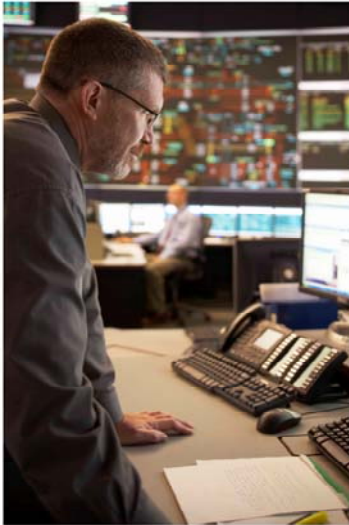


# Getting Real about Smart Grids

Don Tench, Director, Market Evolution  
EUCI, April 15, 2009

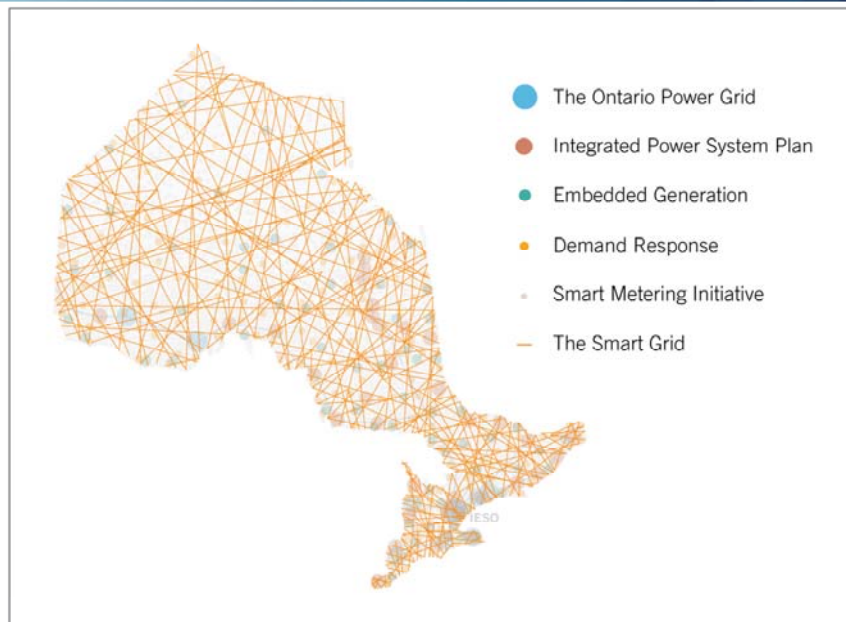


- The speed and scope of the discussions about the Smart Grid have been truly astounding.
  - It has become a central part of the public policy debate about the recession and the environment ...
  - New technologies and pilot initiatives are emerging all the time...
  - And as such ... our experience *with* or at least our understanding *of* Smart Grids is starting to build.
- So where are we in terms of the development of the Smart Grid?
  - We're past the stage where we imagine what a smart grid could be.
  - We're past the stage where we need to convince people of the need for one.
  - We're even getting past the stage where we need financial commitments to start building it.
  - We're now at the point where we have to start delivering smart grid capabilities and prove why this is the right thing to do.
- I believe our job is now to turn Smart Grids into reality.
- We need to get real about Smart Grids.



- Ensure the reliable operation of the power system
- Efficiently manage the wholesale electricity market
- **Balance Load and Generation**
- Integration takes place through the wholesale electricity market

- The IESO is the not-for-profit organization that brings together electricity suppliers, or generators, and electricity buyers, or consumers, including large-volume industrial operations and commercial power users, local distribution companies that serve Ontario's cities and towns and other market participants.
- Our primary responsibility is to manage the reliability of Ontario's power grid by directing the flow of electricity to consumers across the transmission system.
- We do this by tracking demand every minute of the day and by ensuring there is enough generation running to meet that demand.
- We also manage the wholesale electricity market.
- Since 2002, when the electricity market opened in Ontario, generators submit offers to run and the IESO determines which generators will run by selecting the lowest price generators first.
- Supply and demand management policies can get ahead of ability of industry to integrate. There are big plans for conservation and demand response, efficient and clean distributed generation, renewables and smart meters.
- But -- and it's a big but -- critical building block is missing
- All of these hard assets are being built -- what about the wires? What about the integration? What about the information needs?
- This is what drove IESO to set up the smart grid forum because we are the integrators.



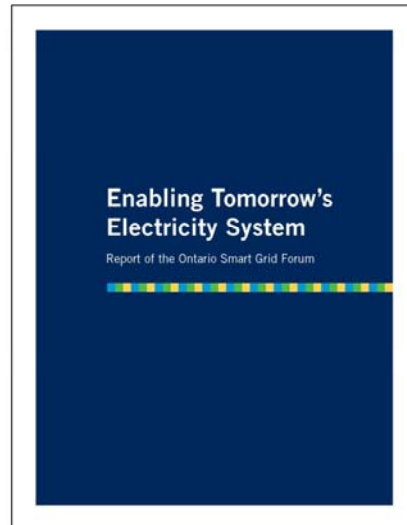
- From the IESO's perspective ... we see that Ontario is in the process of establishing many of the building blocks of a smart grid.
- In addition to the traditional infrastructure that's in place, Ontario's electricity system is going through "an extreme makeover"
  - The replacement of coal-fired generation by the end of 2014 is well underway with new gas-fired facilities providing many of the needed operating characteristics in service. This new system will feature a significant role for clean and renewable sources of electricity with conservation.
  - Embedded generation is taking off. The province is providing significant incentives to embedded (and mostly renewable) generation.
  - Demand response programs are taking form – with the Ontario Power Authority offering up verifiable programs.
  - And more than two million meters have been installed in homes and small businesses throughout the province. Time-of-use rates are already in effect in some communities – and will be ramped up significantly over the coming year.

- Industry leaders brought together to develop a vision for the development of a smart grid vision for the province
- Vision designed to guide:
  - a co-ordinated approach across the sector
  - the mitigation of technology risks
  - the development of capital investment plans
  - a supportive regulatory framework



- The IESO convened an Ontario Smart Grid forum with a broad range of industry support.
- While various smart grid investments were taking place in every area of the industry from research to investment by regulated entities to investments behind the meter by consumers.
- However, even though the need, the opportunity, the regulatory structures were all there, more was needed to get a smarter grid happening faster.
- And as the government continues to move forward on its green energy agenda – it was clear that we could not achieve these objectives without the supporting technology of Smart Grids.
- A vision of a future Smart Grid was needed.

- Provincial Government should facilitate Ontario's smart grid, by:
  - Clarifying authorities
  - Establishing requirements
  - Creating incentives
- Industry partners should work together to:
  - Develop requirements for the monitoring of distributed generation, energy storage and responsive load
  - Determine authority to direct operations of these facilities
  - Propose pricing arrangements for these facilities to support reliability that are also consistent with the market
  - Co-ordinate the development and implementation of grid controls
- A framework needed for smart grid research in Ontario that would include funding targets and mechanisms
- A comprehensive plan needed to enable electric cars in Ontario



- We issued our report in January, with some of the following recommendations:
- The Ministry of Energy and Infrastructure should facilitate the development of Ontario's smart grid, by:
  - Clarifying authorities
  - Establishing requirements
  - Creating incentives
- Distributors, transmitters, the OEB, OPA and the IESO should work together to:
  - Develop requirements for the monitoring of distributed generation, energy storage and responsive load.
  - Determine authority to direct operations of these facilities.
  - Propose pricing arrangements for these facilities to support reliability that are also consistent with the market.
  - Co-ordinate the development and implementation of grid controls.
- The Ontario Centres of Excellence should develop a Task Force to produce a framework for smart grid research in Ontario that would include funding targets and mechanisms.
- The Ministry of Economic Development should establish a Task Force to develop a comprehensive plan to enable electric cars in Ontario that would address the policy, financial and electricity system impacts of substantial electric vehicle penetration in the province.

**Objectives:**

- Incent renewable energy projects
- Promote a “culture of conservation”

**Legislation calls for:**

- More generous rates for small renewable generation
- LDCs, municipalities, community and aboriginal groups, and even homeowners to be renewable power proponents
- Streamlined approvals processes and a Renewable Energy Facilitator
- Significant investments into transmission networks and a smart grid for Ontario
- LDCs to develop smart grid plans for approval by the regulator



• And the government responded. Not long after, the Ontario Government tabled the Green Energy Act which was groundbreaking in many, many ways.. Accelerating in many ways what we were anticipating – sets higher the goals for conservation and renewables – but recognises the need for integration to make it work.

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## 2011

- Smart meters and time of use rates
- More in-home displays and LDC smart technologies
- Preparing the grid for plug-in electric vehicles

## 2015

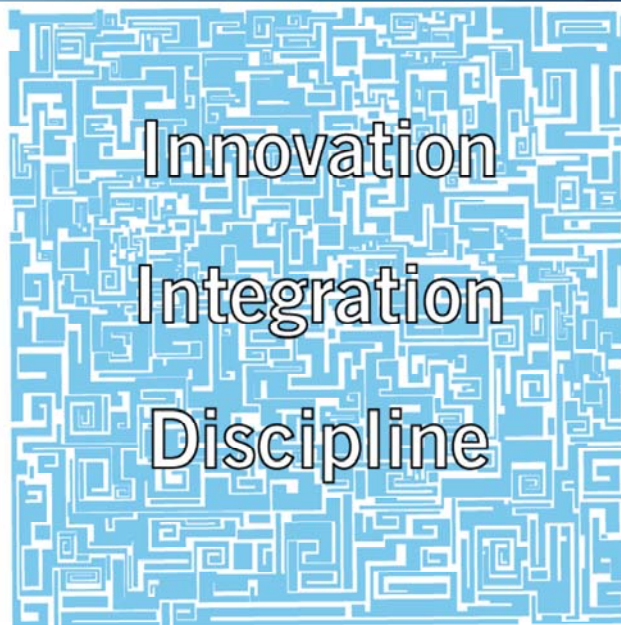
- Substantial increase in smart appliances
- Renewables, demand response, storage projects and LDC automation technologies are widespread
- Electric car infrastructure in place

## 2020

- Coordination across the sector complete
- Smart appliances standard
- Micro-grids begin to emerge



- Here's how we see the future will unfold ...
- We realize that we can't expect that with three or four years of investments,, we'll have a Smart Grid in place with all the bells and whistles. It's a long-term, evolving process.
- But our customers will expect to see progress in the early years. They'll want to see how these capabilities can work to improve their quality of lives and benefit the environment.
- And while there are many, many projects underway. There are elements of the smart grid that can be accelerated – in particular when it comes to conservation and in-home displays.
- Sometimes many small investments are easier than one large one.



- We are talking about a lot here – and achieving this vision for Smart Grid capabilities will require significant effort and investments.
- As I see it, we will need to approach this task with three things in mind:

**Innovation ...**

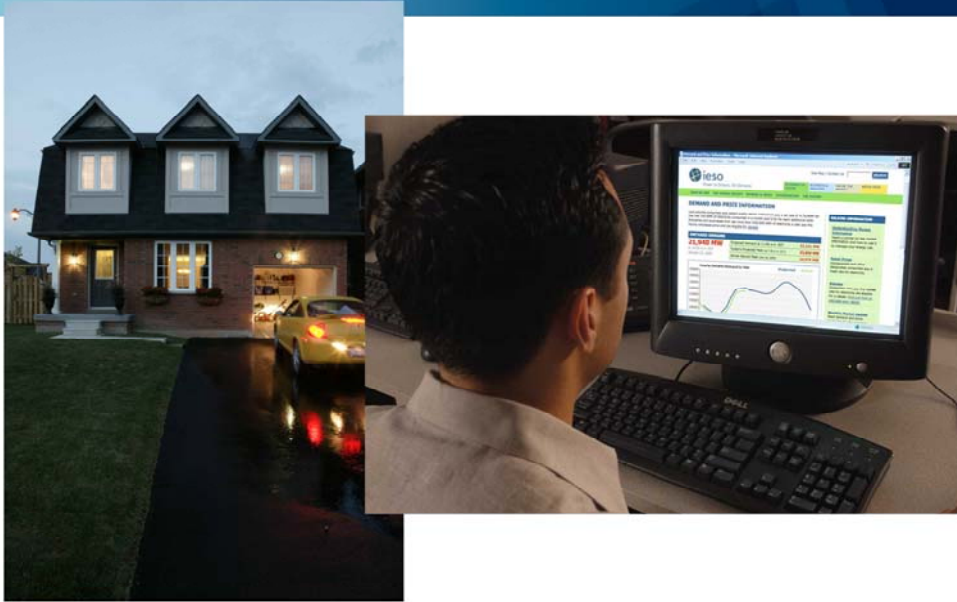
- There is a lot still to be learned about what these technologies can do for us.
- We need to ramp up our understanding of smart grid capabilities and test them vigorously.

**Integration ...**

- No silos allowed!
- We are developing a system of systems – integration and co-ordination are critical for an effective and cost-efficient system.
- Technologies need to speak to each other.
- We require greater integration across organizational boundaries and between industries.
- We need to be able to see into the distribution level to manage the system on a provincial level.

**And Discipline ...**

- We must manage the inherent complexity created by Smart Grids.
  - This requires coordinated activity among dozens of organizations; and
  - Includes investments in assets as well as people and processes.
- We need to ensure that the technologies work and maximize the benefits.
- We must share information, co-ordinate our efforts and focus on the projects that work



- We've created expectations – now we have to deliver on them.
- The Forum recently reconvened to discuss our next steps following the announcement of the Green Energy Act ... and it's clear that we are on the cusp of a real opportunity.
- There's a convergence of interest – from the need to revitalize our electricity systems, concerns about the environment – and most importantly ... the need for jobs. Our role in the Forum will likely focus on driving the necessary investments to propel Smart Grid capabilities forward.
- We have to ensure that a mismatch doesn't emerge between what industry can deliver within a particular timeframe and what stakeholders expect of us.
- In our industry, being the cautious people that we are, we only tend to celebrate our successes when a project is complete. We don't usually highlight the plans for successes and provide updates on our progress.
- We need to encourage those players who are leaders in the field to show us their efforts – and create the impression that an Ontario Smart Grid is happening now. Because, as a matter of fact -- it is happening now.