



**Notes for Remarks:**

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Check against delivery

## **Thanks and Introduction**

Good morning and thank you for inviting me here today.

Everyone in this room knows that the electricity sector has been transforming at a rate not seen since the opening of Ontario's electricity market in 2002.

The traditional one-way, top-down structure dominated by large, centralized generating facilities and electric utilities is being replaced by a much more decentralized and dynamic electricity system.

But with any challenge – I like to think – there comes opportunity.

For the IESO, it is an opportunity to look at how we do business while – of course – always keeping foremost our commitment to reliability and cost-effectiveness.

## **Background on the IESO and the storage sector**

Energy storage has been a part of how we've done business in the past and – I can say quite confidently – it will play an increasingly more important role [in building our brave new energy world] as we move forward. There will be more opportunities coming online as the system continues to grow and evolve.

Let's look at that evolution for a moment.

## **Setting the stage for more storage – an era of change**

According to Klaus Schwab, founder and executive chairman of the World Economic Forum, we are currently in the midst of the fourth industrial revolution. Disruptive technologies are changing the way we live and work and – I will add – how we generate, use and *store* energy.

The first industrial revolution – the one that we all learned about in history class – saw production mechanized using water and steam power, beginning around 1760 and lasting about a century.

Between 1870 and the beginning of the First World War, the second industrial revolution was a period of growth for existing industries and the expansion of new ones, such as steel and oil. Think Henry Ford and his mastery over the moving assembly line – the point in time when the world moved into the era of mass production.

The third industrial revolution – or the Digital Revolution – began as early as the late 1950s and – as the name implies – refers to the use of electronics and information technology to automate production.

Today, we find ourselves in a fourth industrial revolution, which Professor Schwab characterizes as “a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres.”

The electricity sector is a textbook example of an industry affected by the latest revolution.

In fact, the World Economic Forum identified three “game-changing” disruptions in our sector – electrification, decentralization and digitization. I would add one more – democratization – as consumers enabled by technology are more active and engaged than ever before.

With this in mind, let’s look at the sector for a moment.

Our sector once characterized by slow and steady change is no more.

### ***Innovation***

It’s now one where creative and innovative thinkers are taking technologies – whether brand new concepts or new ways of using existing technology – and applying them to our power system in ways we could never have envisioned 20 years ago. I know some of you will remember when a timer on a light in a window to fool potential burglars while you were on vacation was “high tech.”

Today, as we know, it’s possible to turn on and off those same lights from thousands of kilometers away with just a few clicks on a smart phone – and monitor, in almost real-time, the data related to that change.

### *More diverse supply mix*

It is a sector with a more robust and diverse supply mix. Think natural gas and hydroelectric generation, growing demand response resources, and dramatic increases in wind and solar on the transmission and distribution systems.

Ontario is now in a stable supply situation with needs emerging in 2023. This was the topic of some of the discussions at last week's – oversold, I might add - 2018 Technical Planning Conference. This now annual event is part of our commitment to introducing more transparency into our planning processes by providing updated information to the market and regularly engaging with stakeholders to enable them to make more informed decisions and investments.

I know that the feedback and input received from participants will play an important role in how we roll out our long-term planning commitments.

But despite the current stability between our energy supply and demand, our already complex sector is becoming even more challenging and we – as well as our stakeholders – need to be prepared.

### *Cyber threats*

We are also now a sector facing more frequent and more serious cyber threats to the safety and security of our system.

It's only been three years since the first known successful cyberattack on a power grid in the Ukraine. Hackers were able to shut down 30 substations and interrupt service to almost a quarter of a million consumers.

Since then, a series of attacks on U.S. resources – referred to in the security community as Dragonfly 2 point zero – had Russian hackers gain operational control and access to 20 U.S.-based company networks.

As a result of these – and the thousands of unsuccessful attempts that didn't make the news – cybersecurity has become a priority issue in the industry. And, we at the IESO, are taking a leadership role, as part of our commitment to safeguard the reliability of the grid.

Since launching the province's first forum for cybersecurity in the electricity sector, we've been expanding and collaborating on cyber defense by building and strengthening partnerships. In fact, we held the fourth gathering of this group just yesterday. It attracted some of the world's leading cybersecurity policy experts and participants from across North America to address the important issues impacting the emerging cyber-threat landscape.

### *More distributed energy resources*

We also have a sector where distributed energy resources (DERs) are changing the relationship between local distribution systems and the broader transmission system. They are providing more opportunities for regions to address local growth

and aging infrastructure issues and bringing more choice to consumers about how and when they get their energy.

While DERs also present opportunities to optimize overall system (both transmission and distribution) investments and provide a range of grid services, their impact on the system as a whole requires an examination of how we do business. DERs present challenges in how we forecast Ontario demand and in changing transmission flow patterns across the province. As the reliability coordinator and balancing authority for Ontario, in order to benefit from DERs, we must understand the impacts and benefits of DERs, as well as their contribution to the reliability of the system and work closely with providers and LDCs so we can effectively operate an integrated power system.

### *Consumers*

Finally, we are a sector with increasingly engaged and active consumers. In the past, the use of electricity was passive. We all took what we were given – or needed – and that was that.

Now, consumers have a myriad of choices to help them manage their electricity use and interact more proactively with the grid. As I mentioned earlier, twenty years ago a timer on a light in a window to fool potential burglars while on vacation was “high tech.” Today it’s possible to turn on and off those same lights thousands of kilometers away with a few clicks on a smart phone – and to get almost real-time data about energy use.

Even windows can generate solar power!

I know consumers want to be involved.

I've seen it myself.

In 2017, we had more than 5,300 people attend almost 120 engagement meetings. That doesn't include the more than 500 community leaders and interested residents who came to five regional forums across the province to discuss local planning issues.

Last year, we had 300 people attend our first Indigenous Community Energy Symposium, representing 77 communities and 20 organizations, not including the almost 100 First Nations communities and 20 Metis councils we connected with over the year.

### **Embracing the opportunities provided by change – especially storage**

In the midst of all this change a notable constant has been storage.

In fact for about six decades Ontario Power Generation's Beck Pumping Station in Niagara Falls has been a part of our power system, frequently pumping water to a reservoir during off-peak hours and providing energy during peak hours to help us balance supply and demand. And as I mentioned earlier, with a more diverse supply mix and growing incidence of DERs, our province's demand isn't as predictable as it once was.



And with more uncertainty in demand, there are new opportunities for energy storage.

In the past six years or so, we have been engaging with storage facilities on an increasing – but still relatively small – scale. However, there are more and more opportunities for energy storage providers to come online to help us manage reliability.

So, as new technologies enter the market we have been exploring new ways for energy storage to provide greater flexibility and resilience into the system.

In 2012, we launched the Alternate Technologies for Regulation pilot program and procured 6 MW of capacity from two storage facilities to provide regulation service.

We acquired 2MW flywheel facility operated by NRStor; and a 4MW battery storage facility developed by Renewable Energy Systems Canada.

Both facilities came on stream in 2014 to provide regulation service.

Then in 2014 and 2015, we procured an additional 50 MW of energy storage from about 20 different projects.

Several of these projects are connected to the system now providing reliability services like regulation or voltage control, and others will be hitting the line soon.

This is a great sign — innovation is paying dividends.

Thanks to storage procurements over the past several years, Ontario has been able to get a head start on testing innovative new technologies to help manage the changing conditions of the power system. We have been able to gain operational experience with how these facilities operate and fit into the system.

Storage proponents are figuring out how to get these facilities built, financed and operational.

We all know that storage resources can offer much to the electricity system – and that the way we’ve used these resources represents only a part of their potential, the tip of the iceberg if you will.

We also know that there continue to be growing pains on both sides of the proverbial table, including regulatory and operational barriers, modelling, and delivery challenges.

To help, as many of you know, the IESO established the Energy Storage Advisory Group earlier this year. At the first meeting in May, the group mapped out its work to identify obstacles that are preventing energy storage from competing with other resources in the marketplace and identify recommendations on mitigating strategies.

Already, we all know that there is a lack of clarity with respect to energy storage resources in Ontario's electricity market rules and OEB codes. The Energy Storage Advisory Group has already identified a number of other obstacles including:

- Inability to access revenues from offering multiple services;
- Potential inability for energy storage to participate in the operating reserve market;
- Inability of the dispatch tools to model energy storage capabilities; and,
- Minimum size thresholds for market participation.

Just to name a few...

The Energy Storage Advisory Group will use this work to inform the development of a draft report back on proposed mitigating strategies which you can expect to see at the end of this month. We will be looking to you for your feedback on the group's work. The final report back is expected to be issued at the beginning of November.

I know I am looking forward to seeing the outcome of this important work.

### **IESO commitment to innovation beyond storage – What else are we doing**

So, I've been discussing energy storage for the past few minutes as an example of the IESO's commitment and openness to embracing innovation.

But what *else* are we doing to adapt to this new environment, navigate our way through the changing landscape and manage disruption in the electricity sector?

Well, I would be remiss if I didn't talk about one of the biggest projects the IESO has undertaken in some time – our effort to lay a foundation that will prepare us to meet future electricity needs as the sector evolves.

### **Market renewal**

The Market Renewal Program is about improving the way electricity is priced, scheduled and acquired to meet current and future energy needs reliably, competitively, transparently, efficiently and at lowest cost. It will put in place a strong foundation to manage a range of potential energy futures driven by an evolving sector.

It will be a market that fosters more innovative approaches to providing electricity to Ontarians. It will more flexibly accommodate more engaged consumers, drive innovation through increased competition and, respond to changes in demand.

Four primary initiatives make up market renewal.

A single schedule market will ensure that we have a pricing system that accurately reflects the cost of producing or consuming electricity at a given place or time, and is consistent with our dispatch of resources.

A day-ahead market provides financially-binding prices and schedules ahead of real-time – allowing producers and consumers to manage risk and helping the IESO to manage the grid more effectively.

The enhanced real-time unit commitment mechanism will improve resource scheduling and commitments in advance of real-time, addressing system and resource changes arising after the day-ahead market has concluded.

Finally, market renewal includes the implementation of an incremental capacity auction to improve the way Ontario acquires supply to meet medium- and long-term needs.

As most of you know, the IESO already has an auction to secure demand response resources. The auction has shown us that such a model brings the benefits of competition, innovation and lower cost to the province. The introduction of an incremental capacity auction will allow all resources including storage, to compete to meet system needs at the lowest possible cost.

I'm delighted to report that the IESO is announcing next week that the first major market renewal milestone has been met.

Next Tuesday, the high level design of the single schedule market will be released. The document – a year and a half in the making and the culmination of consultation with 140 stakeholders, including many of you in this room – outlines the decisions that will guide the detailed design phase of the project and move us closer to implementation.

As you can imagine, it was a huge task for all involved and I'm incredibly proud of the work done on this critical element of market renewal.

There will be an eight week feedback process. I encourage you to have a look and see what *part* of the new marketplace will look like.

### **Conclusion**

In the end, it's not good enough to just keep up with rapidly evolving technologies—like energy storage—and emerging innovative business models. As an industry, we are working to get ahead of those that have value and momentum, working with developers to better understand how these resources can meet power system requirements, and determining how we can effectively and efficiently accommodate these technologies.

The IESO is working to create an environment where innovation is encouraged and can thrive. We are doing this because it will:

- Introduce more competition and generate market efficiencies and cost savings;
- Allow consumers to manage their electricity use and interact more proactively with the grid;
- Drive down costs;
- Help keep critical assets safe and secure from unanticipated external events, which in turn supports the system's overall resilience, and, most importantly,
- Lead to a more efficient and effective electricity grid.

Thank you for your time.