

Notes for Remarks  
To the Smart Grid Road Show

Making Smart Grids Happen  
Opportunities created by Smart Grid Technologies

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October 6, 2008

I am pleased to be here to kick off what promises to be two days of exciting and informative presentations and discussion. Over the next few days, we will talk about many of the technologies that support and come together to create the smart grid concept.

I can't believe it has been only 10 months since I first talked about a Smart Grid at an Ontario Energy Network luncheon. In the last year, discussion on the Smart Grid has grown substantially in our industry. Conferences like this are becoming more frequent. Phrases like "Prices to Devices", "Two-Way communication" and "Two way power flows" are becoming the buzz words of our sector.

But it shouldn't be a surprise; our world is changing and changing very quickly. How quickly it is changing became quite clear to me when I recently went shopping with my daughter.

In taking her shopping I was reminded of how quickly technology has advanced. She picked out a couple of outfits and came out of the change room wearing one of them. I expected her to ask my opinion, but instead she handed me her cell phone and said "take my picture Dad". She then emailed her picture to her older sister who was working at a mountain lodge in Alberta.

This little shopping experience clearly demonstrated three things to me: first, technology is allowing new ways of doing things that were not even possible just a few years ago; second, young people are completely comfortable with new technology- they have grown up with it; and third, when it comes to picking out teenage girl's clothes, my views are completely irrelevant.

To understand why a smart grid is so critical to the future of this industry you only need to look at what is happening around us and understand the priorities of governments everywhere including the government of Ontario. Those priorities are quite simply around reliability, economics and the environment.

From a reliability perspective, we are in much better shape than we have been for some time. Paper megawatts (MW) that we have been forecasting are now concrete megawatts that are helping to meet electricity demands. And more megawatts are on the way. Over the next 18 months, more than 5,000 MW of new supply is scheduled to come into service. Much of that supply is already being commissioned or is well under construction.

The first stage of the 550 MW Portlands Energy Centre was available this summer, with its full capacity expected next summer. The 1,000 MW Greenfield plant near Sarnia is commissioning now as is the 880 MW Goreway plant in Brampton. Both have connected to the grid and have produced power.

By Christmas, Ontario for the first time in its history will have more natural gas generation than coal.

There has also been progress on new transmission. Recently the Ontario Energy Board gave permission to Hydro One for a new transmission line out of the Bruce area. This new line will help deliver refurbished nuclear power from the Bruce complex and from renewable sources of generation including wind in that area. The 1250 MW tie line between Ontario and Quebec is expected to be in service before next summer.

On the demand side, given the increasing impact of conservation programs and the current economic conditions, we are projecting a drop in demand over the next two years.

So if the reliability picture is so strong, you might ask why I am still stressing the need for a smart grid so strongly? Well for one thing, it is important to remember that over the next six years more than 6,000 MW will be taken out of service when the government's commitment to phase out coal-fired generation in this province is complete. The phase out of coal reflects the strong environmental priority that this provincial government, and indeed many governments, have.

Climate change, or more importantly, the need to reduce the electricity sector's impact on climate change is our biggest challenge. It is also one that government and customers both expect us to address. It underscores the need for our focus on conservation and an increasing contribution from renewables to reliably meet demand.

Of course electricity is only one sector targeted for carbon reduction. The intersection of the transportation and electricity sectors is emerging in the form of the electric vehicle which has the potential to profoundly affect our industry in so many ways.

I am becoming increasingly convinced that our environmentally driven imperatives for aggressive conservation, large and small renewable resources, and new applications such as electric vehicles can only be achieved if we make our system much more intelligent.

Our industry can no longer continue to look for historic solutions to meet future challenges.

In the past, as demand climbed, we built more generating plants, more transmission and more distribution to meet that demand. But the economic impacts associated with new generating plants ... not to mention environmental impacts of certain types of generation ... can no longer rely solely on that type of approach.

Quite simply, we need to do things differently.

Smart grids have the potential to change some old utility paradigms – where only big generators create power and the small consumer just pays what he or she is told. The smart grid will create a more diverse, a more devolved, and a more innovative sector.

From my perspective, a smart grid offers many specific benefits that can't be ignored.

By expanding the level of real-time information and automation in the system, a smart grid will benefit Ontario's power system in a number of ways. These include:

- Ensuring the best use of existing transmission and distribution infrastructure thereby avoiding new investment.
- Accommodating greater levels of renewables and conservation in Ontario's supply mix the plan is to double renewables and reduce demand 6300 MW through conservation and demand response.
- Leveraging the investment in smart meters by enabling time based pricing for things such as plug-in cars, in-home generation and other smart home appliances.

- Enabling consumers to vary their energy use in response to market price signals.
- Improving operational performance with fewer and shorter power outages.
- Providing us, the system operator, with a clearer view of generation and consumption at all levels – ensuring more effective and efficient management of the system. In particular by offering the potential to manage consumption to match the varying generation supply rather than the other way around. These are a few of the benefits from my perspective; no doubt you will hear many others over the next couple of days.

Let me focus on just one of these applications for a moment; the plug in electric car. I believe this has the potential to catapult the need for a smart grid more quickly than anything else as the cost and supply of oil and ultimately natural gas drive us toward cleaner, cheaper electric alternatives.

Electric cars are being widely investigated by a number of automakers now. And from a system operator's perspective, that is either my worst nightmare or a very encouraging development. Clearly if electric vehicles have the effect of increasing demand at peak load times, stressing both supply and delivery capability, then I won't sleep well. Actually I may sleep like a baby; go to bed early and wake up every two hours crying!

But, electric cars can store electricity... something we, as system operators, have never had access to on a large scale. Without storage, we have to make sure there's enough distribution, transmission and generation capacity to meet the highest levels of demand. But if Smart Electric Cars charge up at night, when demand is lower, more supply is available and the delivery system has spare capacity, then we can maximize the use of our electrical infrastructure.

Electric cars could even sell this energy back to the grid during system peak to help maintain reliability. So in theory, you wouldn't need to build a single new power plant to accommodate a significant number of electric cars.

But this need for two way communication between the electric car, the electricity grid and the electricity market again underscores the need for us to improve the intelligence of the grid.

Ontario is ideally positioned to be a leader in smart grids. The Government's Smart Grid Initiative will allow all consumers to directly receive the benefits of smart grid technology.

Ontario already has in place 1.5 million smart meters and by 2010 all Ontario residential consumers will have a smart meter installed. Our challenge is to use those smart meters to their greatest potential.

Earlier this year we created the Ontario Smart Grid Forum.

I am joined by 10 senior officials from all walks of this sector from the distribution companies, government, the regulator, academia and from the Ontario research and development community.

Our forum is considering how a smart grid in Ontario can offer significant operational, environmental and consumer benefits. While our focus is Ontario, we recognize that there is a lot we can learn from other jurisdictions and presenters to the forum are not limited to this province.

Each meeting of the Smart Grid Forum features formal presentations by recognized experts, followed by dialogue and debate about the material presented.

Discussions during the Forum's monthly meetings have focused on a broad range of questions including, but not limited to the following:

- What does a smart grid mean for consumers?
- What are the potential costs of a smart grid?
- How can the idea of a smart grid be communicated to consumers?
- How will a smart grid change the interaction between LDCs and consumers?
- What is a logical sequence of steps to move toward a smart grid?
- Who controls the consumer data generated by a smart grid?
- What sort of standards need to be established?
- What research and development efforts are required?
- And, who should take the lead in moving Ontario toward a smart grid?

The presentations that we have received are posted on the IESO web site. A full report is planned for release early next year. This report will provide the foundation for further action and discussion among Ontario's policy makers and industry participants.

Our hope is that this report will provide the framework for a co-ordinated approach to the development of a smart grid. We are learning that many of the elements of smart grid technology are either already in play or in the process of being implemented. I believe that it's critical that we leverage these efforts off each other and ensure that our investments provide the maximum benefits.

The smart grid has the potential to turn this industry in directions that we couldn't imagine a few years ago. Smart grids will create a scenario where the electricity commodity becomes a much more tangible, active component of our lives.

Consumers, I believe, will take more ownership in the way they use or perhaps produce electricity. Consumers will also be more demanding of us -- the traditional electricity entities -- to meet the demands that this new level of empowerment will create.

A Smart Grid, with intelligent monitoring, assessment and communications from generators right through to home appliances could enable a wide array of innovative applications.

Some of these, such as self-healing distribution grids would help distribution companies improve service to consumers. Others such as automated load response could enable system operators to match demand to variable intermittent renewable supplies. Still, others such as in-home appliance sensors could allow consumers to select prices, times and convenience levels that would guide the automated operation of various devices.

As I mentioned, many of these technologies don't need to be invented. But they do need to be sewn together and integrated in new and innovative ways so that their full potential can be realized.

There are a myriad of important questions yet to be answered. For example:

- What are the policy, regulatory and economic ramifications of smart grids?
- What is the impact on our traditional generation and transmission planning?

- How are local distributors going to address their distribution requirements in the face of increased uncertainty and complexity?
- How do we ensure that the benefits outweigh the costs and how do we even measure the benefits?

These are big questions – and perhaps questions that should not be left to engineers like me. And that’s the point. We need to engage a broad range of interests in this discussion.

That’s where conferences like this can help so much. Over the next two days, I encourage you to look at questions like this to help us tap the full potential that a smart grid offers.

I started this presentation by talking about the changes we are undergoing. And that’s where I would like to come back to.

The phase out of coal, the economic pressures we are under, and the rate and scale of the change we are experiencing, are all coming together to create some significant challenges for us in this industry.

But while I see challenges, I also see opportunities. The spectrum of change and challenge that we are entering provides an opportunity, and I would argue a necessity, to realize the potential that a smart grid offers.

The potential to increase grid efficiency and reliability;

The potential to better engage customers through two-way communication flows;

And the potential to better address the reliability, economic and environmental goals that are being established.

There is tremendous excitement about the possibilities of a smart grid. But we must temper some of that excitement with the recognition that these changes are not going to happen overnight.

When I first joined the industry 30 years ago, Ontario had just installed its sophisticated energy management system. For the first time, operators were able to monitor thousands of status points and measurements from across the province. And with increasing computer power, they could conduct reliability analysis and simulations never before possible. But this capability did not develop overnight. The concept and the need were the product of the 1965 Northeast Blackout. And the full capability of the software applications were only realized well into the 1980's; roughly a 20 year time span.

Similarly, just last week I visited some hydro electric generators in Northern Ontario that are just now being refurbished and converted from 25 HZ to 60 HZ operation. This is more than 50 years after the major frequency conversion program took place.

Big change takes time. Even with the impetus I expect to come from electric vehicles, the development and widespread deployment of smart grid technologies will take time.

In our excitement, we also have to remember that it is not all about the technology.

Customers have to embrace many of the changes and welcome them into to their home. In some respects, customer engagement will be one of the most important benefits of the smart grid. But it may also be the most difficult to achieve.

And this is the challenge we all have to address. Whether we are engineers, systems analysts or other technically- oriented individuals – we have to think clearly about how these advancements will be accepted, adopted and employed on a human level.

We can't run the risk of providing consumers with capabilities they find difficult to use or that are inconvenient. And we shouldn't assume that all consumers are the same with the same behaviours and responses.

I'll give you an example. The IESO has been working with Milton and Newmarket Hydro on developing communications materials to raise awareness of time-of-use rates which are now in effect in both these communities.

Newmarket and Milton both offer their customers sophisticated real-time energy monitoring systems. In the case of Milton Hydro – they are piloting a home automation system that can be controlled remotely through the web. These types of projects are exciting.

Yet we have also found that a simple sticker that clearly shows the various price periods can have a particularly powerful impact.

These stickers were provided to all customers in the Milton Area. Our research showed that 40 per cent of those customers surveyed actually use the sticker – and that this group had a 20 per cent higher recall rate of the start of off-peak periods. We shouldn't

expect that everyone should need an internet connection to their fridge – if a 10 cent sticker may in fact achieve a lot of the same results.

Other research in Chicago with consumers on the hourly price, shows that basic education about when prices are likely to be higher, followed up with phone messages alerting customers of critical peak periods – will similarly prompt demand response efforts.

My point is not that technology on the consumer level isn't effective. It is. But sometimes the low-tech solution can take us a long way in making the smart grid real for consumers.

We can't lose sight of the human element if we are to make the smart grid work. And the sooner we learn more about that interaction... the better we will be at building a smart grid that truly engages the customer.

As demonstrated by my shopping experience with my daughter, thinking about how people at different ages and experience embrace new technology will be critical to making the smart grid happen.

I encourage you to take full advantage of this "Smart Grid Roadshow". Visit the exhibits, talk to the experts and share your experience with some of the true pioneers in this exciting field.

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