Notes for Remarks
To the Ontario Energy Network

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Introduction

I am pleased to be here to kick off the OEN speakers' series for the year and indeed the decade.

Over the last few years, I have been fortunate to be the first speaker of the year ... as Gord says it has become somewhat of a tradition ... and I am glad I am able to continue that tradition.

There are a few people in the room that I would like to mention including a number of our Board members ... Jim Hinds, the IESO Chair ... and other Board members Rudy Riedl, Howard Shearer, Helen Polatajko, and John Wiersma. I would also like to welcome Saad Rafi, our Deputy Minister of Energy and Infrastructure.

In years past, I have also pulled out my crystal ball and my remarks have tended to focus on the coming year and what we can expect to see ... the beauty for me of course being that by the end of the year everyone has forgotten what I predicted.

But given that it is the start of the decade, I am going to use a bigger crystal ball ... perhaps a smart one to go along with the smart meters, smart grid, smart cars, smart phone, smart appliances, smart cities and the smart planet that we are hearing about now ... and use my smart crystal ball to look beyond just this year into well into the decade.

I am going to look five years out and describe what the sector in Ontario will look like in 2015 ... and more importantly what we are going to have to do between now and then to help dissipate some of the clouds that I see gathering in my crystal ball.

A look back

A lot can change in five years ... we only need to look back to 2005 to realize that.

Five years ago, coal played a prominent role in meeting our electricity demands and the government's commitment to phase out coal was met with scepticism. Yet in 2009, coal output was at its lowest in 45 years and accounted for only six per cent of the supply ... the phase out of coal is well underway.

In 2005, there was virtually no wind installed on our system ... today there are over 1,200 MWs of wind installed that provided a record amount of wind generated electricity last year. More wind-powered energy is on its way.

Five years ago, no Ontario resident had a smart meter installed and no one was being billed on time of use rates ... today, we have over three million meters installed and those customers are expected to be paying time of use rates in just over a year.

2005 was the last year Ontario was a net importer of electricity. Last year, exports were three times what the imports were.

We have gone from depending on our neighbours to help maintain reliability of the power system to backing down nuclear units or taking them off line to manage our surplus conditions.

Five years ago, not many of us in the industry were worried about a coordinated cyber attack on North America's electricity infrastructure. Yet today, President Obama has called cyber threat one of the most serious economic and national security challenges the U.S. faces as a nation.

A lot can change in five years.

A glimpse into 2015

So, what's on tap five years from now in 2015?

From a supply perspective, no coal seems certain ... 2015 will be the first year in my lifetime that Ontario has not produced any electricity from coal-fired sources.

We'll see a significant uptake in renewable power. To that end, I would like to acknowledge the efforts of Colin Andersen and his team at the Ontario Power Authority. The first wave of the Feed In Tariff (FIT) and microFIT programs attracted more than 8,000 megawatts in applications.

The room that we are in today will have a different lighting system in five years because the use of incandescent lights will be illegal by then.

New transmission, including the Bruce-to-Milton line, should be in service to support cleaner energy.

On the distribution front, there will be ongoing development of the smart grid. Load aggregators, responsive appliances and electric vehicles are just some of the things we should expect to see by 2015.

How many of us in this room will be driving an electric vehicle by 2015? Hopefully charging that vehicle overnight and maybe even being able to supply power during the peak hours?

Dealing with the impacts of climate change will continue to play a major role in our industry going forward ... even if Copenhagen didn't live up to everyone's aspirations. Maybe even more so because of Copenhagen.

Cap-and-trade should be in place within five years. Ontario has been working for the past year with Quebec, California and others to develop a cap-and-trade program. Last month legislation was passed which will allow Ontario's cap-and-trade program to link to other systems in North America and abroad.

But reducing our carbon footprint will come with a price. One thing that hasn't changed significantly in the electricity sector over the past years is the total price that consumers are paying for electricity.

That isn't likely to last given what's on the horizon ... cleaner, but higher priced power, new transmission facilities, new distribution infrastructure ... not to mention the impact of HST on electricity bills.

By 2015, all 4.5 million Ontario residents will be on Time of Use rates ... as compared to the 300,000 to 500,000 customers now being billed on TOU.

And from a non-electricity point of view, 2015 will be the year the world's focus will be on Toronto as we get set to host the Pan Am games. We will need to ensure that reliability is maintained while the world's eyes are upon us.

Although we do have a positive reliability outlook over the next few years, meeting adequacy requirements beyond 2014 is less clear at this point.

Some important decisions need to be made about the role that nuclear will play over the decade. Are we dealing with shutdowns, new build or refurbishment of the existing nuclear fleet? Or all of the above?

These are big decisions that require long lead times to coordinate and to implement. They will have significant impacts on how we manage the reliability of the system in the second half of the decade.

As our most recent Ontario Reliability Outlook stresses, decisions surrounding nuclear new build, refurbishments, and life extension strategies are needed on a timely basis.

Some of you in the room today may have already read the ORO, which we released late last month. In this report, we outline the challenges of operating and integrating the

new supply mix – and put forward ideas about how to facilitate greater levels of wind and other renewables in Ontario's electricity system. Copies of the report are available here on your way out or on our web site for download.

As we look beyond 2014, there are a number of things that we need to come to terms with. And for the purpose of these remarks today, I am going to focus on three priorities.

One is coming at us like a freight train, one represents an untapped potential, and one is something that nobody is talking about in Canada but should be.

Effectively addressing these three priorities will be key to ensuring that the opportunities in 2015 can be realized and that a reliable supply of power will be there for the Pan Am Games.

Priority number one

Let me start with the freight train or what we in the industry know as the Green Energy Act ... or more specifically ... reliably incorporating significant amounts of renewable power into the power system. This is my number one priority.

We have 1200 MW of wind operating in the province now either connected to the grid or embedded within the distribution system. As much as four to 5,000 MW of wind and solar is expected in the next few years ... perhaps even more.

A lot will be embedded within the distribution system. From a system operator perspective, this highlights the need for both visibility and control ... for us and for transmission and distribution operators.

We have started discussions with the EDA and Hydro One to lay out a framework for how system and local operators can work together. We will need to develop a closer, collaborative working relationship in order to address both local and system needs.

As increasing numbers of variable generators come into service, we need both sufficient forecasting and adequate flexibility to ensure system reliability.

Centralized wind forecasting will be one of the new tools at our disposal and it is currently under development. It will help us build a better picture of what our overall wind energy supply will be and help us deal with the variability of the wind resource.

Last Hallowe'en, we experienced just how variable this wind supply can be. At 4:00 in the afternoon on October 31st, we benefitted from almost 1000 MW of wind output – yet at 4:00 p.m. the next day, we had just 7 MW. From record highs to near record lows in just 24 hours.

One option to deal with that variability is storage. Flywheels, compressed air, advanced batteries and other storage technologies can be useful additions to the system operators' tool kit.

There are mixed opinions on the need for and value of storage ... particularly when you consider the costs and benefits. Those for it will cite the many storage pilots and projects that are popping up around the world.

In the U.S., the Department of Energy awarded $186 million in grants in 2009 for 16 projects. American Electric Power has plans for community energy storage, scattering 25 kW lithium ion battery banks throughout neighbourhoods.

On a much larger scale, a Japanese company ... NGK ... has picked up several significant battery orders including 300 MW worth to Abu Dhabi's Water and Electricity Authority.

Critics of storage cite the high costs associated with it. Yes it's expensive ... today. But variable renewable resources are "use it or lose it" generation. In my opinion, the only way to realize its full potential is to have a substantial amount of storage along with it.

That could include a number of options:

- The traditional pumped storage located here in Ontario;
- Arrangements with neighbours who have hydro or other storage;
- Or distributed new technology even to the level of that electric car soon to be parked in garages around the province.

Priority Number Two

Dealing effectively with the increased variability of our supply mix will also require an increased role for the consumer. Developing the demand side of the market accounts for my second priority.

The consumer represents an untapped potential in helping to address system needs. Consumer response can match up with variable generation ... consuming less when the wind's not blowing or when the sun's not shining.

We're well on the way with smart meters; we're on the verge of seeing the Chevy Volt in dealer lots, and innovative technologies are being developed to automate demand response.

The potential to leverage our consumption behaviour is there. But an important key to realizing that potential rests with effective price signals.

Price signals continue to be the most effective means to co-ordinate all the many moving parts in the system including the participation of consumers. An accurate and dynamic price signal is the only way to align the short term actions of generators and consumers of electricity in an efficient way.

We are on the cusp of having consumers in Ontario equipped in some ways to take pricing matters into their own hands through the introduction of smart meters and time of use rates.

As I have said, prices will be higher which again underscores the need for effective price signals to help customers better manage their costs ... combining those signals with the capability to adjust consumption in response to price.

But how do we develop those price signals given the conditions of the market today?

We have seen a lot of change over the last five years in the ways that suppliers are compensated ... to the point where most of the supply is now under contract. These contracts are securing Ontario's future supply and were the right thing to do.

But we also need to consider the impacts of moving too far along the 20-year contract path that we have set ourselves on. Will future contracts prevent Ontario from being able to take full advantage of transformative technology ... technology that could well develop over the next 20 some years in areas such as distributed storage, interactive appliances, solar efficiency?

My point here is that flexibility will be a key requirement if we are to realize my second priority around customer engagement. By this I mean flexibility in dispatch of generation, flexibility in the terms of future contracts, flexibility in pricing, and flexibility in the way consumers can respond.

This is why I want to say a few words about the Global Adjustment.

The Global Adjustment has been rising in the past year to the point where the average Global Adjustment in 2009 was almost equal to the Hourly Ontario Energy Price. Given that many of the GA costs can be attributed to the need for peaking capability, large

industrial customers have expressed concern that they are paying more than their fair share.

We have been working with the OPA, AMPCO, APPrO and others to look at how the Global Adjustment should be treated from a customer perspective. The OEB has considered this in time of use pricing for residential customers.

In my view, any proposal for allocation of these costs in a way should improve industrial competiveness, promote price responsiveness and improve transparency.

Priority number three

My third and final priority relates to the security of our electricity infrastructure and in particular cyber security.

The Christmas Day incident on the airplane landing in Detroit once again reinforced the threat of terrorism. Anyone taking a flight to the U.S. since then can relate to the increased attention they are getting.

To my mind, coordinated cyber attack is a significant reliability threat facing the electricity industry ... but it's one that's not being talked about a lot in Canada. Coordinated cyber security threats are real and preparing for them needs to be built into our planning, into our design and into our daily operation.

The pervasive use of digital technology in the monitoring and control of generation, transmission and distribution is increasing exponentially with the development of the smart grid.

Canada is not paying nearly the attention to this as is the United States. Cyber attack is fundamentally different from physical attack in terms of its familiarity, observability, proximity and impact. Roles for responding to targeted, coordinated and widespread

attacks are not well defined or understood. And the collaboration between our industry and the federal government needs to be improved.

Increasing the awareness of the potential dangers and the ways to deal with them presents a unique challenge to us.

The Department of Homeland Security in the United States, the Department of Defence and the FBI hold periodic secret level cyber security briefings for a limited number of CEOs and I have been fortunate to be on the invitation list. However, the problem is that the information that is provided is classified and I am unable to share it.

You know the old joke about "I could tell you but I would have to shoot you." In this case with DHS, it's more like "I could tell you but they would have to shoot me."

The North American Electric Reliability Corporation or NERC has set up a policy level sector steering group and I am part of that group. One of my goals is to use that to help drive awareness of this more broadly with my Canadian counterparts in the electricity industry.

In the coming weeks and months, I will be looking to engage some of my colleagues in energy and perhaps other sectors to begin working together. Our common goal will be to protect and enhance the reliability of our critical infrastructures.

We can learn much from observing what is being done in the U.S. and elsewhere. This initiative involving the CEOs will hopefully provide an opportunity to share information, increase awareness, develop common approaches, and encourage coordination amongst the public and private sector entities.

Through this group, we can provide executive level advice and support to government, just as we continue to do with the Smart Grid Forum.

While this initiative is still in its infancy, you will hear more from me on this.

Conclusion

I am going to conclude by going back to my crystal ball again.

Wind, solar, electric cars ... these are all new technologies that were not evident five years ago but promise to be an increasing part of our immediate future ... a future that holds the promise of cleaner energy and less carbon.

But we shouldn't underestimate the challenges in getting there. It's clear that there are a number of things we need to focus on and I have highlighted a few of them for you here today:

- Timely decisions on nuclear;
- Reliably incorporating the significant amounts of renewable power expected;
- Helping our customers manage the impact of higher prices and becoming active players in balancing variable supply and demand;
- And finally, we need to broaden our awareness and efforts in dealing with the cyber security threats that are on our horizon.

Thanks very much ... I look forward to your questions.