really on the interface between engineering and economic and technical analysis, and they mirror the way the power system operators work and dispatch the system.

Recently, my team and I were involved in the pan-Canadian wind integration study and are currently evaluating a few grid simulation studies across Canada: the regional electric co-operation and strategic infrastructure study—the RECSI study—as well as a renewable integration study in Saskatchewan. The analysis performed by GE energy consulting in these studies, the pan-Canadian wind integration study and almost all of our grid studies, indicates that increased transmission interconnections and co-operation between regions, whether those be Canadian provinces east-west across the country or north-south to neighbours in the United States, can be an effective strategy to reduce thermal electric generation, decrease carbon emissions, and increase renewable penetration.

A key finding from many of these studies has been that increased co-operation and increased interconnection between neighbouring power systems, utilities, or markets is a step in the right direction to move towards a low-carbon future and a high-renewable future.

Today it can be challenging at times to economically justify the cost of new grid infrastructure on disparate energy and electricity prices alone. While one region may have low electricity prices and others have slightly higher prices, typically the price differentials are not by themselves enough to justify new transmission capacity being built. It's about layering in several of the benefits, and I'll walk through those here today.

I'll list six benefits that you could see from increasing the strategic interties between the provinces and between the United States and Canada. There are several other benefits that are important, but the six primary ones that I can think of today include, first, energy benefits, meaning more efficient utilization of the generation fleet that's there today—using lower-cost resources in one region to offset more expensive or less efficient generation in other regions, so that there's an energy benefit.

As I said before, that's typically not enough in and of itself to make these investments economic. Other benefits include resource adequacy benefits. Here we're talking about reliability benefits and deferring new capital cost investments that are required on the generation fleet in order to meet peak demand. Having a broader portfolio and more interconnection between the regions allow system reliability to be maintained while using capacity sharing and the sharing of resources from one region to another. In general, as load grows, a reserve margin is maintained, and that's a surplus capacity that's needed. As you start to diversify the resource mix, the total amount of surplus capacity that's needed to maintain reliability can be reduced.

This is for three main drivers. A larger generation portfolio means that at any given point in time you'll have fewer generators on outage, whether for scheduled maintenance or emergency or forced outages. The larger generation portfolio that comes with interconnecting multiple regions benefits from a reliability perspective.

The second reason for the ability to reduce surplus capacity is seasonal load diversity. While some regions or provinces, such as Ontario, are summer-peaking—the highest electricity loads occur during the summer—in many other provinces the peak occurs in the winter.

● (1540)

There is a seasonal and weather-related diversity, the larger you make that footprint. The same is true when looking to the United States and states south of Canada, where most systems are summer-peaking and thus have surplus capacity available during the winter that can be effectively used to meet peak load in many winter-peaking systems in Canada.

Finally, similar to the seasonal load diversity, there is also a time-of-day load diversity. As the grid spans four time zones east to west across Canada, the peak load of the day will not occur at the exact same time in each of those provinces. Even having just a few hours of shifting between provinces can have a capacity benefit whereby surplus capacity needs will be reduced slightly.

A third benefit of the increased interties is grid services. This is not just energy and capacity, but things such as reserves regulation for both the variability and load of wind and solar, to allow the system to go up and down with those resources, and also for contingency events. If there is an emergency in one region, having more interconnections to neighbouring regions will help in contingency or emergency events.

A fourth benefit would be a renewable integration benefit, basically using transmission as a key tool to facilitate increasing the variable renewable generation, whether it be from wind or solar or another renewable. Transmission can be an effective tool for integrating renewables. There are a lot of drivers or reasons for this, but one that comes to mind is short-term balancing. The short-term fluctuations in wind and solar become less extreme the larger the geographic scope you're looking at. While a wind front or a cloud cover may come through one individual region very quickly and cause variability in those resources, the likelihood of this occurring across a large system the size of Canada, or even of portions of Canada, is much lower.

The second driver for the renewable integration benefit would be reduced curtailment. Curtailment occurs when the grid is unable to accept all of the variable renewable generation from wind and solar, and as a result you have to essentially waste what would have been a “zero marginal cost” resource. The inability of the grid to accept wind and solar leads to curtailment.

Increased transmission can help solve parts of that problem because time periods in which one province or region has high wind and solar output can be a time period when they export surplus energy to neighbouring provinces. Again, just balancing the real-time nuances of wind and solar variability can be achieved with interconnections.

A fifth benefit of increased strategic interties would be hydro-renewable coordination, using the vast hydro resources in Canada along with variable renewables to help offset some of the resource diversity. In some years or months when wind and solar output may be lower than others, hydro can be an effective tool for mitigating some of the variability while continuing to achieve renewable targets.

Last is resource diversity more generally. The larger transmission network across Canada will allow hydro-rich regions in some provinces to help offset generation shortages in other regions caused by fluctuations in gas or coal availability, and vice versa. In periods when hydro generation is lower or the hydro resource is low from one year to another or one month to another, surplus generation in other regions can help backstop those regions. Having a more diverse resource mix can be achieved not necessarily by installing new generation resources but just by using what's there more efficiently through increased transmission co-operation.

I won't go through all the details of the pan-Canadian wind integration study. Some of these benefits were addressed in that study; some were not.

● (1545)

At a high level, the pan-Canadian wind integration study showed that the Canadian power system can integrate up to 35% of its annual energy consumption coming from wind generation without the need for significant changes to operating practices or new investment. Given the fleet that's there today, there's no operational or reliability concern to doing that.

Changes will need to be made. One of those changes proposed was an increase in transmission interconnection. That was evaluated for that study both across the different provinces but also to the U.S. One of the big take-aways from the study was that reaching 35% wind penetration across Canada means there's going to be times when there are large amounts of wind export between the provinces and also to the United States.

Curtailment was mitigated with increased transmission, and transmission congestion was mitigated with increased transmission interconnection, and the study proposed that up to 4.6 to 4.8 gigawatts of new inter-area transfer capability, transmission capability, could be implemented at a cost of approximately $2.7 billion in order to facilitate that renewable and wind integration. We showed in all those scenarios that the transmission and wind build-out could be done cost-effectively.

I talked about the benefits of transmission. I want to touch on some of the risks and challenges quickly. I've listed three of them in my work here.

The first is social and environmental. There's always a challenge with any energy asset on the system, and transmission not being excluded, there's a need to balance some of the social and environmental costs that go along with implementing any new infrastructure. That's something that would have to be evaluated on a case-by-case basis moving forward.

A second challenge would be allocating the benefits. Whenever you implement new transmission infrastructure, there are going to be some regions or some areas that benefit more than others, and allocating those benefits equitably is a challenge and a role for legislation and regulation.

Finally, there is stability concern with increased tie-line contingencies. If you move forward to a large interconnected power system, there may be times when, if you operate the system solely on economics and not on reliability, one region may be a large importer of electricity. If there's a contingency or one of the transmission lines goes down during that operation, you risk a stability or reliability concern. With proper engineering judgment, with studying the stability and reliability impacts of transmission, and with operating the system to a secure level, that can be mitigated. That's something that's been done for many years across the power system, both in Canada and globally. It's certainly something that can be done here. When you're moving forward to a new system with increased transmission, it's something that should be evaluated.

Finally, the pan-Canadian study was a great start to looking at the increased strategic interties between the provinces and between the United States, but it wasn't a study designed solely for that purpose. Several other studies should be evaluated or could be evaluated in the future, including production cost studies, more similar studies that look at the economic utilization of the grid, reliability and capacity adequacy studies, and finally, grid stability studies. But—

● (1550)

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

Mr. Derek Stenclik: Please do.

Voices: Oh, oh!

The Chair: We're just about ready to go with our next witness.

Mr. Derek Stenclik: Thank you for your time.

The Chair: Thank you very much for that presentation. It was very helpful.

Mr. Matthiesen, thank you for bumping up your schedule so that you could accommodate us. We're grateful for that.

I'm not going to go into great detail. I'm going to turn the floor over to you. You have up to 10 minutes to make a presentation. Following that, there will be a series of questions from the members around the table.

I'll turn it over to you so that we can get going.

Mr. John Matthiesen (Vice-President, Power and New Energy, Advisian Americas, WorleyParsons): Good afternoon. My name is John Matthiesen. I'm the lead of Advisian's power and new energy team in the Americas.

Advisian is a strategy and technical advisory arm of the WorleyParsons Group, a company with more than 130 years of experience in the power sector. Advisian leverages the real-world practical experiences and technical depth of our consultants, who are focused on asset-intensive businesses such as the mining, hydrocarbons, chemicals, and infrastructure sectors.

The power and new energy team that I lead focuses on strategic and technical advisory services, early-phase project development, mergers and acquisition support through project due diligence and lenders' engineering, and owners' engineering services to clients, which include utilities, IPPs, various industry clients and institutions, financial institutions, and governments.

The new energy part of my team includes traditional renewable energy—such as onshore and offshore wind, solar power including photovoltaic and concentrated solar thermal power, hydroelectric, and geothermal power—all forms of energy storage, whether it's chemical, pumped hydro, compressed air, or thermal storage; microgrids; and distributed generation. We have dabbled in electric vehicles, as well as fuel cells and the integrated hydrogen infrastructure that comes with them.

I'd like to thank you for this opportunity to present some thoughts to the Standing Committee on Natural Resources. In the next few minutes I'll identify a few areas in which Advisian is seeing fantastic growth opportunities and other areas in which there are challenges to this growth. My comments really will focus on the 10 questions at the end of the email that was sent to me in advance.

We're seeing an energy transition taking place globally whereby roughly two-thirds of the current uses of oil and gas is changing to more sustainable, reliable, and economically better options, and threats to industries that source, extract, process, transport, and sell traditional fossil fuels are becoming more and more apparent.

Using rough figures, a third of the oil and gas is used for power generation. Today, solar and wind are cost-competitive with these technologies at the point of load. With the ever-reducing costs in concentrated solar, energy storage, hydrogen, and other technologies that allow intermittent renewable energy generation to provide reliable 24-hour power, the clock is ticking on the economic feasibility of continuing to build and operate traditional fossil fuel power pants. As an example, certain utilities in California have already made decisions such that it's unlikely another natural gas power plant will be constructed in that state.

Roughly another third of oil and gas is used for transportation. While it's a little further away, electric and fuel-cell powered ground transportation is nearing a tipping point in market acceptance and growth so that just about all manufacturers of automobiles are being forced to adopt and embrace. The governments of Norway and the Netherlands are moving forward with legislation to stop the sale or use of fossil-fuel powered cars by 2025. Larger countries, such as France, China, and India are looking at similar legislation.

About a year ago I made a personal announcement that I believe the last fossil-fuel powered car will roll of an assembly line in the western world by 2028, and since then Volvo has beaten my estimate by a staggering nine years by announcing that its last model year of cars with an ICE will be 2019.

The remaining third of oil and gas, roughly, is transformed into higher-value products, such as plastics in the chemicals industry. We feel that this industry will be thriving in the future as its primary feedstock drops in price.

Traditionally, WorleyParsons has been a hydrocarbons company. Roughly two-thirds of our revenue comes from clients who predominantly operate in this industry. We have recently noted shifts in some of our clients' behaviours such that they have begun to reposition their businesses to become early adopters in the energy transition. Some of these include Total buying an energy storage company, Saft, for over one billion euros; Shell developing a new energy business and repositioning itself as a transportation fuels company; and Dong divesting itself of oil and gas assets and renaming itself to remove oil and gas from its name. We're helping companies like these understand the challenges and guiding them through the energy transition.

Closer to home, Enbridge, Suncor, and TransCanada all have growing renewable energy businesses. Atco Power and Enbridge are dabbling with fuel cells and hydrogen, connected in minigrids at a residential level, as potential technologies of the future.

Speaking of hydrogen, we just completed a study for the South Australian government about how to create a hydrogen economy, and with it numerous clean energy jobs. The basis of the study was to ask what an abundance of clean power generated within the state of South Australia could be used for, other than paying the neighbours to take some of their excess generated power.

● (1555)

The result was that hydrogen could be generated through electrolysis with essentially free electricity and converted into ammonia. The ammonia would be exported to neighbouring countries such as Korea and Japan, where there is a demand for ammonia, both as a fertilizer and for conversion back to hydrogen to power their 26,000 public transit buses, which the government of Korea announced a requirement to convert to.

Canada may have several similar opportunities in provinces such as Quebec, Ontario, and B.C., where there are large amounts of clean power currently generated through hydro or nuclear. While the demand for new generation is slowing, if it could be created cost-effectively, a new industry could be created to counter the inevitable decline in oil and gas jobs on the horizon. Additionally, hydrogen could be used as seasonal storage in remote and northern communities that generate solar power in the summer and burn hydrogen in the winter.

Other trends we've been seeing are greater challenges to achieving a social licence to operate assets with carbon footprints or GHG emissions. Communities are having more say in which projects go ahead and want to know more about the local impacts of GHGs. The uncertain social acceptance of projects is also a huge barrier for financing projects.

Speaking of investors, we see a change in the types of questions that lenders are asking. For example, if a natural gas power plant is to be funded, lenders are asking whether the natural gas plant could be curtailed before the loan is paid back. Also, they ask, what the environmental challenges are in getting proper permits and approvals for this process for building new natural gas facilities. I do know that the Canadian Environmental Assessment Agency is in the process of making changes that will provide more certainty in this process, which is welcomed both by project developers and by their lenders.

There are some challenges we see, such as finding ways to properly educate the public on an apples-to-apples comparison of renewables when significant subsidies to oil and gas industries are provided in ways not easy to see, versus some past FIT contracts with renewables that make the complete costs very visible to the public. With the costs of solar and wind power reducing monthly, decisions based on six- or 12-month-old data are already out of date. These should also be compared with the soaring costs of nuclear refurbishments, which never seem to include insurance costs and, rarely, the long-term storage of their spent fuels.

This challenge can also be extended to remote and islanded communities, where there needs to be more effort and support to reduce their dependence on costly diesel. This would include communities and mines that are grid-connected but at the end of a long feeder line, and those that are completely islanded due to the uneconomical ability to connect them to the main grid via transmission.

Other challenges are around updating the curriculum in universities so that new graduates are aware of today's industry challenges and have innovative ideas on how to resolve them. Artificial intelligence, machine learning, new energy storage technologies, blockchain, augmented learning, power systems integration, virtual power plants, and cybersecurity should be the courses of today. These are the jobs that industry and in fact our company are looking to hire for.

While there is importance in the interconnected nature of long-distance transmission lines between provinces, states, and countries, the power industry is generally moving away from single-point generation sources supplying multiple cities long distances away. Instead, the future is a community-industrial-commercial scale microgrid, where local distributed multiple generation sources provide the needed heat and electricity for that community or industrial complex. Individual homes will purchase the power using blockchain-based transactions, bypassing traditional utilities. Instead, the role of utilities will be changing, and in fact is changing already.

Various state governments in the U.S., such as California, Connecticut, New York, Massachusetts, and Colorado, are rolling out grants and funding opportunities for the deployment of such microgrid systems. Canada could offer something similar to drive early-phase innovation and development of these technologies. In such a future state, cross-country transmission lines become less important. Fewer expensive long-distance systems are required. Instead, more locally distributed, smart, interconnected systems will be built.

I'd like to close by saying that the energy transition is already here. We are in its early days, but through technological advancements already taking place, the way we generate, transport, store, and use energy will look very different five and 10 years from now.

● (1600)

Decisions that spur innovation, attract the best talent and technology, and help Canadian companies be competitive on the world stage must be made in the immediate near-term future. If there's anything that I or Advisian can do to help the committee or the government further understand, study, benchmark, or conduct options analysis, we'd be pleased to help. That's exactly what we're doing for our clients, which include other governments around the world.

Thank you for your time.

The Chair: Thank you for your presentation.

Ms. Ng, it's over to you.

Ms. Mary Ng (Markham—Thornhill, Lib.): Thank you so much, gentlemen, for coming in today, both Derek and John, and for making your remarks to the committee.

It's really great to have GE here. You've recently opened the Grid IQ Global Innovation Centre in Markham. You've talked about this, and I'll ask some questions around it, but it's great that the firm there is working at improvements on the efficiency, reliability, and security of the world's electrical grids. It's great to hear about the studies you're doing. As one of the world's oldest and most established electrical companies, you're going to have a lot to offer us today on the subject of strategic electricity interties. We've heard a lot recently about how the role of interties will allow for more low-emitting electricity sources while also being able to meet the increased demand in the future.

To Mr. Matthiesen from WorleyParsons, thank you very much. This is another great company that also has a facility in Markham. We've listened to a lot of producers over the course of this study, so it's really nice to have someone here with the expertise, particularly the engineering expertise, that your company and the subsidiary Advisian are going to provide us. It's a bit of a unique perspective.

My first question is for GE. Your renewable energy division has been really successful. You've talked to us about the opportunities around strategic interties. You've done the pan-Canadian studies as well as studies in other provincial jurisdictions here in Canada. As this committee is looking at where the opportunities might be for regional strategic interties, can you talk to us—just because you guys have done the study—about where we might be thinking about a priority area? Where would those areas be regionally that might make some good sense for us to start looking at?

Mr. Derek Stenclik: Thank you. I appreciate your comments.

To get right to the point on what regions make the most sense, when we evaluate this through some of our pan-Canadian study work, we look for, first, regions that have the highest concentration of wind and solar energy, and where in one region you may have a surplus of wind energy that can be exported to a neighbouring region. In the analysis, we looked at certain areas—the Maritimes and Ontario—where today you're seeing some curtailment of wind resources, and they can be some of the early candidates for some transmission expansion to neighbouring provinces.

The other thing we've looked at in these studies is using transmission to facilitate the transition to a renewable grid. We're looking at the provinces that are more thermal based and could support additional renewables coming from outside of the province, but we're also looking at the building of new renewable capacity in their provinces and exporting. In provinces such as Saskatchewan and Alberta, which have an installed capacity that is more thermal—coal and natural gas—we're looking at transmission as one of many tools that can help facilitate that transition.

● (1605)

Ms. Mary Ng: Thank you.

A little earlier, you mentioned the ability to do the interties regionally and that there certainly is a way to transition capital costs that is effective. Can you talk a bit more about that?

Mr. Derek Stenclik: I'm sorry. Can you repeat the question on that in terms of capital costs?

Ms. Mary Ng: Yes. Actually, maybe it's not so much about capital costs. You were talking about the overall benefits of being able to do interties in a way that can be relatively cost-effective. Just talk to us about that so that the committee can understand it a little better.

Mr. Derek Stenclik: Here, in order to be cost-effective.... When evaluating the study, you have to look beyond just some of the energy savings of transferring a megawatt hour from one region to another and the differential energy price in one region versus the other. You have to look at and evaluate some of those other benefits in quantifying what are the capacity benefits of that increased intertie. Capacity benefit means ensuring you have enough firm generation capacity to meet the peak load at all times.

Typically, the power system in many regions has generation capacity that's built and installed only to serve load on a few hours or a few days of the year with the highest peak demand. In using transmission as a tool to broaden that portfolio, you can potentially defer investment in peaking generation capacity in lieu of using the resources across a wider network more reasonably.

There are another couple of benefits. Again, it's not about looking at just energy or capacity but also at some of the ancillary services, such as regulation and contingency reserves being provided, and then looking at things that are a little harder to quantify, like resource diversity or what the risk is of there being a low hydro year in one region or a natural gas shortage in another. Using that risk analysis, that's a little harder to quantify as well.

Did that help to answer it?

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

I'm going to turn to Advisian or WorleyParsons, Mr. Matthiesen. As you're a very large multinational design firm specializing in asset management, I'm going to give you a bit of a two-part question. Maybe you can comment on the benefits of unused electrical generation and what that potential is. We've certainly heard from a lot of witnesses throughout this study about how interconnection increases can help a company or a power distributor manage their assets more effectively.

I'm wondering if you could comment on the benefits that increased interconnection can have on asset management for an electric utility provider.

Mr. John Matthiesen: Yes. I guess there are a number of points there.

On your first one around unused electrical generation, as you know, for certain provinces when we over-generate, we tend to have to pay our neighbours to take that power. That was actually the basis of the study we did in Australia, where there's a large penetration of solar. They're estimating that upwards of 50% of their power within the next couple of years will be generated by solar in South Australia. One of the possible solutions was using what is essentially free power coming across the grid to generate hydrogen through electrolysis at specific points on the grid. Also connected to that is the further installation of large-scale utility energy storage and being able to shift a load through different times of the day.

To your second point about managing assets and interconnection, if you're able to transfer power more easily as a utility that operates different loads or is able to manage the loads across different jurisdictions, you're naturally able to balance that more if you can shift it between one side or the other.

I'm not sure if that answers your question on the second part.

Ms. Mary Ng: It's going to have to. I'm out of time.

The Chair: Thank you.

Mr. Schmale.

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

I appreciate the two of you being here today.

Mr. Stenclik, I would like to start with you, if you don't mind, because of your strong support and advocacy for wind power as well as solar.

Mr. Derek Stenclik: Yes.

Mr. Jamie Schmale: I'm sorry for my colleagues here who have to hear this rant again.

Now, in Ontario.... I know that you are based in New York state. Is that correct?

Mr. Derek Stenclik: Yes, that's correct.

Mr. Jamie Schmale: Okay. Do you know much about what we're dealing with in Ontario in terms of electricity, wind power, solar power, and the Green Energy Act and that sort of thing?

● (1610)

Mr. Derek Stenclik: Yes. I try to stay present with it.

Mr. Jamie Schmale: Okay. That's perfect. I'm glad you said that.

We have a situation here in Ontario where, in this provincial legislation, local decision-making was taken right out of the process. They got a say, but it really didn't have much of an effect in terms of whether or not the local council agreed or...you name it.

Be that as it may, we in rural Ontario require a 550-metre setback from any wind turbines to a residential building. In downtown Toronto, you have a two-kilometre setback. My question is basically this. You can't put the wind turbines or solar panels in northern Ontario because they don't have the ability through the transmission grid to bring the power back down, so where do you advocate that these turbines be built?

Mr. Derek Stenclik: I've not looked at where individual turbines or individual solar plants, gas plants, or hydro plants should be sited. The analysis my team does is, if you have a resource mix, how should the plants that are there today be utilized? In the pan-Canadian study, we did evaluate potential candidate sites for new wind development, but it wasn't a specific site-by-site selection.

As I said, with any asset, whether it be wind, transmission, or thermal based, there is a social and environmental aspect to those decisions that any generating resource will have to go through. Evaluation on a case-by-case basis would be needed.

Mr. Jamie Schmale: I realize that every energy is subsidized to a certain degree—wind and solar in Ontario substantially more. Where do you think we should be focusing on energy? You're advocating for wind and/or solar. In terms of this new generation that you're talking about, do you support the same kinds of subsidies that we're dealing with now in Ontario—the government subsidies?

Mr. Derek Stenclik: Thanks for bringing that up. It's a good question.

My advocacy here was using transmission as one tool to facilitate, whether it be renewable.... I didn't come here to advocate for one generation resource or another.

One benefit I tried to highlight was a diverse resource mix. It's important to have this diversity in a resource mix, whether it comes from conventional, thermal, nuclear, wind, or solar.

Really, what I came here to discuss was how the grid and increased transmission can be used as tools to facilitate some of that integration of all the different resources. I wasn't trying to speak specifically on wind or solar.

Mr. Jamie Schmale: Thank you for clarifying.

In discussions with manufacturers, businesses, you name it, the number one thing that comes into any decision-making process is the cost of electricity. That is a fixed cost, as are labour, taxes, etc. They all play a part. As we all know, especially in manufacturing, at some point those fixed costs make it impossible to produce a product, based on what the market will pay for that product, whatever that product is. If that is the case, those businesses or manufacturing plants don't produce that here; it gets done elsewhere.

Where you were saying a mixture, which I was glad to hear you say, where...? Actually, first, I'll ask my first question, and that will lead to my second.

Obviously, you would agree that all sectors—manufacturing, business, agriculture, you name it—will benefit from stable, long-term energy rates.

Mr. Derek Stenclik: Yes. I believe that price is always important for customers, no matter what sector they're in.

Mr. Jamie Schmale: Perfect. Thank you.

That being said—and I'm glad you said that—where do you see the most benefit in expanding wind and solar? You also mentioned a few others. If you were giving advice to this committee right now, how would you list your top preferences?

Mr. Derek Stenclik: I came here to talk about the benefits and the challenges of increased inter-regional co-operation and interties, not necessarily for one specific resource versus another. There are ways to analyze that, and it's something our group, GE energy consulting, has done in the past through integrated resource planning or long-term planning of the power system.

It's a more detailed question to answer than what I can do right here. It's specific to each province, to Canada as a whole, and really to what the goals are of the stakeholders. Typically, they're around price, the environment, reliability, and stability. Those are things that we have to weigh as a society.

● (1615)

Mr. Jamie Schmale: Okay. I'll quickly go to Mr. Matthiesen, if I could.

Sir, do you have any research that you can quickly state on the impact of electric vehicles on the future of energy consumption here in Canada?

Mr. John Matthiesen: No, we haven't looked at that in Canada. We have done some of that study work in Australia, but not here in Canada.

Mr. Jamie Schmale: In your best guess, being that there's no research, do we here in Canada currently have the ability to meet the demand as we move forward?

We do have a surplus—in Ontario, at least.

Mr. John Matthiesen: Is that to meet the increased demand from electric vehicles?

Mr. Jamie Schmale: Yes.

Mr. John Matthiesen: Absolutely. I think it will come from a slightly different focus on transmission. It will be more on your local distribution systems. You'll need to have more local, smaller generation, whether it's micro-turbines or, to Derek's point, a mix of renewables, a mix of technologies, or a mix of generation types that feed that local distribution.

I mean, the power obviously exists. There's an excess particularly in Ontario, where I'm from. We have too much. We generate too much. That can be used in a variety of ways, such as electric vehicles and batteries.

The Chair: Thank you.

Mr. Stenclik, how's your time doing? Are you able to stay with us for a few more minutes?

Mr. Derek Stenclik: I'll do my best to squeeze a few more minutes in. I appreciate your checking in.

The Chair: Okay.

Go ahead, Mr. Cannings.

Mr. Richard Cannings (South Okanagan—West Kootenay, NDP): Thank you.

Thanks to both of you for taking the time to present to us.

Due to your time constraints, Mr. Stenclik, I'll start with you. You talked about expanding wind integration and I think about the cost-benefit analysis there. I'm wondering if you could briefly expand on that subject.

Mr. Derek Stenclik: One reason I spoke specifically to wind integration was that it was a study we recently conducted for CanWEA, the Canadian Wind Energy Association, and Natural Resources Canada. We looked at what happens if you add wind to the power system across Canada. How do you do it in a way that is reliable for the system? What changes to operations need to be made?

In other words, how does the additional wind energy change the existing operating practices of different resources? What's the impact on the thermal fleet versus the hydro fleet? What's the change in imports and exports between provinces and from the country as a whole? As well, what are the emissions and cost benefits of doing that?

Mr. Richard Cannings: Thank you.

Mr. Matthiesen, you talked about some of the challenges we're facing. You said that one of the challenges was to properly educate the public on the apples-to-apples cost of renewable energy when significant subsidies to the oil and gas industry are provided in many ways that are not easy to see.

I just wonder what those could be if they're not easy to see. Hopefully it's easier to explain.

Mr. John Matthiesen: No, not really.

Voices: Oh, oh!

Mr. John Matthiesen: It's through numerous ways, including tax incentives, property tax reductions, and tax reductions. In other areas traditional fossil fuel industries are subsidized, whereas with renewables, if you look at the Ontario feed-in tariff program from a couple of years ago, for example, that was pretty clear. I believe it was 15¢ or so for wind. When you add it all up, it's very visible. It appears to be a lot more than other industries. We do a lot of work with the nuclear industry as well in Ontario and New Brunswick. Those companies don't tend to pay insurance. As a result, those costs aren't really included in the total LCOE.

Those are just some specific examples.

Mr. Richard Cannings: You also talked about the tipping point we're coming to with electric vehicles, with the cost of renewables being close to or equal, or sometimes below, the cost of generating electricity through fossil fuels. When you're giving advice to clients, I'm just wondering whether you discuss the danger of stranded assets when people are considering new projects.

● (1620)

Mr. John Matthiesen: Absolutely. In fact, we're speaking at the moment with a gold mining company in Ontario that's considering some renewable energy technologies. The concern on the lender's side is that the mine would be their only offtaker. What would happen if that mine stopped, or if for whatever reason that commodity wasn't valuable anymore? Even though the projected life of the mine is sufficient for the loan on the asset, there's a risk there.

There's another risk, just generally, that.... In California, for example, if you're building a natural gas power plant, there's a high likelihood that the plant will not run long enough for the lender to get their money back. The penetration of renewables in California and the duck curve, for example, is making it more challenging to deploy fossil fuel technologies there. Coal plants have already gone. I believe one of their last nuclear reactors, Diablo Canyon, is scheduled to close in the not-too-distant future.

We do a lot of work for a number of clients in California. It's probably our largest power market in North America. The type of work we're providing is really shifting away from fossil fuel—either new builds, retrofits, or repowerings—and more to renewables, distributed energy, and battery storage solutions as that mix shifts from more fossil to more renewables.

Mr. Richard Cannings: Quickly, perhaps I can get your idea on what the mix of energy for transportation in Canada might look like, say by 2040, as we make this shift.

Is it going to be significantly different than it is today when we look at EVs versus ICEs?

Mr. John Matthiesen: The short answer is yes, it will look very different.

We haven't done an assessment specifically on the Canadian market, but more broadly speaking, the tipping point is projected to be when the price of an electric vehicle is comparable to the price of a fossil fuel vehicle, or even within 5% or 10%. At that point, economically it doesn't make any sense to buy a fossil fuel-powered vehicle in the same range. There's less maintenance, less fuel costs, less rotating components, less moving components generally speaking, in electric vehicles. It's actually to the benefit of the automobile manufacturer to sell an electric vehicle. They have less maintenance concerns. From the owner's perspective, the warranties are longer. Aside from your tires, you're not changing much all that often, except a new battery, I suppose, every seven or eight years.

Once that price differential within 5% or 10% is reached, I believe it's going to be a fast change. We've done some assessments in New Zealand on this working with the government there, and it's shifting.

Then, connected to electric vehicles—and I know this wasn't quite your question—is the autonomous element of ground transportation and how that will impact the industry. Broadly, infrastructure is going to be quite significant.

Mr. Richard Cannings: Thank you very much.

The Chair: Mr. Serré.

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

I see Mr. Stenclik is still here.

We've heard from other witnesses that Canada is in the top three in the world as far as green energy and that we should sell our energy at a premium.

I want your thoughts. Because of the worldwide implications of your companies, do you feel that's something we could do, and how can we go about that?

Mr. Derek Stenclik: I'll take this one first.

I appreciate the question, and I apologize. After this, I will have to drop off.

Canada has a long history of exporting electricity to the U.S. markets, most notably of the northeast United States getting imports from Quebec, Ontario, and the Maritimes.

Predominantly, historically, a lot of that has been hydro-based generation. One of the findings from the pan-Canadian wind integration study is that with much of the wind that was added to the pan-Canadian system, some of that was exported to the U.S. markets at a revenue for the Canadian provinces, even accounting for additional renewables being added to the U.S. I know that a lot of the proposed transmission projects from provinces to the U.S. are specific to the northeast and looking to sell renewable energy to those markets based on renewable energy requirements there.

It's definitely a possibility to not only look at increased interties between the provinces, but also to the U.S. markets, for exports specifically.

● (1625)

Mr. Marc Serré: Before Mr. Matthiesen answers, Mr. Stenclik, can you answer one more question quickly—in 30 seconds?

Earlier we talked about—and I know my colleague Mr. Schmale talks a lot about it—the Ontario pricing. In Ontario, there are no more blackouts, no more smog days, and there's no more coal. We've invested in the aging infrastructure, and our prices, in terms of kilowatts per hour, are still lower than Detroit, Boston, New York, and San Francisco.

I want to get your sense of the pricing structure and the benefits of Canada in that regard.

Mr. Derek Stenclik: I haven't looked at the comparative retail prices of electricity, so I can't necessarily speak specifically to the comparison between the different cities.

You brought up that there are often three priorities to power system planning more generally. One is price and the impact on the ratepayer. That's always a key consideration. You also have to factor in reliability and grid stability. Then, more and more, customers are asking for sustainable energy or clean energy technology. Typically we look at that as a three-pronged approach to system planning, and it's up to the final stakeholders and ratepayers to decide how they value the different requirements.

I hope that helps to answer your question.

I apologize. Thanks, everyone, for your time. I really appreciate being here. Please reach out if you have follow-up questions or need help in analyzing something further.

The Chair: Thank you for extending your time.

Mr. Marc Serré: Thank you.

Mr. Matthiesen, do you have any comments on these two questions?

Mr. John Matthiesen: Yes. The fact that we generate a lot of clean energy is certainly beneficial. From a pricing perspective, I think that market pricing should really dictate how much we are paid.

There are other ways I feel we can benefit from or leverage the fact that we have such a green economy, from a generation perspective. We should be able to market that to industries and attract foreign investment, whether it's in petrochemicals, automotive, or mining. We already have a strong aerospace sector. Those industries are paying more attention to their carbon footprint right now, and the fact that the power they use would come from a clean source would benefit them, and us.

Mr. Marc Serré: Thank you.

You also mentioned a northern Ontario mining company. I'm assuming Goldcorp is the company you're dealing with, for batteries. You mentioned some of the risks of an all-battery mine, but can you expand on some of the benefits and your role there?

Mr. John Matthiesen: I can't really say specifically who our client is, but having an electric mine has numerous benefits. Let's look at underground mining in particular. A lot of the power consumption comes from running ventilation fans and from pumping the water from a depth up to the service to extract it. Ventilation, in particular, is there to make the air clean for the miners, primarily because of the diesel emissions from the equipment that is driving underground, whether it's doing the drilling or moving equipment, supplies, and people back and forth. For the most part, all of that runs on diesel. If those pieces of equipment were to run on electric, then you wouldn't have the ventilation demand requirements. As a result, you would need less power, and it would all be clean.

● (1630)

Mr. Marc Serré: I have about 50 seconds left.

You mentioned in your presentation that there were grants and funding for microsystems in various states, and you said that it would be a good thing to look at for the innovation aspect in Canada. Can you give some examples and expand a bit further here? Is it linked to interties? Just expand a bit on your comment there in your presentation.

Mr. John Matthiesen: Sure. For example, both the CEC in California, and the Massachusetts clean energy coalition have a lump sum of funds—I think it's in the $40-million or $50-million range—that they have made available to provide grants for microgrids. The typical parties that are looking to take advantage of these funds would be universities and commercial or industrial complexes. Connecticut, in particular, has a program in place that's community-focused. Smaller towns and villages within the state are looking for funding of up to $5 million per site to install systems that would provide microgrid-type services.

In different geographies, there are different benefits for it. In the northeast, for example, there is a resiliency concern following Hurricane Sandy. We are already speaking with clients in Florida and Texas, on the back of the recent hurricanes there, about building resiliency when storms come up. Grids go down, and if you can have individual communities or individual industrial sites that can self-generate and sustain themselves, the cost is.... Maybe it's a little more, but not in all cases. Sometimes it's cheaper to create that community microgrid, but in all cases it's the resiliency. It's resiliency, reliability, sustainability, and economics. All of the pieces have to come into play.

Mr. Marc Serré: Thank you.

The Chair: We have five minutes over here, and then we'll finish with Mr. Tan for five minutes.

Mr. Jamie Schmale: Thank you, Chair. I'll be very quick.

I want to mention that, according to CBC.ca—Marc, you probably knew this was coming—

Mr. Marc Serré: You listen to the CBC...?

Voices: Oh, oh!

Mr. Jamie Schmale: I knew you'd like that, Marc.

This is from July 20, 2017: “The price of electricity grew significantly faster in Ontario than everywhere else in Canada over the past decade”. According to the study here, Statistics Canada “shows from 2008 to 2016 residential hydro costs in Ontario rose 71 per cent, while the average increase across Canada totalled 34 per cent.” It ended here....

Mr. Marc Serré: Is there a question coming?

Mr. Jamie Schmale: Yes, there is a question, but this also says, “The study finds the hydro bill for a typical household grew 62 per cent in Toronto from 2010 to 2016, while rising [only] 36% in Vancouver”, so clearly we do have a problem.

Mr. Matthiesen, to follow up quickly on what we were talking about at the end of our question, you said that the current supply, you believe, will meet future demand for electric vehicles. Is that correct? Is that your belief?

Mr. John Matthiesen: I'm not sure about current generation supply. No. I'm sorry. I thought the question was more around the electrical interconnects.

Mr. Jamie Schmale: Okay. I thought it was around supply. I thought that's what we were talking about.

Mr. John Matthiesen: As more electric vehicles come onto the grid, there's going to be an increase in—

Mr. Jamie Schmale: Exactly, yes, that's what I asked, but you also mentioned that Ontario does have a surplus in electricity, as do Manitoba, Quebec, and a number of other provinces. How much focus do you think we should be putting on the intertie, on the demand for the federal government to get involved and move forward?

I know that many of the witnesses have said that it's a piece of the plan, but not the main driver. I'd like to hear your thoughts.

Mr. John Matthiesen: I would agree with what you've just mentioned. I think it is a piece of the plan but not the main driver.

I think that when you look at the future of transmission networks, at where they're going, it's more microgrid, more community and smaller scale.... It's going to be local supply with local load where possible. On the long-distance transmission lines, I think they make sense when you have a very large, very clean, and very reliable power source, such as Quebec might have on the hydro side. If there's a way to bring that elsewhere, I think that makes sense.

Large coal is pretty much gone. For large gas plants, there are some of them, but they're getting closer to communities—either that or communities are expanding closer to where the gas plants are.

Personally, I believe it's more in the community, smaller-scale area. That's where the challenge is going to be and the need will be.

● (1635)

Mr. Jamie Schmale: Thank you, sir.

I'll turn it over to my colleague.

Mrs. Shannon Stubbs (Lakeland, CPC): I think I might only have a minute and a half, so I might not get to a question.

I want to recognize the exceptional work that WorleyParsons has done, including a 2014 study that compared Alberta with nine other oil- and gas-producing jurisdictions around the world and found Alberta to be a leader in environmental standards enforcement, compliance, and transparency.

I want to thank you also for pointing out in your presentation—and citing specific examples—that the conventional oil and gas companies and pipeline companies in Canada are among the biggest private sector investors in renewables and energy projects and technology. I think it's important to recognize that this innovation and this culture of technology and advancement are part of the same continuum, and not opposed to one another.

I was a little concerned last week. We heard the NEB say that they believe there's a lack of information with respect to renewables. The witness said, "Whenever we do these analyses, and we do them regularly, it takes a great deal of our staff's time and effort to come up with what the current situation is."

She also said, "When we're looking at policy and changes to the energy system, if we had better.... What is the current state of events? We also have very poor information in Canada with respect to renewables. We have struggled to try to fill that gap."

When you look at the percentages in the total amount of federal grants and contributions in Canada given to the energy sector in 2016-17, you see that 75% went to wind, for example, and only 6% went to fossil fuels. I think this discussion around cost mitigation for consumers and respect for taxpayers is a serious one, especially given the multi-million dollar collapses of renewable energy companies in the U.S. that have left taxpayers on the hook financially, but also with significant environmental mitigation and land surface disturbance, and the storage of hazardous waste that now needs to be disposed of because of these publicly funded—

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

Mrs. Shannon Stubbs: —companies that went out of business.

The Chair: Usually I'll let you go over to finish answering a question, but since there isn't one, we'll move on.

Mrs. Shannon Stubbs: I would have welcomed your insight on how to mitigate those risks.

The Chair: Mr. Tan, it's over to you for five minutes.

Mr. Geng Tan (Don Valley North, Lib.): Thank you, Chair.

The committee has heard about some benefits of strategic interties. Ontario, B.C., and Quebec all produce more electricity than they can consume domestically. As a result, all three provinces sell their surplus power to other provinces, and as you or the other witness mentioned, to the U.S.

The greater intertie coordination and the quota needed for more efficient energy management by the provinces as a whole means they're going to be selling more electricity to other places. Of course, they can use the surplus power to produce hydrogen by electrolysis, like you mentioned, but they can also sell more power or electricity to the U.S.

How might this impact on the Canada-U.S. energy trade and their relations?

Mr. John Matthiesen: I'm not sure I'm in the best position to answer that.

I'm more of a power generation guy, and—

Mr. Geng Tan: I'd ask the other witness, but he's gone, so I'm asking you.

Anyway, if you don't mind, I'll go to the next question. This one you might be able to answer better, based on your study and background.

Our committee is currently studying the strategic electricity interties with a focus on five aspects, which probably you have heard somewhere: the regional electricity independence, low-carbon electricity distribution, opportunities for alignment with the Canada energy strategy, the Canada-U.S. energy trade and relations, and the fifth is employment and the economic impact.

From your study, how might the government best prioritize these five aspects in order of importance or need? How close is your company aligned with any of or all of these five aspects?

● (1640)

Mr. John Matthiesen: I'll answer the second question first.

One area where we're seeing a lot of opportunity and connecting to the Canadian energy strategy is around energy efficiency. We're seeing quite a shift in some of our traditional clients in the hydrocarbons, petrochemicals, and mining sectors, where costs are becoming more important. The price that they can sell their product for is reducing. They're looking at how to more efficiently generate their product, and their electrical consumption is high on that list—and water, actually. Maximizing electricity and water are both taking a priority.

On energy efficiency, we've been doing some work with some mining clients and refineries around how to make their assets operate with less power. We have a large office in Sarnia—several hundred people down there working with a number of players. In Alberta, Edmonton, and Calgary, we do a lot of work out there with oil and gas clients in this space.

I'm going slightly off topic, so if you want to bring me back to any particular point, let me know.

Mr. Geng Tan: Go ahead.

Mr. John Matthiesen: Other areas where we see real opportunity are around innovation. I know there are some innovation clusters being developed. I think that's really important, both from branding the country from a technology perspective, as well as connecting to universities and training the next generation of employees in the new energy industries.

Personally, I went to the University of Waterloo. I think there are a number of great technical universities in the country that are contributing to the innovation, as well as small technology companies.

There's also something to be said about putting some of these innovation hubs closer to the universities. Again, slightly off topic, but if you look at how RIM was created, being well connected to a technology university, the close proximity, was beneficial. I think in the energy sector, if you're looking for companies that are creating new technologies and driving that growth, there's something to be said about linking that with technical universities.

I didn't quite answer all your questions, and I apologize.

The Chair: We're out of time, unfortunately. We'll stop there.

Mr. Matthiesen, thank you very much for joining us, and again for adjusting your schedule to accommodate us.

We're going to suspend the meeting for a couple of minutes and then we'll go into committee business. We'll let you go. Thank you again.

[*Proceedings continue in camera*]