

THE CD HOWE INSTITUTE  
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RENEWING ONTARIO'S POWER GRID

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## **INTRODUCTION**

Good afternoon. I want to thank the CD Howe Institute for inviting me to speak today.

It's an especially great honour to be a speaker at the Institute as it celebrates its 50<sup>th</sup> Anniversary. My congratulations to you on reaching this important milestone and in particular, for the efforts you make to further debate around economic and social policy.

As the Institute celebrates 50 years, we in the Ontario electricity industry have just marked our first 100 years.

It was just over a century ago when Sir Adam Beck, considered by many to be the father of public power in Ontario, brought the economic engine of electricity to this province by harnessing and delivering the power of Niagara Falls.

Sir Adam Beck was a visionary, much like CD Howe, and Beck's quest to electrify this province is, in large measure, the reason Ontario has become the modern industrial power it is today.

Just over 100 years later, we still largely rely on the electricity system that was envisioned by Sir Adam. However, we are now poised to enter an entirely new century of power.

And this is not Sir Adam Beck's electricity system.

Emerging technologies and the need to connect clean and renewable generation are challenging transmission and distribution companies to recalibrate and establish more flexible and smart electricity grids.

### **Context**

Let me start by providing a bit of context.

Hydro One's mandate is the safe, reliable and cost-effective transmission and distribution of electricity from various supply sources to Ontario electricity users.

Hydro One owns and operates Ontario's world-class, high-voltage transmission network – one of the largest grids in North America, which covers about 97% of Ontario's transmission capacity.

Our transmission system delivers electricity to large industrial customers – the GMs and Incos - and to municipal utilities – like Toronto Hydro. In addition, we own and operate a low-voltage distribution system that serves about 1.3 million customers and smaller municipal utilities in the Province, primarily in rural and remote areas.

These are systems that have served us well but we now have other imperatives. The need to rapidly reduce the energy sector's carbon footprint dominates today's energy policy agenda and has also created high expectations for us to act now to reduce our demand for power and to expand clean and renewable energy supply.

This particular imperative creates challenges and opportunities for Hydro One's transmission and distribution systems.

The *challenges* are significant. Renewable power sources tend to be where the wind blows, the sun shines or the water flows. They are often located far from major markets and connected to rural lines designed to deliver power to the last farm, not to collect power from a variety of generation sources.

At the same time as we're connecting these sources of generation on our systems, our own assets are aging and new facilities haven't been built in a long time. Compounding all of this - our workforce is also maturing and long periods of downsizing and hiring freezes have left us with some demographic gaps.

These challenges are not unique to us. Most North American utilities are facing similar issues.

The *opportunities* are also significant. We have an opportunity to renew our assets and our workforce in a way that addresses the new imperatives *and* makes our systems stronger and more flexible.

Fortunately, we are not alone in meeting these challenges. At Hydro One and across our sector, we are all working to renew our systems and our workforces so that we can continue to ensure that the homes, businesses, schools and hospitals of Ontario have clean, reliable and affordable power. We're working on this together – across Canada and with many other countries around the world.

Today, I want to share with you *how* we are meeting these challenges and creating opportunities.

The way forward is through *innovation* and *leadership*, which brings me to the theme of my speech today:

### ***RENEWING ONTARIO'S POWER GRID.***

Renewal, in my world, means three things:

- **Infrastructure Renewal**
- **Connecting Clean and Renewable Sources of Generation**
- **Workforce Renewal**

### **INFRASTRUCUTURE RENEWAL**

As mentioned, our assets are aging and while most are not a hundred years old, many are approaching end of life, having served us well for many decades.

To address this issue, Hydro One has recently embarked on the largest program of infrastructure renewal in more than two decades.

A number of major system improvements have been undertaken, including projects to enhance the performance of existing infrastructure, relieve internal congestion points and deliver clean and renewable generation into our system.

We are delivering on several complex, large-scale projects:

- We are constructing a new high-voltage connection, linking the provinces of Ontario and Quebec, to be in-service in early 2009.
- Early in 2008, we completed a tunnel under the busy streets of Toronto (3 metres in diameter, 30 metres underground and 2 kilometres long) and energized the power cables in it to improve power reliability to the City of Toronto. We were successful in doing so with minimal disruption or inconvenience to the people and businesses in the area.
- We recently obtained approval from the Ontario Energy Board to build a 180-kilometre, \$635M transmission line from the Bruce area on the shores of Lake Huron to the Milton area – one of the largest transmission projects in North America. We still have several more approvals to obtain before we put a shovel in the ground and are currently in the Environmental Assessment phase of the project. We expect the line to be in-service by the end of 2011.

In addition to these projects, we are working on detailed plans to site and develop the power grid of the future, as outlined in Ontario's Integrated Power System Plan, or the IPSP, as it's known.

We are planning investments in new lines and stations to bring power from where the renewable and clean resources are located. We are working on *how* the grid's design and operation should be renewed—from essentially a one-way system delivering power to customers into a smarter, two-way system. This system will enable the integration of small and distributed generators, as well as enable our customers to manage conservation and demand management in a smart manner.

What I'm now referring to is what we call the Smart Grid or Smart Network.

Simply put, the Smart Grid is all about using communications, IT and sophisticated operating and control technologies to expand the capabilities of the electricity distribution grid and bring it into the 21<sup>st</sup> Century. This is important to Hydro One as we face the unique challenge of managing a distribution grid that stretches across the Province, including some very low-density rural areas.

Today's transmission and distribution grids were designed in the early 20<sup>th</sup> Century. They were marvels at the time and the fact that they have moved with the times is a testament to their design and the innovativeness of electricity workers over the years.

We have to start with what we have, which is a system that continues to serve us well, and we have to renew it in a way that makes it smarter and more responsive.

To draw an analogy, our reality is we need to supercharge this car while we are still driving it.

The explosive growth of computing capabilities and broadband wireless telecommunications has opened up whole new worlds of possibility to improve power transmission and distribution.

But I am getting ahead of myself.

The fact of the matter is, it all begins with Smart Meters.

Hydro One is pleased to support the Province of Ontario's goal to have a Smart Meter in every home and business by 2010.

We are advancing solidly towards that goal and, together with our subsidiary, Hydro One Brampton, we have installed about 750,000 meters.

This is the largest smart meter deployment in North America, especially when you factor in geography – we cover 640,000 square kilometres in an area that is largely unserved by wireless coverage.

But meter installation is only a fraction of this proposition.

In fact, the communications network we are establishing for our smart meter project will allow us to realize the vision of a Smart Grid.

## **BENEFITS OF THE SMART GRID**

What will the Smart Grid really do for us?

The Smart Grid will, quite simply, transform our customer relationship and we think this is a very exciting way to enter the next decades of electricity delivery.

Technology will now allow us to anticipate, identify and better respond to power outages and confirm restoration – today we rely on customers calling in.

For example, right now, if a tree falls on a distribution line and causes a power outage, we have to deduce the location from the pattern of incoming phone calls from our customers and dispatch a crew to determine the actual location of the outage.

In more remote parts of the province, this can add hours to restoration time.

With the Smart Grid, when that tree falls on a power distribution line, we will know it and be able to move immediately to the outage, thereby improving service to our customers and creating more efficient deployment of our crews and resources.

### **Empowering our Customers**

The Smart Grid will also allow our customers to make the smartest use of electricity, furthering conservation and demand management in the Province.

A smart grid will enable customers to better control “smart appliances” and “intelligent equipment” in homes and businesses, interconnecting energy management systems in “smart buildings” and enabling consumers to better manage energy use and costs by allowing them to make use of real-time electricity or “Time of Use” electricity pricing, when it comes into effect.

### **Enabling Distributed Generation**

Smart grids will provide us with the operational flexibility required for distributed generation located on our distribution system.

A smarter grid will further facilitate investment in renewable sources of power generation like solar, wind and biomass – key to this Province’s goal to increase the amount of renewables in our system and decrease our reliance on carbon-based fuels.

### **Optimizing our Assets**

The Smart Grid represents the technological convergence of the high- and low-voltage wires systems.

The intelligence and flexibility of the transmission system will be incorporated into the distribution system providing seamless and efficient operational control across all of our wires assets.

We will be able to piggy-back onto the extensive province-wide fibre optic network we own to provide the communications backbone to enable new smart functions and applications across our distribution system.

Better and more-timely asset information will allow us to optimize our maintenance and refurbishment programs, as well as reduce our operations and maintenance costs.

Harmonizing local distribution with interregional energy flows and transmission traffic improves use of existing grid assets and reduces grid congestion and bottlenecks.

### **Leading the Way**

There is still much to do to realize the Smart Grid and Hydro One has played, and continues to play, a leadership role in engaging the electricity industry to advance the smart grid vision.

We are partnering with industry players, via industry forums like the Canadian Electricity Association, university researchers and the Ontario Centres of Excellence to demonstrate the Smart Grid value in facilitating new, innovative and green energy technologies.

We have taken an active role in the Smart Grid Forum, chaired by Paul Murphy of the IESO, to help ensure that Ontario develops common standards and technology.

And the world is starting to take notice of what is going on in Ontario.

Where possible, our smart meter and network requirements emphasize non-proprietary and open standards, with a view to leveraging the system for future smart grid applications. We are influencing Advanced Metering Infrastructure (AMI) initiatives across North America.

Our executives play a leading role in international Advanced Metering Infrastructure organizations and we are opening our doors to delegations from around the world, including the US, Australia, France, Netherlands, Ireland and Japan to share our experience, research, and vision.

I am also very pleased to share with you that Hydro One was recently selected as a finalist out of 200 world-wide entries for a prestigious 2008 Platts Global Energy Award in the category of “Sustainable Energy Initiative of the Year” for our smart meter/network project.

We are proud to be at the forefront of such an exciting and transformational project.

## **CONNECTING CLEAN AND RENEWABLE SOURCES OF GENERATION**

I'd like to turn now to my second topic in our discussion today about renewal -- or more to the point, renewables.

### **The Ontario Context**

Ontario has set for itself aggressive targets to realize its vision for a cleaner, greener legacy for its children – a vision we fully support.

This Province will eliminate its reliance on coal by 2014 in order to dramatically reduce carbon dioxide emissions. The Province is also well down the road to procuring new nuclear generation in anticipation of nuclear plant retirements. The Province has also committed to a major expansion of renewable generation.

As you will know, many renewables are being sited throughout the province and, in some cases, we refer to that as distributed generation or DG. Most of the potential for renewable power sources is located far from where the power is used.

Distributed generation is really decentralized power and also includes on-site generation. It can be clean or renewable or both. Clean includes gas and nuclear while renewable covers wind, solar, water, biomass.

Currently, Ontario, like so many other industrial jurisdictions, generates most of its electricity in large centralized facilities, such as coal, nuclear, hydroelectric or gas-powered plants. While we will continue to generate on this basis, distributed generation provides opportunities to rethink our system of generation, transmission and distribution.

For example, we can reduce the amount of energy lost in transmission by locating the electricity to be generated close to where it is used, which can also result in reducing the size and number of power lines that must be constructed.

Put another way, when you look at our future electricity system, there will be many different shapes and sizes of cars going to many places. Our job is to build and operate the right type and number of highways to carry those cars.

We have to make sure traffic, or in our case electricity, is flowing in the right direction, safely and with minimal bottlenecks. We have to continue to balance all types of generation with load.

This leads me to one of our biggest challenges with respect to distributed generation which is our ability to connect it and get it to market.

And currently, the demand and desire for adding renewables is outpacing our ability to assess the impacts of these projects and to connect them to the grid. And we are not alone on this issue.

Our friends in the US are grappling with the same issues, but on a much larger scale. In fact, Kevin M. Kolevar, US assistant secretary for electricity delivery and energy reliability, said in a speech last year:

***“Modernizing the electric infrastructure is an urgent national problem, and one we all share.”***

As I mentioned previously, the Smart Grid, once realized, will better allow us to manage more distributed generation on the distribution system but the reality is that a smart grid will take a number of years to be fully deployed.

In the meantime, we are working with universities, research organizations as well as experts in other jurisdictions on technical solutions to respond to the ever-increasing demand for connecting distributed generation.

## **GENERATION CONNECTIONS**

Since 2005, we've connected, or will have connected by year end, over 4100 MW of generation of which 803 MW is renewable.

Let me give you some examples of the types of clean and renewable projects we've connected. There have been a number of biomass projects brought online, including the recent connection of an anaerobic biodigester, using animal waste as fuel, on a farm just outside of Ottawa.

In terms of hydroelectric power, this past summer we connected the 12 MW Lac Seul hydro-electric and the Umbata Falls 24 MW hydro-electric project, both in Northern Ontario.

With respect to gas projects, we connected the 638 MW St.Clair Energy gas-combined cycle plant, as well as the 550 MW Portlands Energy Centre (natural gas), which will be connected as combined cycle by next spring.

And in terms of wind, we connected the 101 MW Kruger Port Alma facility in the southwestern part of the province in June this year, and the 182 MW Enbridge Underwood project in the Bruce area of the province late this summer. We've also incorporated two 10MW wind farms on the distribution system in southwestern Ontario, with more to come.

And these are just some of the projects of many that will be coming online over the next years.

We also know that in addition to working on technical solutions, we must improve internal processes that can also impact the timing to connect new projects.

We are working hard to process the many applications for connection to help us all meet the government's renewables targets. We've increased the staff dedicated to generation connections more than ten-fold.

The answer to this challenge will be a combination of technology, clearer rules, better processes, more investment and we're working on all of these fronts.

## **WORKFORCE RENEWAL**

We've just talked about the renewal of the physical assets and applying innovation to transform our current system. The third pillar of renewal I would like to talk about today is workforce renewal and the innovative thinking required to address this issue.

As an employer, we are grappling with one of the single greatest human resource challenges our industry has ever confronted.

In Canada, 9.6 million baby boomers will soon reach retirement. This generation has long provided our industry with an enormous pool of talented and innovative women and men.

At Hydro One, we expect to see more than 30 percent of our workforce depart in the next few years. Add to that the fact that we haven't been hiring, to any great extent, for decades. We are facing the spectre of having an incredibly adept and skilled workforce walking out the door - at precisely the time we need them to mentor a new generation of workers *and* to transfer 30-40 years of knowledge to those workers.

And then, we have all the work to be done to renew infrastructure and to connect renewable and distributed generation.

Unless we act now, we're facing the likelihood of a severe shortage of trained staff over the next five to ten years.

This is not a simply a problem for the HR professionals – it extends well into our businesses, across the country and throughout the world. It will not be resolved by recruitment ads in the paper.

The good news is that we have a proactive and aggressive plan to renew the workforce and it's starting to take effect.

I'm pleased to be leading a company that sees the opportunities in this rather bleak scenario.

We understand that if we need to be able to draw from a deep well of skilled and experienced people, we have to help build that well. And here's how we're doing it.

## **Apprentices**

First, because skilled trades represent a significant piece of our business, Hydro One has undertaken an ambitious apprenticeship program in the trades.

Since 2002, almost 600 people have been hired into apprentice jobs in our various trades.

We give them the best possible training, a safe environment in which to develop their skills, and the foundation for a long and safe career.

They benefit from working alongside our most capable and committed employees.

Our people are very proud of what they do and how they do it so it goes without saying that they are passionate about mentoring new apprentices and passing along their expertise. This is the most fantastic synergy of all – to be able to bring these two generations together to learn from each other.

## **College Partnerships**

Also key to our workforce renewal strategy is establishing creative ways of working with educational institutions. I see this initiative as absolutely key to our success in renewing our workforce.

One partnership, of which I am particularly proud, is the one we set up last year with a number of Ontario colleges.

In November of last year, we announced we had established partnerships with Mohawk, Algonquin, Northern and Georgian Colleges to fund curriculum development and ensure that graduates will leave school with the skills we need.

For its part, Hydro One will contribute to scholarships, program development and equipment over four years for programs that will train people as technicians, technologists and skilled trades in the electricity sector.

Our experience with these Colleges has been extremely positive and I understand that this partnership is already paying dividends.

Georgian College tells us that their enrollment is oversubscribed in their Electrical Engineering Technology Program for next year.

This is fantastic news and proof of what employers and schools can achieve together.

## **Relationship with Universities**

We are also partnering with universities because, in addition to trades and technology skills, we also need to attract and retain Electrical Engineers.

We have established partnerships, MOUs, scholarships and on-line course delivery with universities to seed the next generation of talent in our industry.

We're strengthening our long and productive association with the engineering faculties at the Universities of Western Ontario and Waterloo.

We're working with Ryerson and McMaster to provide intern opportunities and to embed power engineering in their curricula and provide us with even more talented grads.

I am particularly proud of the initiative shown by our employees in this regard as they developed the partnerships, the curricula and the programs. They saw the need and they jumped at the opportunity. In addition to their day-to-day jobs, some have assumed teaching roles to provide the specific knowledge about power system engineering to our young people.

The curriculum we help create, the people we train and develop, will help launch a new generation of skilled workers with a portable skill set that will put them in good stead in any electricity utility -- anywhere.

We feel a responsibility for filling the employment void that is being created by the mass boomer exodus from the workplace – the exodus that is already upon us. And we have taken that responsibility seriously and will continue to do so.

### **Diversity**

We also recognized an opportunity to improve the diversity in our workplace. The people we hire should be a reflection of our customer base and the people of this province. To that end, we have a number of programs underway to increase our diversity, working with women and youth at risk, supporting retraining programs, new immigrants, and many others.

In particular, First Nations and Métis tend to be under-represented in our workforce. Aboriginal communities have the opposite demographic profile to other communities as they have larger youth populations.

With this in mind, we recently began to pilot a partnership with the Sioux Lookout Aboriginal Management Board and the Power Workers' Union to offer training to aboriginal workers so that they have the skill sets to do our type of work.

We are excited about this initiative and hope to roll it out on a broader basis in the future.

We also recently penned an agreement with the First Nations and the Métis Nation of Ontario on our Bruce to Milton Project and, as part of these agreements will look for opportunities to bring young Métis and First Nation workers into our workforce.

We are on the right track, but I believe that to renew our workforce, we need to dig even deeper.

It will require reaching back into High Schools and possibly even Grade Schools to increase awareness amongst young people about their career possibilities in the electricity sector. And we've been working with the schools to do just that.

As a 30-year employee of Ontario Hydro and Hydro One, I am passionate about our people and the work they do. This topic, like the others, is something I could talk about at length, but I will leave my comments there and come to my concluding remarks.

## CONCLUSION

Everything about our world is changing, and in our industry, we are very much influenced by the world events around us.

Society's expectations have changed and will continue to evolve.

This is an interesting and challenging environment in which we find ourselves and one thing is very clear - we cannot go on operating the same old way.

It is also clear that our customers want cleaner and renewable forms of energy. They want to manage and conserve their use of electricity in order to protect our environment.

This is no fad. This is for real.

Our generation has a new Adam Beck and he is called the customer.

As a company, we are dedicated to providing customers the capacity to connect and control innovative products. Customers are now telling companies like ours what kind of electricity system *they* want rather than transmission companies telling them the system they will get.

It is incumbent upon us to listen and anticipate customer needs, to renew our electricity system in a way that will enable clean and renewable sources of energy.

Transmission and distribution companies must transform themselves. We have to make wholesale changes to how we do our business. We have to show **leadership** and **innovation**.

As Ontario's Minister of Energy and Infrastructure, George Smitherman says, the electricity industry has entered into a renaissance.

He is absolutely right.

By pursuing renewal of our power system in the way I've described, we have not only entered into the renaissance, we have embraced it.

We will make sure we have the right people with the right skills in place to deliver the system that customers are demanding.

We are entirely focused on innovating and establishing an electricity grid that is modern, flexible and smart – one that will also support and drive consumer choices about electricity.

At the same time, we will also innovate and apply new technologies prudently, so that we can drive efficiencies and improvements in our business. We are very aware that renewal comes at a cost and we always need to balance service and cost, and be as productive as we can.

Our work will also help drive further demand for innovative green products and create fertile soil to grow green industries and greener jobs in this province.

I am excited about the opportunities and confident that Hydro One is well-positioned to take a leadership role in renewing our electricity system.

Thank you.