

Notes for Remarks
to the Toronto Board of Trade
Energy Series

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Transforming Ontario's Power System

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Thanks very much. Let me start by extending my appreciation to the Toronto Board of Trade for having me here this morning. Given the level of attention that electricity matters in general are getting right now in Ontario, it's a good time to be here ... hopefully to provide some insight into some of the stories we are seeing.

Several years ago, I used to comment on the speed of change (or more appropriately lack of change) in the electricity sector. I did that by telling the story that if Alexander Graham Bell came back and observed today's telephone system, it would be completely foreign to him. But if Thomas Edison came back to see the electricity system, it would be just as he had left it. I can't say that anymore.

The rate of change we are seeing in Ontario is unprecedented. In a few short years, our supply mix has begun to transform, incorporating more renewable, clean sources of supply and phasing out what used to be one of our staples in terms of electricity production, coal fired generation ... our pricing structure has changed with business and industry customers now dealing with the Global Adjustment and residential customers coming to terms with time-of-use rates ... even the way we consume electricity is changing with tools and systems emerging to communicate with consumers, helping them to make more informed decisions about electricity consumption.

The provincial government's Long Term Energy Plan that was released earlier this week is a clear indication that more change is ahead of us. At over 60 pages, the government's plan was a comprehensive document that provides a clear indication of their desired path forward. This morning, I want to touch on two aspects in that plan ... the significant increase outlined for renewable power and the move to a smart grid.

One of the desired outcomes of a smart grid is increased consumer engagement ... that isn't going to happen overnight and I want to highlight today some of the things that need to occur to achieve that increased engagement, in particular a change in mindset about the ability of the consumer to engage.

And of course, being Ontario's system operator, I can't ever speak to an audience without looking at the real time operation of the province's bulk power system. It's the area that I want to focus on first.

Short Term Picture

As part of our responsibilities for short to medium term planning, the IESO publishes an 18 month demand/supply outlook four times a year. Our next outlook is due to be published in the next few days and I want to give you an advance look at the issues it addresses.

Our short term supply picture is very positive ... in fact, I can't recall it ever being this good. To date this year, Ontario has been self sufficient in meeting its own needs even with demands this summer that were higher than they have been in three years. We met those demands without the need for imports, a far cry from a few years ago when we were reliant on neighbours to keep our air conditioners humming. While we trade electricity on a daily basis, our imports these days are all acquired because they are economic ... not because we need them for reliability.

We expect about 1,700 megawatts (MW) of new generation to come on-line over the next 18 months ... almost a thousand of those MW are renewable.

The renewables now on-line are starting to have a noticeable impact in meeting demand. Just a week ago, we set a record for hourly wind production with output over

the hour at 1,155 MW. And several weeks ago there was a day during the week when wind supplied six per cent of Ontario's needs over that 24 hour period. Even this week we felt the impact of wind ... a record daily output was set on Tuesday ... on the same day that the government released its Long Term Energy Plan calling for a significant increase in wind generation.

With our transmission system adequate to meet expected demands, we are not foreseeing any unusual reliability or adequacy issues in the short term.

For Toronto, urgent issues that we identified in the past have largely been addressed by Portlands and the downtown transmission upgrades that Hydro One has done.

But while the short term picture is bright, we can't afford to relax given the significant transformation that this industry is undergoing.

Long Term Energy Plan

The Long Term Energy Plan that was released this week outlines that transformation. It also reinforces the direction that the province has started on.

From an initial expectation of 3,500 MW, the combination of RES Contracts, FIT applications, and the Korean Consortium project are expected to result in up to 7,000 MW of renewable variable supply in service by 2013. The Long Term Energy Plan has upped that to 10,700 MW by 2018.

This increasing reliance on variable power sources like wind and sun raises new issues for our role ... maintaining reliability of the power system. Let me use wind output this week as an example.

I had mentioned that we set a record in terms of wind output over a 24 hour period. On Tuesday, hourly wind output was averaging 1,000 MW. By the overnight period, the output had dropped to about 600 MW and in the early morning hours when people were getting up, getting ready for work, and using more electricity, that output dropped to 100 MW. So not only were we losing resources but we had to meet increasing demand. (A double whammy so to speak.) That situation will only get magnified as we add more wind to the mix. And at this time of the year, it's too dark in the morning for solar to save the day.

In the coming months and years, the growing contributions from contracted variable supply sources will require the IESO to develop new approaches to balance supply and demand. The rapid deployment of renewable power across the province will fundamentally change the characteristics of the power system, challenging us to continue to maintain reliability. And we are up to the challenge.

The key principles for our renewable integration efforts fall into three areas: forecasting, visibility and dispatch.

Ontario will move to a centralized forecasting model to accommodate many of the new wind and solar resources. This centralized approach will better enable the IESO to accurately predict variable generation output.

With more generation being connected to the distribution system we will need visibility at the distribution level that we have never needed before. We'll be working with our LDC partners to achieve this.

Having the ability to dispatch all resources will allow us to reliably manage the variability and make best use of all available resources. This means we need to find new and better ways to coordinate the dispatch of more resources such as Non-Utility

Generators (NUG), embedded generators, nuclear units and even consumers. It also means the renewable supply itself will, at times, need to be flexible.

The most important thing about any plan for the future is that it be flexible, because the one thing I know for sure is that the future will not develop as we think it will. That flexibility is critical whether the future is 24 hours away or 20 years away.

The day-ahead plan we produce every 24 hours to help our control room manage real time reliability has flexibility built into it and so should a 20 year plan.

Think back 20 years to 1990. What didn't we see in our industry's future back then? We didn't see the breakup of Ontario Hydro; a transparent and competitive spot market; intelligent smart meters in every home; the sale or lease of generating assets; the closure of almost half of the nuclear fleet; carbon as a primary force for change; or cyber security exposure. In short, we didn't foresee most of the things driving our industry today and we shouldn't expect to be more insightful looking forward.

Flexibility is the key to navigating the future; flexibility in supply mix; flexibility in structure and duration of contracts; flexibility in the market products and services for both suppliers and customers; and flexibility to adapt regulatory requirements as needed.

I am pleased to see the Long Term Energy Plan recognizes the need for flexibility with its direction on NUG contracts, the potential for conversion of some of the coal facilities to gas, and the potential for storage in meeting electricity needs. And, of course, it recognizes that a Smarter Grid will enable some of that flexibility we require.

Smart Grid

One of the struggles when talking about a Smart Grid is to put it in words that people can understand. It is not a project like the Smart Meter Initiative which has province wide implementation targets for both the installation of smart meters and the implementation of time-of-use pricing.

A smart grid addresses our need to modernize our electricity infrastructure -- dragging our 20th century technology and business processes into the 21th century ... using digital communication and control technologies to better manage the way we produce, manage and consume energy.

A smart grid is a modern electric system that should develop at the speed and locations where it makes the most sense. It uses sensors, monitoring, communication, information and computers to improve our electricity system.

A more intelligent distribution system can better accommodate and enable the diverse and distributed resources that we expect in Ontario and will be a necessary requirement for the wave of electric cars that are headed our way.

I have the privilege of Chairing Ontario's Smart Grid Forum, a group made up of some of the province's leading authorities in the electricity sector.

I was very pleased to see the Province renew its commitment to smart grid as part of the Long Term Energy Plan. The Minister has issued a directive to the Ontario Energy Board to take a series of steps to establish, implement and promote a smart grid. It identifies three broad objectives to be considered in the areas of customer control, power system flexibility and adaptive infrastructure. The directive also identifies a set of principles to guide the Ontario Energy Board, LDCs and others in the development

of the Smart Grid. The Smart Grid Forum had the opportunity to help the Ministry as it developed these principles earlier this year. These principles should also provide some direction in the application of the \$50 million Smart Grid Fund that the province had previously established ... money that will be applied to Ontario based manufacturers.

But the province or the regulated sector can't do this alone. Smart grids are about more than public sector investments in the wires and transformer stations. Its success will in large part be determined by private sector innovation and investment.

The development of electric cars, smart homes, and the development of embedded and renewable generation will largely fall to the private sector -- working in partnership with public utilities.

With support from Elise Hersig and the Ontario Energy Association, we have formed a Corporate Partners Committee to advise the Smart Grid Forum. The partners committee is made up of a variety of companies that have interests in developing and implementing the smart grid. They vary in size and include equipment manufacturers, systems integrators, meter providers, electric vehicle transportation, etc. This initiative will help ensure that what we do in the public sector supports the work of private interests. It is the Forum's hope that this committee will broaden the perspective to the private sector that will be investing in the products and services for smart grid.

Role of the Consumer

A key goal of a smarter grid is giving the customer more control over their electricity use. The success or effectiveness of the smart grid will in large part depend on the ability of the consumer to become more engaged.

Getting the customer more involved has been a recurring theme of mine over the past few years.

Why I have been so vocal on this?

Because every day it is the customer's use of electricity that drives the supply pattern.

Every kilowatt that the customer uses during the peak hour of the day drives the use of the most expensive generator to meet that need.

And every kilowatt that the customer uses during the peak days of the year drives consumption of an extra 2,000 MW of supply that is only needed several hours of each year. Providing that electricity can be expensive, requiring the construction of peaking plants that can sit idle for most of the year.

Responsive customers can also help manage the variability associated with the large amount of wind and solar generation that we are expecting.

Customers represent an untapped potential for meeting future energy needs in a way that can lower overall sector costs.

So what's needed to make that happen here in Ontario?

Smart meters are a great start. In September, the U.S. Department of Energy estimated that there are now two million smart meters installed in the United States. The United Kingdom plans to install 26 million smart meters by 2018 but has only pilot projects at present. Those numbers serve to demonstrate Ontario's leadership in this area, with more than four million smart meters already installed. All residential customers should have one within a matter of months.

Globally, there are estimates that over 300 million smart meters will have been installed by 2015. While this may sound like a lot, let's remember that there were over 1.2 billion mobile phones sold in 2009 alone, and 170 million of them were smart phones ... another reminder that modernization of the electric system has lagged other sectors, and in particular telecommunications.

In Ontario, we have the fundamental infrastructure in place to enable customers to participate.

The smarter technology is already occurring. Let me start with some simple examples – and build from there.

If you think about simple things that people can do to take control of their energy use – let's start with timers. Most dishwashers today have them. It's simple technology – but it's still smart. You can now pick up a washing machine for about \$600 with a delay timer on it – and that's not even a Black Friday price. LDCs like Toronto Hydro are giving away power bars with timers.

Take a step further – roughly one million Ontario electricity consumers now have access to their hourly electricity consumption on-line. Once they've logged onto their LDC portal, they can look at their hourly use and figure out ways to save ... They can't think about what appliance they were running in higher priced peak hours that they shouldn't have.

If you think of the thousands of Ontarians with a smart phone... they are probably ready to use those phones to do more than just play Angry Birds. You can manage your home thermostat using an app downloaded on iTunes. So if you leave for a vacation and forget to set your thermostat, no problem, just go on-line.

And then there's the set it and forget it approach. A fully-enabled smart home will listen to and speak to the system, making changes based on a set of parameters you've already determined. If demand is high and peak pricing is in effect, your house will reduce energy use based on already established criteria. Negative prices on the horizon? You may be asleep, but your electric vehicle is getting ready to charge up.

Two way communication in the home is not new to us. We order movies or television shows on demand, we are on the internet, and even our home alarm systems are two way.

It shouldn't be hard for us to take it one step farther and apply this principle to electricity particularly as individual appliances become capable of communicating and responding.

Price signals are an important ingredient if consumers are to become more responsive and to that end, I was pleased to see the government reaffirm its commitment to time-of-use rates in the Long Term Energy Plan.

But in my opinion, the biggest need is a change in mindset. We often talk about protecting customers ... but who do they need protection from?

We need to stop thinking of electricity consumers as victims who need to be protected and start thinking of them as participants who can be empowered and benefit from that empowerment.

One of the things I find interesting is that there seems to be a lot of distrust about the smart meter. Most people have a wifi router in their homes, a cell phone in their pockets and a GPS in their car; yet they don't trust the smart meter. Why? Maybe because the content of smart meters is not nearly so much fun as the content from an

internet connection or as useful as avoiding being lost in a strange city ... or maybe because customers see smart meters as something being done to them rather than for them.

Or as TV Chef Mario Batali would say “There's a battle between what the cook thinks is high art and what the customer just wants to eat.”

When it comes to smart grid development, to avoid customer pushback and encourage their participation, customers will have to see the value of managing their electricity use, just as they see the value in their cell phones or their GPS.

This may sound simple but it isn't; the value may be largely a “system” value that ultimately will provide value to customers in the form of less supply investment, better reliability or a cleaner environment but these values will be in the future, they will be in aggregate not individual, and they will be complex to explain. Personalizing some of these values will be key.

Conclusion

In closing, let me leave you with a few final thoughts.

There is no question that change is coming. That change is going to have price impacts. We may disagree on the degree of change or the cost of it, but it is happening ... change in the way electricity is generated, delivered, consumed and even priced.

I think we have woken up to that ... Now I think we need to take our hand off the snooze button and get up and respond to it.

Ontario's significant progress in implementing smart meters across the province and introducing time-of-use has given us a head start in our move to develop a smart grid. Let's not throw that advantage away.

As we move forward, we can't leave the customer behind ... we have to take them with us every step of the way. We have had some painful reminders of that ...opening the market eight years ago and more recently the introduction of time-of-use rates.

Comprehensive education for customers on both of these initiatives would have helped smooth the way and we need to ensure that education is part of the development of the smart grid. It is one of the areas that I will be encouraging the Smart Grid Forum to ponder further.

It was also one of the recommendations that came out of Burlington Hydro's GridSmartCity roundtable earlier this week.

Education is what we need to make it real for the customer ... demonstrating how the changes taking place are relevant to their lives and how those changes can deliver tangible results.

Thank you very much. I look forward to your questions.