

Notes for Remarks
To the Electricity Sector Council
Bright Futures in Canada Conference

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Thanks Tom and thank you very much to the Council for inviting me here to talk to you today.

The title of this conference, Bright Futures, is certainly one that rings with me - particularly given my role to make sure we can balance supply and demand every day and keep the lights on in Ontario.

The challenges and opportunities facing our industry are very large, and I suspect you probably would have heard some of them yesterday. I didn't hear Minister Smitherman speak to you, but I think you would have got a flavour from his talk that our industry is changing very rapidly. We are going through a revolution in our industry in so many ways.

While there are elements of our traditional electricity system that are certainly going to sustain, most of them are undergoing some pretty radical changes:

- The plan to phase out coal plants and the potential for coal plants to be rejuvenated using renewable energy.
- Nuclear plants are undergoing refurbishment.
- There are plans for new nuclear plants.
- There will be a tremendous need for transmission development.

What the Green Energy Act really introduces is a fundamental change in the way that a lot of our electricity is supplied. In the future, we are going to have a lot more renewable generation; wind and solar in particular, as well as biomass and others. It's going to be much more distributed than we've had in the past.

The model that we've had for decades is one of large, centralized power plants. There will still be centralized plants, but many more of our future supplies are going to be in the form of distributed generation connected at various parts of the province and at lower voltages to the distribution level of the system.

The other area that is fundamentally going to change is at the consumer level. A good part of the Green Energy Act is aimed at conservation and consumers are becoming much more engaged and much more active in their control and use of local electricity.

Tying all of these things together - home, renewable energy and storage capability - is something that's been dubbed the smart grid, the ability for all of these pieces to communicate with each other.

Tom referenced the work I was part of last year called the Smart Grid Forum, where a group of industry leaders, including Norm Fraser who is on your Board of Council, were exploring what it was going to take to get the most out of a future with more renewable resources, together with the changes in energy consumption in the home.

It became clear to us that increased intelligence in communications within this future power system was going to be required in order to be able to realize the potential of our government's policy objectives. I'm very proud of the report that we produced in early March and I encourage you to read it.

But I'm actually going to refer to something else, a book by Thomas Friedman, his best-selling book called *Hot, Flat and Crowded*. In this book, Thomas Friedman spends quite a bit of time on the smart grid. He refers to it as E.T. meets I.T., and E.T. isn't extraterrestrial. He's talking when energy technology meets information technology.

For those of you who read it or the people in your organization who read it, he actually provides a really good and understandable description of today's electricity system and how it really works in the North American context.

He also spends a fair bit of time painting a picture of the future. It is a future that envisages all the appliances in your home having intelligence built into them in the form of a smart chip. It is

intelligence that allows them to communicate - it says, here's what I'm doing, here's what I'm consuming right now and allows all of these various appliances: your television, your refrigerator, your compressor motor on your freezer, your hot water heater and your air conditioner to be integrated into a smart network that is exchanging information with your utility or system operator. The utility or system operator can then match this information with the conditions on the power system at any particular time.

The notion is that, with this intelligent communication taking place, you can build in the capability for consumers to simply express their preferences – such as selecting a particular rate plan, or a particular preference for clean energy supply, and many of the decisions of when these devices will operate will be determined automatically, without the consumer having to do anything to intervene.

The capability to constantly monitor system conditions needs to exist in the future in order to match demand from consumers' homes and from workplaces and businesses with the variability of the supply that is going to come from new renewable energy. This is the way that we can make efficient use of electricity and make the best use of these renewable resources that we are going to install.

So this vision of a completely automated power system with decisions being made instantaneously, in terms of turning your little motors on and off, and your water heaters on and off constantly, may sound a little bit far-fetched.

But every time I think a future like that sounds far-fetched, I'm reminded of an experience I had a little while ago while shopping with my teenage daughter. She tried on an outfit, came out of the change room and handed me her cell phone and said, "Dad, take my picture." I took her picture and she sent the picture to her sister who was working in Alberta at the time. She got a message back from her sister that said, "Looks great, tell Dad to buy me one too."

When I was going to school, innovations in the telecommunications industry meant you could buy a phone from Bell that wasn't black. If somebody told me then that I would be witnessing this with my teenage children years later; this technology of enabling a telephone to exchange information, I would have said that was really far-fetched.

But clearly, smart grids are not as far-fetched as you think. A lot of the technology that is envisaged in this description of the future that I refer to in Thomas Friedman's book, is actually under development now. It's not beyond the realm of possibility at all when we think of some of the advances we've made in communications and telecommunications.

Clearly this is something that has caught the attention of politicians not just here, but around the world. There are tremendous investments that are being made through stimulus packages. In the U.S., 4.5 billion dollars of investment has been earmarked towards smart grid development as part of Obama's stimulus package. These are matching funds for the most part, so it really translates into nine billion dollars worth of investment they're expecting to generate over the next few years. Natural Resources Canada has announced a billion dollars in clean energy funding. A lot of that is going towards carbon capture and sequestration research, but some of it will go towards smart grid development research and development projects. Within the budget that Minister Duncan announced a short while ago, there was 50 million dollars worth of funding specially earmarked for smart grid research and development projects.

This is really exciting innovation. Leaders have recognized that this is what our transmission and distribution systems require in order to enable the types of response by customers that we will need, as well as support renewable supplies.

There are many skills that are going to be required in order to advance this kind of future. There is going to be a big telecommunications focus. Software engineers will need to be able to program to take advantage of these capabilities. It's bringing a two-way information exchange into parts of the sector that have never had it before.

Automation technicians will be required. In fact, I had a story recounted to me by a woman whose husband was building a new home. They were very environmentally conscious and they wanted to build in various capabilities to their house. They put in solar panels, they put some storage devices in and they had all of their appliances controlled by a programmable controller. They were able to do that, but they said they had the most trouble with finding someone who was able to actually come in to tie all of this together and program it for them. They ended up having to invest an awful lot of their own capability to be able to do that.

Clearly there's a fair focus of the smart grid on information technology. It will not a single big project, it'll be hundreds of thousands of little projects, and that means project management capabilities will become very important to make sure these projects are developed, designed and built on time and on budget.

This enhanced information capability will generate a tremendous amount of new information - new information about consumers' consumption habits, about the status and conditions of all the equipment on the distribution system, with sensors and monitors on them that have never been available before.

To be able to take advantage of this, we have to have people who are going to analyze that information, understand it, and apply it to the business and say, "What does this mean to the management of my assets, what does this mean for the new investments I need to make in my assets? What are some of the new product or service offerings I might be able to make for my customers?"

There is also an area that may be a bit overlooked, and that's the whole area of cyber security. When you think of it right now, the amount of two-way communication we have in our system is quite limited. A large distributor might have tens of thousands of communications points, monitoring points, controls and signals going out to devices. With smart meters, Ontario is

really getting a tremendous head start on this whole notion of smart grid. We're now going to have two-way communication capability with 4.5 million points of contact from distribution utilities. When you think of extending that into appliances in the home, you can multiply it by a factor of 10 again.

These are all entry points essentially with two-way communications capability. There is tremendous concern with the exposure of a critical infrastructure system like the electrical grid, to those who would like to do damage to it. I think this is going to be a tremendous focus of attention and it will start right from the device manufacturers, through the whole process to make sure we design, build and install systems that do not jeopardize the reliability and efficiency of the system we are trying to address.

Now within this industry, we think a lot about our piece of the industry, the transmitters, distributors and generators. But the players that are taking part in the smart grid are many and varied. We have the equipment and control system manufacturers like ABB, Siemens, Areva, and General Electric. There are also a lot of big software companies that are really excited about the opportunities with respect to the smart grid, like IBM and Cap Gemini. Telecom providers like Cisco System and Bell, are really seeing this as a potential for them.

A lot of this has to do with communications, but what's really interesting to me is that there are some very new players that are entering the field of electricity, Google being one of them. What they see is the potential for Google to be the information provider of metered consumption information to you and me as customers. They want to provide consumption meter information into your home through their normal, very well used information platform. This is a new player in the electricity businesses.

The other new players that are really fascinating are the auto manufacturers, Toyota, Honda, General Motors, and Tesla Motors in California. These are the people who are working towards hybrid electric vehicles or all electric vehicles.

This sometimes helps me think of what a smart grid is and why you need it. If you think of everybody driving around in electric vehicles and the need to charge those vehicles, you will realize you can't charge all of them at the same time. That would impose tremendous stress on the system. You need some sort of intelligence to say this is the right time to charge that vehicle, while again accommodating an individual's preferences.

The other fascinating thing about electric vehicles is that they are also storage devices. They are essentially batteries that store a lot of electrical energy. There is tremendous potential to be able to call on that electrical energy to balance out some of the variability of renewable energy. I mean, this is not a free service; customers should be able to get a benefit from being able to do that, so the car companies are all very much engaged in developing this kind of technology.

Just the other day, I saw that Pacific Northwest National Labs in the U.S. had announced they just developed the controller which would allow the interfacing with utilities that would allow the cars to be charged at the right time.

Now not everything is changing in the industry. The laws of physics are not changing. However, the laws of society essentially are changing. The Green Energy Act is a law created by men and women. For us, and it's giving a priority to connect to renewable and creating a lot of innovation in the way electricity is used in homes and communities, and produced in homes and communities. It encourages and enables the smart grid to knit all of this together.

In essence, the Green Energy Act is doing merges the sectors of electricity, information management and exchange, environment and transportation. When we think of our workforces, we have to think about our people having to merge the old and the traditional with the new and the innovative.

There's an awful lot of innovation within the smart grid. At the Ontario Centres of Excellence conference that was held just two weeks ago, there were 2,100 attendees. It was a tradeshow as well as a demonstration of the innovations that are being encouraged. It showed a huge potential for Ontario.

For our existing and future workforce, what we will see as a result of some of these developments are some very different interfaces that people will have to get used to dealing with. We're seeing some of this already. We have engineers who for most of their careers, have been talking with other engineers, system planners or transmission planners, in technical language. What they are finding now, is that they are talking to project proponents, their lawyers, their sales and marketing staff, or investors. So the nature of the conversation they are having is quite different to what they are used to. We're going to have to encourage our employees to be much more flexible and a little bit broader in terms of their understanding of the world outside the typical utility business. They are going to need to communicate to a very broad range of disciplines.

Now within our own company, you should have heard in the past few days of what we have been doing, so I'm not going to dwell a long time on our workforce in terms of our recruitment strategy. Just one thing I will highlight that I am particularly pleased with is our success with our co-op program for recruiting.

We are an organization of about 400 people, and at any time, we have about 20 students working for us through all three cycles - so about 60 per year. It's worked particularly well with a few college and universities, but we really take them from all.

Our co-op program has provided us with a potential workforce to draw from, not only for our company, but for others in the industry. It gives people a real appreciation of what it is that gets done. It has proven to be very helpful and we work with some educational institutions to help them design programs that will meet the needs of the industry.

We've put a fair bit of effort these past few years, as many other companies have, into a talent management program, developing our people, having them make personal development plans, and coaching managers.

What I typically tell people entering our company is that we want them to be desired by every other company in the sector. I want them to be getting phone calls from people who want to hire them. I want them to be that good. But I don't want them to go anywhere. I want them to create a learning environment within our company to want to stay motivated, to want to fulfill their desires and their careers with us. But I do want them to be desired. I take it as a compliment if other people are looking for my employees.

To sum up, the face of the industry is going to change quite dramatically over the next few years. There are many new opportunities that will result in many new challenges in terms of the work force and resourcing perspective.

Some of the skills required are not so much completely new disciplines; they are new and innovative ways of applying them and new ways that people are going to have to interact with each other.

The Green Energy Act establishes a direction for the future, a direction that we're heading towards in terms of renewables. It doesn't map out the route precisely by any means. There are lots of uncertainty, lots of challenges out there, but we have an established policy direction. The policy direction is backed up with regulatory direction, which is backed up with funding for innovation.

The smart grid is going to be essential and will enable us to achieve the government's policy direction. It's a combination of technology and people capabilities because it won't do us any

good if we have leading technology and we don't have the workforce that understands it and are able to work with it.

Thank you very much for your attention and thanks again to the Council.