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# Proceedings of APPrO 2017
# The 29th Annual Canadian Power Conference
# "Future + Focus"

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*Special thanks to the following contributing writers:*
David Cheung Atkinson
Andrew Clare
Ahmed El Gammal
Lobna el Gammal
Najiba Hussain
Maral Kassabian
Christine Kilby
Steve Kishewitsch
Harman Komal
Musab Qureshi
Anjali Wadhera

*Primary writer and Editor: Steve Kishewitsch*
*Managing Editor: Jake Brooks*

**Acronyms used in this report:**
CAE: Capacity Allocation Exempt
CAR: Capacity Allocation Required
CBA: Cost Benefit Analysis
CCGT: Combined Cycle Gas Turbine
CESOP: Clean Energy Standard Offer Program
CHP: Combined Heat and Power (co-generation)
CIA: Customer Impact Assessment (or Connection Impact Assessment)
COD: Commercial Operation Date
CONE: Cost of New Entry
DERs: Distributed Energy Resources

DSC: Distribution System Code
EA: Environmental Attribute(s) or Environmental Assessment(s)
ECT: Economic Connection Test
EOT: Eastern Ontario Triangle
FIT: Feed-in Tariff (Ontario's open-ended program for procuring renewable energy)
GA: Global Adjustment (a fixed charge added to Ontario electricity bills)
GTA: Greater Toronto Area
HOEP: Hourly Ontario Energy Price
HONI: Hydro One Networks Inc.
IESO: Independent Electricity System Operator
IPSP: Integrated Power System Plan
IRRP: Integrated Regional Resource Plan
LDC: Local Distribution Company
LMP: Locational Marginal Pricing
LRP: Large Renewable Procurement
LRT: Light Rail Transit
LSE: Load Serving Entity
LTEP: Long Term Energy Plan
Mini Perm: Short-term financing used to pay off income-producing construction or commercial properties, usually payable in three to five years.
MRDCL: Minimum Required Domestic Content Level
NTP: Notice to Proceed (a stage in the FIT process which allows financial commitments to be confirmed)
NUG: Non-Utility Generator (generally associated with power purchase agreements signed by Ontario Hydro in the late 1980's and early 1990's)
OEB: Ontario Energy Board
OEFC: Ontario Electricity Financial Corporation
OPA: Ontario Power Authority
OPG: Ontario Power Generation, Inc.
PV: Photovoltaic (solar panels)
REA: Renewable Energy Approval
RESOP: Renewable Energy Standard Offer Program
RIP: Regional Infrastructure Plan
RFP: Request for Proposals
RPP: Regulated Price Plan
RRFE: Renewed Regulatory Framework for Electricity (a regulatory initiative in Ontario)
SBG: Surplus Baseload Generation
SIA: System Impact Assessment
SMD: Supply Mix Directive
TAT and DAT: Transmission Availability Test and Distribution Availability Test
TIR: Technical Interconnection Requirements, a document produced by Hydro One
TSC: Transmission System Code
TSSA: Technical Standards and Safety Authority
VNM: Virtual Net Metering

## APPrO 2017 conference proceedings

**Day 1, Monday, November 20, 2017**

Opening comments

Conference Chair **Stephen Somerville**, President of H2O Power LP, observed that, once again, the electricity sector is facing unstoppable change from new technologies, new market participants and a new regulatory world. Innovation and long-term grid stability will remain as critical factors.

Community energy consultant and former Guelph mayor **Karen Farbridge**, introducing keynote speaker Jan Vrins, observed that, one hundred years ago, Ontario communities took steps to accelerate their transition to the new industrial age, resulting in the formation of both municipally-owned local distribution and the Hydro-Electric Power Commission of Ontario, which became Ontario Hydro. A century later, history is repeating itself, she said. As we enter the third industrial age, our economy and communities will be significantly powered by renewable, distributed energy. There is an increasing range of connections between local development and the wider energy industry. Globally, cities are stepping into the energy space once again. Energy is coming back home, and the opening keynote speaker, Jan Vrins will be underlining the global trends pointing towards more distributed generation.

**Getting ready for the Energy Cloud: Jan Vrins sketches a vision of the future**

Speaking at the Canadian Power Conference on November 20, Jan Vrins, leader of Navigant's global Energy practice, sketched a picture of pervasive change ahead, both conceptual and practical, for the energy sector. According to Mr. Vrins, the energy industry, market participants, consumers and regulators can all expect to face significant adjustments to their respective outlooks. Navigant, through its work in the energy sector globally, has come to this conclusion based on its experience helping utilities, governments, large corporations and industries manage their energy portfolios as a means of empowering their businesses.

Mr. Vrins highlighted the expected emergence of distributed energy resources (DER) and the Energy Cloud – a platform of distributed, two-way power flows and intelligent infrastructure. He noted that value is shifting within the Energy Cloud across generation, transmission, and distribution sectors, and that the opportunities for stakeholders and customers are changing as the energy transformation accelerates. Mr. Vrins outlined factors driving new utility business models. His key takeaways included:

- The integration of renewable resources, DER, and electrification in transportation are rapidly affecting the ways in which energy is produced and consumed, and this pace is not to be underestimated. Customer preferences, technology evolution and public policy are driving this transformation.
- With this energy transformation, conventional generation requirements, load, voltage, price of power, and distribution system operations will no longer retain fixed values. As a result, both market structures and regulatory frameworks will need to be redesigned.
- There will be shifts in what customers and shareholders value, and different utilities will need to take different approaches, depending on the region they serve and roles they play. Mr. Vrins suggested that instead of a 30-year integrated resource plan or a 5-year strategic plan, utilities will need to develop an Energy Cloud Playbook. This playbook takes a 10-to-12-year view of where the business should be going, and a 3-to-6-month cyclical look at opportunities, threats and new products and services for customers.

Slide 3

Mr. Vrins also touched on the growing importance of sustainability and reducing greenhouse gas emissions. Citing the UNEP Emissions Gap report, Mr. Vrins said current Nationally Determined Contributions will amount to just one-third of the required global greenhouse gas emissions reductions, but that three key solutions for emission reduction can make a difference. These include renewables, energy efficiency in buildings and appliances, and electrification of transportation. In Canada, the country is projected to miss its industry target for 2030 by 100-240 megatons of CO2 emissions. Furthermore, the increased integration of DER, as suggested by the Long-Term Energy Plan, will be more disruptive than the integration of renewables Ontario has seen so far.

According to Navigant Research, installed DER power capacity additions in Canada (figure {4}) are expected to reach 15 gigawatts (GW) in just the next five years. This is projected to occur in the

form of distributed generation (DG), demand response (DR), electric vehicle (EV) charging load and energy efficiency. This will bring a significant shift of value from generation to newer business models such as behind-the-meter energy solutions, Energy-as-a-Service and Energy Cloud platforms, creating a $1.3 trillion market between now and 2030.

Slide 4 (graphs only)

Slide 5 & 6

Mr. Vrins further elaborated on these emerging business models as follows (figs. {5 & 6}):

• Energy-as-a-Service: Providing demand (building efficiency, optimization, commissioning and DR), supply (renewable, backup generation, storage, microgrids) and optimization services (monitoring, load management, waste/water/energy nexus and robotics/artificial intelligence [AI]/machine learning) to commercial, industrial and residential customers. As an example, ENGIE North America Inc. signed with Axium Infrastructure to manage The Ohio State University's (one of the largest university campuses in the US) sustainability programs.

• Energy Cloud platforms: Because any single technology (e.g., rooftop solar) is susceptible to erosion over time due to competition, there is a need for utilities to create platforms with assets, infrastructure, smart applications, data analytics and products and services that address value proposition for customers.

Slide 8

The traditional utility may not exist 20 years from now. Instead, it is more likely to become a network orchestrator, managing different types of platforms with collaboration among communities and product and service providers. Under this business model, utilities would focus on integrated DER and microgrids instead of power plants, optimization of usage and production of energy in buildings, transportation, behind-the-meter and Internet of Things energy solutions, peer-to-peer energy transactions and smart cities. Mr. Vrins cited an example of a EV platform that has been tested in Denmark, and is being introduced in the UK, Germany and Italy. This involves a vehicle-to-grid platform such that EV owners get up to €1,500 a year for parking their cars in designated parking spaces where the local utility has access to the feed. Such solutions will be pursued in North America as well (fig. {9}).

Slide 9

Slide 10 (graphic only)

On the changing roles of the local distribution company (fig. {10}), Mr. Vrins argued that in addition to changing their business models, utilities would evolve into Energy Cloud platform orchestrators to increase customer and shareholder value, and distributors would change to distribution system orchestrators to manage the intelligent, neural and mobile grid. Regulatory, technology/DER, data analytics, and AI capabilities are key in this transformation. Underutilized or stranded assets are the biggest risks arising from integrating DER technology without proper business models. Furthermore, the Energy Cloud could lead to the re-bundling of services. Instead of the conventional unbundled service markets, which are helpful for facilitating competition, re-bundling may be needed to ensure availability of the relatively sophisticated processes and data required to manage the full impact of DER.

For power producers, there will be a shift from traditional centralized generation to some centralized generation complimented by DG, storage and clean fuel production. The customer base will expand from utilities, wholesale markets and government to include commercial and industrial customers and communities. Success factors that focus on project development, construction management, low-cost capital, project finance and operations efficiency will be replaced with others focused on innovation in technology and business models, the ability to scale, integrate and orchestrate, as well as data analytics. The role of the power producer will change from the "opportunity pursuer" to "opportunity maker." To maintain shareholder value and customer value, power producers need to both optimize and ensure resilience of the current business model, while beginning investment in Energy Cloud platforms.

Mr. Vrins left the audience thinking about whether the Energy Cloud has already emerged, and considering whether the traditional knowledge of generation, transmission and distribution requirements, and price of power may need to give way to new types of knowledge. Business models and regulations will very likely need to adapt quickly to changing customer preferences, technologies and policies.

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*Report prepared by Najiba Hussain with edits by APPrO.*

**Panel discussion**
**Setting directions – what generators are concerned about**

Panelists
Evan Bahry, Independent Power Producers Society of Alberta (IPPSA)
David Butters, APPrO.
Dan Dolan, New England Power Generators Association (NEPGA)
Moderator: Linda Bertoldi, BLG Canada

**Moderator Linda Bertoldi:** The electricity sector is facing disruption and significant changes such as new climate change policies, Market Renewal, distributed generation, energy storage, micro-grids, cyber security issues, the evolution of capacity markets, and significant changes in the political landscape. These are among the pressing challenges and opportunities in the electricity sector which face policy makers, generators, politicians and consumers.

The panel discussion focused on three topics:
- The most significant changes of the day and how members are reacting to the uncertainty
- The future of natural gas in a renewable world
- What advice can be given to policy makers to get it right this time.

What are the really big technology changes, public policy directions and customer choices facing the electricity sector today?

**Evan Bahry**: Alberta's energy policy is undergoing much change with respect to how their market will evolve for the next five to ten years. There is plenty of opportunity in Alberta as the government is interested in adding 13,000 MW of new capacity by 2030, part of which will be at the community level or through the Renewable Electricity Program (REP, which aims to add 5000 MW of renewable supply by 2030). In addition, Alberta is currently working on the design of a capacity market. Over the next 18 months, IPPSA is priorizing the ability of its members to earn a reasonable return on the investments they have made to date. IPPSA members have added about $20 billion of new supply to Alberta in the last 15 years, meeting one of the fastest growing demands in North America. However many of those assets have yet to recover their costs.

While the capacity market is intended to add supply, there is also interest from government to add supply through central planning tools like community generation and the REP, and it is unclear how those supply streams would be reconciled. In addition, generators and investors will be dealing with a shift from an open competitive market to one that faces significant new market mitigation, and will have to respond to not only to their competitors, but also to new rules.

**Dan Dolan:** New England is facing the same pressures that are being seen in Alberta and Ontario. With decarbonization as the overarching goal, it becomes more complicated as the States approach it in the way they want, not necessarily in the most cost-effective, transparent or competitive manner. New England's approach is to contract for 1600 MW of offshore wind, slightly over 100 MW of Hydro Quebec hydro, as well as more traditional renewable resources such as wind, solar and run-of-river hydro. New England is also facing some of the behind-the-meter challenges that Mr. Vrins spoke of in his keynote speech. Putting this all together, over the next several years the states are authorized to carve out roughly fifty to sixty percent

of the wholesale market into these individual resources and insulate them from any competitive market pressures. In contrast, approximately 85% of today's market is subject to the open competitive pressures.

With these new resources becoming price-takers in the market, Mr. Dolan doubts there will be sufficient revenue left for the remaining resources that are still required for reliability and competitive pricing.

This dramatic shift in terms of taking resources and load out of the market and into state-subsidized long-term contracts or other arrangements is going to create a need for a fundamental change in how the market is designed. The jurisdiction has been holding annual forward capacity auctions for the past 11 years. The original design had contemplated taking care of the missing money for the remaining resources. The question now is, if there is an energy market that caps the amount generators are allowed to offer and, unlike most commodities, there is the requirement of excess amount on the system at all times, where is that money going to come from? The industry's answer has been a full capacity market, and so there is currently an initiative underway (the Competitive Auction for State Policy Resources – CASPR) and an intense stakeholder process to fundamentally change this.

New England is looking at other markets' approaches. PJM is starting with existing energy markets and having inflexible resources set the price for every hour in which there is a dispatch instruction. Mr. Dolan's guess is that there will be some level of blend of the capacity auction solutions in New England and the energy market solutions in PJM to try and deal with the issue. It is unclear how it would all work, and whether it is even possible – "*Can we actually have a market in which a significant amount of the marketplace is insulated from competitive market forces while the rest of the market has to live and die in the markets overall?*" wonders Mr. Dolan.

**David Butters**: Ontario is currently going through its Market Renewal program, and APPrO members are trying to understand what this might look like and how it would affect their operations in the near term. There is little to no load growth. As a result no significant assets are being built and any big changes in supply would be at least four to five years out.

As in Alberta, Ontario generators are concerned about how to continue getting a return from assets that are already in the ground, and are very busy balancing their work managing assets with their work on the market renewal initiative. In addition, the Fair Hydro plan, where the fundamental premise was that all of Ontario's current assets have significant lifetimes beyond their contract, is an issue. If the premise is true, how can generators make sure that it actually happens?

Provincial politics is another real concern with a provincial election coming up in 2018. If a new government is elected, generators are thinking about how that would impact the issues the industry is involved in including Market Renewal, planning, and responding to the kinds of changes that Mr. Vrins mentioned in the keynote. The biggest issue in Ontario from an APPrO perspective is change, and as Mr. Butters notes, "*Trying to understand the change and still be able to ride it in a way that allows you to get a return on your assets and survive it with minimal damage; at the same time being able to take advantage of the opportunities that you can see in the coming world.*" The challenge is not knowing when the changes will take place.

**Ms. Bertoldi** asked how the members of the respective associations are reacting to the changes and uncertainty discussed.

**Mr. Dolan**: In New England, the biggest fundamental shift is the profile of the NEPGA membership, with now more than half of NEPGA's membership being private equity. Twenty billion dollars has been invested over the past fifteen years. The industry has seen a restructuring over a similar period: where there used to be mostly pure generation, publicly traded independent power producers (IPPs), these companies are now buying up some of the retail companies to be able to optimize the generation with retail load. They are also coming out of the public market because the public valuations have been so volatile due to the regulatory risk and low commodity pressure that now exists in the markets.

NEPGA members also include the integrated public utility holding companies, some of which are owned rate-base utilities in other regions of the U.S. that have diversified their portfolios to have merchant generation within some of the competitive marketplaces. The big question is where future investments are going to come from, and to what degree these two types of companies are interested in making long term investments in a capital intensive industry.

The electricity industry is one of the last major manufacturers in New England that still produces a commodity that is bought and sold in the marketplace. Since the crash of 2007/2008, the economy has largely been based around services or intellectual property. Given the ongoing changes and current state policies, the key questions is "where is the next generation of investment going to come from" and right now that is an open question.

**Mr. Bahry:** In Alberta, IPPSA members have had a positive response to the REP and are significantly engaged in the capacity market work group to make sure they can navigate through, recover existing investments and find a path forward for future additions. One of the only current large scale renewable calls left in Canada, the REP called for 5000 MW. The province has already seen 7000 MW appear in the connection queue which are all planning or siting, getting ready for the next series of auctions. Investors are coming from around the globe, including Korea and Scotland, to name a few.

The decarbonization pressures are present in Alberta, with some of the existing thermal players announcing natural gas conversions of their coal-fired plants, and demanding clarity on regulation. The capacity market working group has about thirty or forty individuals involved, mostly generators and including the thermal players. With an open market, there are dozens of players with different assets, interests, histories and cost structures that need to be involved and engaged. IPPSA members are also actively speaking to the government on how things will unfold for them on a political level.

**Mr. Butters:** In Ontario, the situation is very similar. Members have a lot on their plates, and are focused on getting as much out of the assets that are in the ground and trying to understand what the changes are. How the changes impact contracts will be a big issue since all contracts in Ontario right now are based on the existing market structure. There could be opportunistic changes such as a financially binding day-ahead market that resolves some of the issues around generator cost guarantees.

Internally, APPrO is trying to figure out what the next generation of the organization would look like, given the possible futures that Mr. Vrins spoke of in the keynote. Although challenging, Mr. Butters is also excited with the possibilities for the future. "I think the biggest issue is probably from now into 2018 will be a lot of stuff on people's plates, while they try to manage their assets at the same time." he ended.

**Ms. Bertoldi**: Within our increasingly renewable world, what is the future of natural gas fired generation?

**Mr. Dolan** is optimistic about natural gas, despite substantial progress on decarbonization. Because of its inherent flexibility and the remarkable progress made on certain storage elements, he sees natural gas having a long term role within these markets. The question is to what degree does integration occur and at what speed.

There is a focus at the latest Conference of the Parties (COP) meetings on climate change to look at economy-wide decarbonization efforts; not only focusing on power generation, but also on sectors like transportation and buildings. In New England, emissions coming from transportation are twice that of power plants. The shift to other sectors that have significant emissions provides an opportunity for a certain amount of blending of the different sectors. For example, if New England moves to all electric vehicles, even given the current power generation fleet that has natural gas as a dominant player, there would be a substantial amount of net emissions reductions coming from the transportation sector. "I think we are going to have, at least for the foreseeable future, a material role for natural gas in this market, while helping to move the electrification of some of the other sectors to hopefully make some of the environmental progress that's necessary."

**Mr. Butters** is similarly optimistic about the role of natural gas in Ontario, which has 6 or 7 billion dollars' worth of natural gas plants that are all quite new, and can provide the flexibility that system operators are looking for. The natural gas system is also incredibly well built out. Ontario's power sector contributes about 2% of emissions, so squeezing emissions reductions out of the electricity sector will not achieve as much as reducing emissions in other sectors. Approximately 80% of Ontario's energy is not electricity, it is natural gas and petroleum products. If the province is going to address that large chunk of energy which is producing most of the emissions, it can only be replaced with electricity. Ultimately, Ontario will need more electricity, not less. There will always be a role for things like conservation, and Mr. Butters

advises policy makers to have more "full-context thinking" rather than focusing on gas-fired power generation to reduce emissions.

**Mr. Bahry:** Natural gas is the reality in Alberta for some time to come. The province has a thermal market with no real possibility for large scale hydro and no history of nuclear. Out of the province's 16,000 MW total, 13,000 MW is thermal; 6000 MW coal and 7000 MW gas. Transmission to Manitoba and British Columbia would be prohibitively expensive.

Alberta does also have the opportunity to help China decarbonize from coal with their natural gas. As is common knowledge, Alberta is trying to get their natural gas to export markets for that purpose, and have been facing challenges in doing so. "Natural gas will be a key fuel for us, that is for sure," Mr. Bahry concluded.

There is significant interest in conversion of power plants from coal to gas in Alberta. Each of the member companies who currently own the coal assets in the province (ATCO, Capital Power and TransAlta) have announced some degree of conversion. Some assets are old and will be retired, but most have been signaled for conversion, dependent on the design of the capacity market. Even though the assets are functioning and well-sited, with simple and low conversion costs, the companies are still looking for appropriate rules, regimes and a market design that would reward their investment in conversion.

Getting the capacity market design right is absolutely critical in terms of getting investment to the province. The right policy regime must exist where investors can see an opportunity to earn a return. This is conditioned upon each company's perspective of those risks and the opportunities they are faced with in other jurisdictions.

**Ms. Bertoldi**: As heard in the keynote speech, the pace of change is accelerating faster than we can imagine and faster than governments can respond to them. What advice would you give to policy makers in terms of how to get it right this time?

All panelists agreed a certain degree of humility is required. **Mr. Dolan:** the role of the government in the competitive market structure is to lay out the objectives, set the overall structure then step back and allow the innovation and capital to flow from there. Maintain the regulation and ensure that things are going in a reasonable direction. For example, if the issue is decarbonization, set a meaningful price on carbon. Generators in New England actually support putting a meaningful price on carbon emissions economy-wide, to then drive investment and innovation. That flexibility also allows consumers to make their own choices, whether that is a Tesla in every driveway or something else.

"If we look back 20 years, very few of us would be able to predict what the structure and the investment portfolio looks like today. Similarly, we have a very hard time today predicting what it is going to look like in 20 years. Let us understand that, and have a certain level of humility of our own limitations in that regard," Mr. Dolan concluded.

**Mr. Bahry** echoes those statements entirely. The challenge arises when governments want to set ambitious social policy like decarbonization, and cannot restrain themselves from prescribing the solution to the goals they have set. We can't predict how fast our industries are evolving; what we think is right today will be invariably wrong in five years. If a policy maker starts making those decisions, the rate payers will be burdened with that risk. If policy makers establish goals and let the market fill in the gaps, at least the ratepayers would be protected from the risk of getting it wrong.

**Mr. Butters** concurs. The recent LTEP talked a lot about innovation, which comes largely from the private sector. "There is a wealth of capital and creativity out there, so step aside, be clear about the objectives and unleash that capital, creativity, innovation and so forth, and don't be prescriptive about the future because you'll get it wrong," he advised. That does require a high degree of humility and realism.

*— Session summary by Maral Kassabian*

**Panel Discussion**
**Identifying the most critical forces of change**

Panelists
Ron Dizy, Advanced Energy Center, MaRS
Brian Bentz, CEO, Alectra Utilities

Matthew Gazzola, Manulife
Jan Vrins, Global Energy Practice Leader, Navigant
Moderator: Jon Norman, HydroStor Inc.

The panel explored three topics:
• Key drivers of change in the electricity sector
• Can regulation and planning keep up
• Possible areas of improvement within Ontario's 2017 Long Term Energy Plan (LTEP) and the ongoing market renewal initiative.

From a global perspective, **Jan Vrins** identified the key drivers of change as new technologies, and the customers who want those technologies. For example, large commercial and industrial consumers, which in most parts of the world still make up 50% of the load, are starting to negotiate contracts for local energy resources. As a result, technologies are becoming increasingly affordable and are becoming viable even in jurisdictions with really inexpensive power. Here in Ontario, solutions are available that are cheaper than the prices of central station asset generated power.

The implications of replacing even small percentages of central station generation are huge. Just a 1% or 2% drop of central station generation demand in the system can have significant impacts on the market structure and the pricing mechanisms within that market structure. This has been the experience in Europe, in the U.S., and it is being seen here in Ontario as well. The key is to figure out how to make it work.

"The biggest mistake we can make is not utilizing all the assets to the max that we have available on the system," cautions Mr. Vrins. Case in point, individual nuclear power plants can go up to above 90% of capacity factor, while the global capacity factor of nuclear is only 72%. That is a problem. If Ontario's assets are not efficiently utilized, not only would the future electricity market be impacted resulting in many losers and few winners, but also customers would be burdened with additional costs which might be increasingly high.

**Ron Dizy** identified three main drivers: cost, customer behavior, and regulation. First, over the past two years, the cost of centrally generated power has increased at a much faster pace than the alternatives, for example solar, especially in Ontario where decisions have been made that lock costs in. One thing that can change this is moving some of the costs out of the rate base and into the tax base.

The second driver is what customers want. Mr. Dizy has observed that price alone is not sufficient to spur customer behavior. Other factors are required. External threats like the ice storm and climate change cause customers to seek alternatives. For example, the last ice storm spurred some customers of LDCs to purchase gasoline-powered generators despite it being uneconomic to do so. Customers want to take control.

Another key driver is that competitors are coming from outside of the electricity sector. They are well capitalized and already have some of the same customer relationships. These competitors could provide energy together with other elements such as home comfort as part of a bundled package on a common bill. This poses a large threat to existing players.

The final driver is regulatory risk and the regulator's ability to keep up with the changes. There are now participants in the market who don't really care what the regulatory environment says – they do not care about stranded assets or whether they are having a negative impact on the grid. If the regulator does not get ahead of this, there is a real risk that the transition will be messy rather than smooth.

The way the regulatory changes are being made is very "Canadian" in that it tries not to hurt any of the participants. "We will have to get our heads around that in a place that is disrupted, there will be some losers", cautioned Mr. Dizy.

**Matthew Gazzola:** One of the big changes that Manulife has focused on within its real estate group is the shift from energy management to a greater focus on decarbonization, through its services to its clients. As an investor in the power sector, Manulife is constantly looking for opportunities to reduce risk and prove the reliability and capability of the company's services to its end users. Manulife's different divisions have been working more closely together with respect to renewable energy through its investment arm, power

producers through its regional power arm, and the ability of their investors and investment arm to communicate how Manulife is going to bring themselves into the future with a lower carbon footprint.

Speaking as a distributor, **Brian Bentz** is fairly optimistic about what is possible in the future.

As the economy was electrified over the past century, it was appropriate to build up capacity in the system. Power was just undifferentiated power. Reliability and safety were job one. In the past 15 years, this idea of a top-down grid has been turned on its head. The sector is changing from a passive model with a non-differentiated product to a new more active model with differentiated products.

Until recently it was the distributor's job to build capacity based on load growth calculations, where for example GDP was a good proxy in forecasting growth. The ability to load forecast today is very different. Over the past 10 years, average electricity consumption has dropped approximately 30% across all rate classes. At the same time, more assets have been built – fixed, rate-baseable assets have gone from about $12 billion 10 years ago to about $20 billion. More capacity has been added to a system where consumers are using less power, regulators are demanding more productivity gains, consumers are demanding more choice and the value proposition for customers has changed. For the customer it's not about reliability and safety anymore; it's about affordability, sustainability and flexibility. He's seen data centres being added with up to 100 MW loads that can't afford even a 3-cycle outage. They need intelligent connections with the grid. Safety and reliability are a given now. Customers want more, which is why Alectra is exploring enhanced time-of-use pricing and trying to give customers more choice.

Another real challenge for utilities is capital asset planning in a world with such volatile consumption trends. It is difficult to predict how much capacity is required in the system when you have climate change policies, consumer activism and technological disruption at the edge of the grid. Utilities need to make up to 60-year bets to ensure that there will be capacity in the system, so planning for capital has to be done in a very thoughtful way. That includes tightening the asset life cycle spend, increasing spending on intelligence in the grid, on data mining and customer engagement, allowing intelligence in the grid to enable switching in real time and enable creation of a connected grid.

Mr. Bentz reiterated the comments of Jan Vrins, that the changes include a re-balancing of the centralized grid with an engaged consumer, a "prosumer" in virtual power plants. He likened the changes in the distribution sector to how SCADA systems revolutionized the sector in the 1970s. At the time, software was used to give visibility to the station, whether transmission or distribution, using elements of the system (relays, breakers and switching devices). Similarly, we are moving through advanced metering infrastructure (AMI) technology and distributed energy resources (DER) to assist development at the edge of grid. It is the software and the intelligence of these disparate systems that will allow the community grids and the microgrids to interact with the power system and the centralized grid. "I see a re-balancing and an increase in intelligence," he concluded.

Moderator **Jon Norman** asked, given the faster-than-expected technology change, costs being driven down, increasing customer interest and drivers for decarbonization, can regulation and planning keep up?

**Brian Bentz:** Ontario has a legacy regulatory model that assumes the delivery system has discrete elements, is monopolistic in nature and lends itself to rate regulation. In today's world, the lines are blurred – it is unclear where distribution ends and the customer begins, where generation ends and begins, where competition ends and monopoly begins. It is difficult to regulate in this environment. Case in point, if Alectra's load forecasting indicates there is a need for a 200 MVA transformer station in a certain area, and the load can also be met with 10,000 or 20,000 solar battery units that provide the same functionality and dispatch capability, the current regulatory model incents the utility to build the transformer station because the solar alternative is a competitive service. And yet the solar battery option is sustainable, it empowers the consumer and is probably cheaper in the long run. The incentives need to be re-thought and there is no easy answer. Perhaps it would be a mix of monopolistic services and rate-regulated services, and things like, for example, if utilities invest in DER, allowing the asset deferral component to be rate-basable.

Mr. Bentz agrees with some of the initiatives of the 2017 LTEP in terms of incentives for reliability. He suggests also including incentives for innovation. How utilities fund innovation going forward is a challenge, since it cannot be funded by consumers and there's the question of how the benefits of things like DER would be shared in the monopoly world and the competitive world. "We need to have a broad view of the sector and what the roles are of the participants in the sector. Then I think you can define a regulatory

model around that". Until the nature of the problem is understood and the roles of participants are defined, it would be very difficult to develop a regulatory regime that is functional.

**Jan Vrins:** Regulators in many jurisdictions around the world are trying to keep up with all the changes, but the onus does not lie solely on the regulator. All actors need to get on the same page – policy makers, regulators, utilities, and others, for example the cities. Looking at the mechanics of how cities procure, or how utilities engage with the market of distribution-end resource providers, there are some fundamental flaws in terms of how business cases and value propositions are being evaluated, how innovation is being supported. There need to be new ways of looking at solutions, how they make sense from a value perspective to customers and to shareholders. If people continue to think within the traditional way of looking at these investments and solutions, it is definitely not going to work. Ontario has a unique opportunity in a platform where the industry together changes the way it looks at the system, at the investments and at the client and shareholder value. "Getting on the same page is absolutely critical. I wouldn't put it on the regulators, I think all the actors have to get on the same page and fundamentally rethink how they look at investments, paths forward and how the system should work," he advised.

**Jon Norman** asked Mr. Dizy how he thinks regulation and planning should evolve, based on the previous speakers' comments.

**Ron Dizy** referred to Mr. Vrins keynote speech where he mentioned two models going forward: either re-regulating and re-bundling, or more clearly defining the lines between unbundled and services, and between regulated and competitive services. Mr. Dizy favours the latter approach, but notes that it is hard to get to. It would mean defining a role for the LDCs that acknowledges that people will not always self-supply in the near future, and wires will be around for a long time yet. A conditional approach is required for connecting DER, where the conditions for connecting are clearly laid out, and if all conditions are met then the project is definitely allowed to connect.

Regarding funding innovation, Mr. Dizy echoed Mr. Bentz's earlier comments that it is a real challenge. The current monopoly structure does not allow for much innovation. There are some easy solutions, for example considering solar plus battery over a transformer station. Other solutions are more complicated. The LTEP encouraged supporting innovation "where cost effective", but what does that mean? Innovation means risk and reward, it means making a bet where you can make or lose money. The current cost-of-service based model does not readily support that. Mr. Dizy believes success will be where utilities start to operate two pieces: core parts that are monopoly and unregulated parts of the business that are competitive.

**Matthew Gazzola:** As an end user and an investor, Manulife is always looking at tried-and-true programs that they can invest in and have safe returns. Manulife will always need power, and the likelihood that the industry will move away from a power grid or power utility is not realistic because a lot of their real estate and investments are in areas where microgrids are not going to be able to support them. Getting its power in a reliable and easy way, as well as cost-effectively, is very important for the company. They will have to react to whatever solution the electricity industry comes to the table with. "I don't see that really changing, regardless of how things change and develop down the road."

**Jan Vrins:** As an industry, the opportunities ahead of us are larger than the threat. As we get to cleaner ways of generating power, there is a huge downstream opportunity around transportation, buildings and industries. "Once we all agree on that, then I think we can move forward with significant change in the way we use and produce power that will provide much more customer value and shareholder value for all the players in the industry" he said.

**Jon Norman:** Given all the changes that have been spoken about and the need for addressing risk and taking advantage of the opportunities, how well does the LTEP and the market renewal process consider these things, and what could Ontario do better?

**Jan Vrins:** One of the primary design principles should be to look at the characteristics of the energy resources; natural gas versus nuclear versus renewables. Clients want flexibility, they want clean, reliable and affordable power. The elephant in the room is how to continue to invest in central station generation, transmission and distribution with local DERs coming onto the grid. Finding the right mechanisms to do that wisely is absolutely critical because it is not a cost that consumers can pay, it is a societal cost that has never been seen before. It would be unwise to end up with underutilized central

station assets or stranded assets on the one hand, and not integrate DER on the other hand. It will not be DER that will replace central assets; however "if DER is not managed properly it will impact the whole system; there will be plenty of losers and very few winners in that scenario."

**Ron Dizy:** The LTEP does what it intended to do: it shows the government's direction. There are still challenging questions regarding how to do it. There will still be a combined grid; transmission, distribution and generation are still absolutely needed, and will not be replaced totally by DERs. In the previous panel David Butters mentioned 75% of energy coming into Ontario is gas for heating and transportation; those are huge opportunities for the electricity system. "Done right, there is a great opportunity to manage the system better, increase utilization, improve efficiency in the system."

**Brian Bentz:** From a distribution perspective, this is about a reset of the system, a new ecosystem for energy - some mix of centralized and decentralized with the grid acting as the exchange, the broker for that power, and multiple power flows, transactive energy through intelligence. There is a lot of investment opportunity there, he notes. With respect to the LTEP, it does not have all the answers, it is an aspirational, directional document which talks about virtual net metering, storage, grid modernization and innovation. For the first time, it recognizes that the world is changing. The devil is in the details, and how these initiatives will be enabled is very important. The LTEP also provides an opportunity to redefine the roles of all players going forward, and to work with all stakeholders in enabling that to happen. The spirit is in the right direction, which is encouraging, and is an opportunity for the sector to advocate for the next generation model.

**Matthew Gazzola**: The fact that users like Manulife need power and are looking for clean power had been discussed, and the LTEP is really committed to that. Manulife is looking forward to it, and it is going to drive the company to change the things they are doing in the real estate world and the investment world in terms of reducing some of the liabilities that exist. "The LTEP is focusing on all the right elements, and we're looking forward to it because we're really trying to figure out how we are going to get down the road and reduce our footprint, and it's these types of programs that are going to help us do that."

*Session summary by Maral Kassabian*

**Keynote: Powering tomorrow together**
**Peter Gregg, President and Chief Executive Officer Independent Electricity System Operator (IESO)**

Mr. Gregg began by acknowledging the theme of the 2017 APPrO conference "Future+Focus" and its prescience ~~constantly when addressing Ontario's rapidly~~ evolving ~~future electricity sector~~of ~~the power sector. Touching on reliability, , and the need to focus on investigating appropriate solutions for the associated challenges. h~~He noted ~~the stable supply of power in~~that Ontario is in a stable supply position, ~~and~~ and ~~that the investments being made to refurbish Ontario's emphasized the significant role~~ nuclear ~~energy will continue to play in the province, with refurbishments ensuring this~~fleet will help ensure long-term reliability. Mr. Gregg indicated that i~~I~~ncremental capacity needs, ~~are~~ expected to emerge in the early to mid-2020s, ~~are being addressed by the IESO as well~~ and that the IESO is exploring a range of dynamic options to meet these needs as they arise.

Since assuming the role of the IESO's CEO in June 2017~~In his new role leading the IESO~~, and based on interactions with stakeholders, IESO staff, government officials and his own leadership team and Board, ~~he has~~ Peter Gregg ~~decided to~~indicated his near-term strategic focus i~~o~~n two key areas:

- Reliability and efficiency of Ontario's power system~~;~~
- Informing policy and fostering innovation.

~~o~~Operating and directing the flow of electricity across the transmission system in real time, planning from the next five minutes out to the next 20 years and acquiring the resources needed are all top priorities. Market ~~R~~renewal, the continued growth of distributed energy resources (DERs) and cybersecurity ~~are key~~ threat management were among a few of the sector themes that Mr. Gregg said will require strong coordination with counterparts, stakeholders and the broader sector.

~~• Informing policy and fostering innovation:.~~

~~Mr. Gregg highlighted the importance of stakeholder input to the Market Renewal program, integration of DERs and cybersecurity. The need for~~On market renewal, Mr. Gregg indicated that ~~i.e.,~~ the initiative will involve the~~the~~ redesign and restructuring of Ontario's nearly 20-year old electricity

market. It will address the, arises from the ongoing changes in the sectoroperability needs of the evolving supply mix and, focus on efficiency upgrades to better acquire, schedule and dispatch resources, and is inspired by similar actions taken by system operators worldwide. Additionally, Gregg noted, current supply margins make this an ideal time for such a important changes to take place. Mr. Gregg introduced thea IESO's newly- formed nNon-eEmitting rResources sSubcommittee, which will at IESO to address concerns raised by stakeholders. The team will focus on removing barriers to market participation of non-emitting resourcesgenerators, addressing the market implications of a high penetration of low- or zero-cost resources, and explores ing incentive options.mechanisms. Leonard Kula, Vice-President of Planning, Acquisition and Operations, is leading the IESO's market renewal program.

Managing a decentralized grid is another major focus for the future, Mr. Gregg noted. Generation and the delivery of energy is no longer a one-way, top-down process due toas a result of technological advancements, an increased penetration of DERs, climate change policies and increased growing customer engagement. In addressing a more decentralized and interconnected system, Mr. Gregg said the IESO is working closely with stakeholders to ensure it can effectively forecast and have visibility into DER activity. It will also explore dispatching those resources through the electricity market. Increased DER integration will require planning, acquisition and operation roles He indicated that, DERs may help optimize the overall system and enhance grid reliability and resilience, and he Mr. Gregg invited stakeholders to collaborate with the IESO in managing DER activity.

With the system becoming more interconnected and complex, Mr. Gregg highlighted the importance of cybersecurity. Seeking to be a thought leader, the IESO will continue working closely with government and industry officials to examine policy-level issues associated with cybersecurity to develop the best practices.

On his second area of focus around policy and innovation, Mr. Gregg said that eEffective and efficient policies need to be developed through collaboration with stakeholders and the government. Mr. Terry Young, the IESO's Vice-President of Policy, Engagement and Innovation, will prioritize this effort and oversee these efforts. Furthermore, theThe recently released Long-Term Energy Plan (LTEP), which was informed by stakeholder input and technical advice from the IESO, supports the market renewal program and recognizes the value that each resource in thehas in the overall supply mix has. The IESO is developinghas developed an implementation plan with initiatives ranging from improving Indigenous conservation programs, to creating innovative DER programspilots and, to evolving the regional planning process. Additionally, the IESO was seeking will incorporate stakeholder feedback intoon the scope and timelines for implementing these initiatives. with targeted engagements to come in the new year.

Mr. Gregg acknowledged the crucial role innovation will play in navigating change in thethe rapid evolution of this sector, and the efforts the IESO is taking to enable innovation. He assured listeners that the IESO will facilitate the stimulation of needed innovation. As an example of how the IESO will be an enabler, Mr. Gregg mentioned the that crucial work that is is being done on makingto make de-identified smart meter data accessible to third parties next year. Stakeholders have reached out with ideas on how this data can be used to help manage systems more effectively in the future. Mr. Gregg also mentioned the question ofaddressed how existing assets can be better utilized either to get more flexibility or make sure they remain cost-competitive. He invited innovation from the generator community as well.

In summary, Mr. Gregg reiterated the followingthe key areas of focus,: reliability and efficiency of our power system, and policy and innovation. key focus areas: market renewal, decentralized grid and cybersecurity, as central to the future reliability and efficiency of the grid. He noted that collaboration will be critical to meeting reliability and efficiency goals, and he invited feedback from stakeholders, whether it be through the Market Renewal Working Group, the Technical Panel or other stakeholder engagements. He acknowledged the demands on stakeholders' time that such engagements involves, and promised to use the time wisely. The IESO and stakeholder community play important roles in working together to shape policy implementation across the power sector.

*— Session summary by Najiba Hussain*

**The Darlington Refurbishment: Canada's Largest Clean Energy Project**

**Glenn Jager, President, OPG Nuclear and Chief Nuclear Officer**

The refurbishment of the Darlington nuclear station more than one year along, Mr Jager said, is on time and on budget, and OPG is confident that it will remain so for the remainder of the project.

Climate change is a pressing issue in our time and electricity generation is a key policy instrument for combatting it. Ontario is 20 years ahead of many other jurisdictions in its decarbonization efforts. The strength of Ontario's nuclear fleet was a key factor in Ontario's ability to shut down coal-based generation. Nuclear power currently provides 2/3 of Ontario's electricity, and this is one of the reasons that the Ontario government continues to recognize the value of nuclear energy in its Long Term Energy Plan (LTEP).

Mr. Jager described nuclear technology as pro-growth, pro-technology, and pro-environment, qualities that the Ontario government has recognized by committing to significant investments in nuclear power. OPG is conscious that it has an obligation to the government and the people of Ontario to deliver on its commitments. Over the long run, the Project will create economic growth and jobs.

Darlington provides roughly 20% of Ontario's energy needs - enough to power a city of 2 million people. Once refurbished, the plant will operate for 30 more years. A report released by the Conference Board of Canada has set out the project's benefits for the Ontario economy, estimating that the economic impact of refurbishment and continued operations to 2055 will be an $89.9 billion boost to Ontario's GDP.

Currently the project employs thousands of workers to conduct the refurbishment, and over the course of its refurbishment and renewed lifetime, the reactor will create approximately 14,200 jobs in the province annually. The continued operation of the refurbished plant will also help the environment by reducing greenhouse gas emissions by an estimated 297 million tons. Darlington alone will provide 1 in 5 homes with greenhouse gas emission-free power.

The process of refurbishing the nuclear reactor is complex and delicate, involving several steps.

Slide 1

Figure {slide 1} illustrates the various steps taken in the refurbishment process: defuel the reactor, remove reactor components, reinstall new components, and then refuel the reactor. Mr. Jager also

played a short video explaining the refurbishment process step by step [the video is included with Mr. Jager's presentation, included on this proceedings disk]. OPG is currently well into phase 2 of the process, the removal of the existing reactor components. OPG expects to complete the refurbishment of the first unit by February 2020, and the entire project by February 2026. The Pickering plant will play a key role in providing power during that time.

OPG spent many years developing the necessary tools, rehearsing procedures on a full-scale mockup, and training personnel, which gives them confidence that they can achieve the timelines in their schedule. Moreover, OPG has a solid track record from its experience in mega-projects such as the Peter Sutherland Sr. Generating Station and Lower Mattagami Hydroelectric Complex, both of which were completed on time and on budget. Such success happens when there is project management and a commitment to continuous improvement through various measures. Additionally, the contractors involved in the project operate under a contract structure that shares risk and reward. Internal and external oversight teams are in place to assess risks based on past experiences. Risks are predicted, assigned probability of impact, actively monitored and mitigated. OPG's schedule is planned down to the minute, with room to accommodate changes, and the budget is being monitored. OPG knows that some things may not go according to plan, and it is ready for contingencies.

OPG is very conscious of its accountability to the people of Ontario. Moreover, as the electricity market moves towards decarbonization in response to climate change, the stakes have never been higher. OPG has been given a rare opportunity to show that nuclear can be a cost-effective method of addressing economic growth without sacrificing the environment. In relation to the project itself, OPG is dedicated to working safely, responsibly and cost effectively, and when the project is completed on time, on budget and safely, OPG and Ontario itself will have set a standard and an example for responsible power production in an era of electrification and climate change.

*— Session summary by Christine Kilby*

**Panel discussion**
**Can Ontario be proactive about the changes ahead?**

Panel Jason Chee-Aloy, Power Advisory LLP
Kathleen Spees, The Brattle Group

Moderator: Dan Dolan, President, New England Power Generators Association

Mr. Dolan began the discussion regarding the future of the Ontario energy market, with the objective of unravelling marketplace changes. He began by posing the following question to the panel. "What will the market look like in 2030?".

**Kathleen Spees:** Ontario is in good position to design and run a market system that works with an 80-100% decarbonized system. Many markets around the world are looking at a decarbonized system by 2050, while Ontario is on track, partially through necessity, for 2030. What does that look like for the wholesale market design?

By 2030, there will be four components to the wholesale market, driven by the fundamental needs and objectives of the electricity system:

- An efficient and reliable energy market that has mostly low-cost resources. Energy prices will be lower than is comfortable for many participants
- A whole suite of operability and flexibility services
- A well-developed capacity market to provide the correct incentives to attract and retain a reliable quantity of supply
- Carbon abatement, or clean energy attribute payments.

That will mean a transition from the traditional approach of making a return on investment through contracts and out-of-market procurement mechanisms to new market-based systems. Revenue sources will change as the energy market becomes a less significant part of the revenue stream, and will have to fit into a flexibility and carbon abatement value proposition. New players in the marketplace will need precise market signals to compete and provide new ways of doing business.

**Jason Chee-Aloy** agreed that the market must change by 2030 and value different things such as DERs and new technologies. But to get there we need to establish some nuts and bolts in the present. There must be a focus on the demand side of the equation, as customers are making reliability, security, and adequacy decisions with respect to the types of resources they acquire or develop. Today, many customers are deciding for themselves on their preferred level of reliability, full or partial. That trend will continue as the technologies develop. Planning and operations metrics need to be re-imagined; currently, the reliability standard is 'one day in 10-years'. If we are planning for a certain standard of tolerance of blackout that doesn't take into account where we're going with technologies, we're over-planning, and potentially over-procuring, whether it be through centralized mechanisms or the markets themselves. We must focus on how we, and the customers, value reliability, which naturally links to the supply side, raising questions such as 'How many megawatts do we really need on a system in general? What should those megawatts look like?'. Energy will need to be valued and priced differently in the future, as well as operability, flexibility, capacity, and carbon abatement. We have to find dynamic ways to value these products, in line with technology trends and in line with what customers are doing.

**Mr. Dolan** asked, are there elements that can be adopted from other markets and applied here?

**Kathleen Spees:** There are pieces of the solution in other markets, but nobody has solved all these problems yet, and Ontario will need to create its own solution, especially because we are so far ahead of the curve when it comes to de-carbonization. Components that are working well in one place or another, that can be adapted:

- Energy markets that value the marginal cost of energy; when and where it is needed.
- Advanced scarcity pricing, utilization of the inter-ties, and valuations of unit commitments.
- New ways of thinking about operability and flexibility services such as fast frequency response services, ramping products, etc. (especially in the United States and Australia).
- Carbon markets and Cap-and-Trade lessons from other markets.

However, if Ontario wants to maintain 80% de-carbonization in the electricity sector, or go further, the current $18/tonne and the price floor is probably not going to keep Ontario on track. We will need to either implement a new system and additional incentives, or accept some amount of re-carbonization. New England has a proposal for a good example of a clean energy market that Ontario can learn from, but it will need to be integrated with a capacity market. In any case, Ontario's answer will be particular to Ontario.

**Jason Chee-Aloy** agreed that the solution for Ontario will not look like anywhere else. If there is going to be some form of market competition, there must be a good price, which is something that Ontario generally has not had. Locational marginal pricing on the wholesale side can help increase market competition, although it may need to be done in stages, due to some zones with low to zero marginal cost resources. This can be dealt with by making decisions depending on system constraints as well as unique attributes and built-in values of operability and flexibility and adjustments to the dispatch algorithm tools. A fundamental redesign of the Ontario market will mean a large capital expenditure, mostly in the form of an IT project.

Regarding 2030, because we are unique we will always have a mix of rate-regulated assets, some contracted assets, and some that we might be able to do with more merchant risk than what we are seeing right now.

In Ontario we tend to compare ourselves to the US northeast, but Mr. Chee-Aloy sees the province as a lot more like the Mideast System Operator, MISO. It has a lot of rate-regulated generation, it's a big contracted market. That's how they maintain resource adequacy and secure capacity. They price things locationally with a day-ahead market.

**Dan Dolan**: Is LMP the right model to price energy if we're going into a world with more low- to zero-marginal cost resource?

**Mr. Chee-Aloy:** When the market renewal program was started, a lot of people felt we were starting with the wrong question, the right one being whether we should even have a market. Many of the problems could be solved through bundling, not just products but also vertical integration. If not that, then valuation and prices must be adjusted to stitch it all together in a seamless manner in a way to benefit rate-payers and customers and investors. With respect to LMP and day-ahead markets, would the revenue start coming from different sources such as flexibility, ramping products, and what else would start driving investments?

**Ms. Spees** separates the problem into two pieces and two timeframes:

- Investments timeframe – resource decisions
- Operations timeframe – given what we've got, how do we use it best?

From the supplier's perspective the money will come from both of those timeframes, and the market has to be designed in a way that the value placed on each of the four pillars reflects the underlying need; value of reliability and value of carbon abatement.

Each resource will build revenue from its specific value; Nuclear plants will find value in capacity, carbon abatement, and energy. Storage will find value in flexibility and capacity with some carbon abatement. Demand-response will find value in capacity and maybe flexibility. Value in the marketplace will be different for each resource type, which is where competition comes into play.

**Mr. Dolan**: 2030 isn't that far away. What needs to happen first, how do we layer the changes – most important things first or easiest things first?

**Mr. Chee-Aloy**: First thing is to get the price right. The continuing trend of customers self-declaring what level of reliability they choose to live with based on the mechanisms at their disposal; self-supply, load-shift, load-interrupt, etc. Rates/prices they will see will drive them, and so energy needs to be priced effectively on the wholesale side. How do we get that price as accurate and as dynamic as popular? That's job one. Second, reliability is still king. We began contracting because in 2003-2005 we had a resource adequacy problem and were developing a forward capacity market, and needed to contract for the time being. Post-2024 2000MW capacity probably won't be obtained in a price-effective manner through incremental capacity auctions, and thus we will still probably have to do some contracting, but with more discipline this time.

**Ms. Spees:** First there must be a continued and sustained policy and executive commitment. It is going to take a while, and there will be time before customers see the value proposition pay off in terms of bidding more value out of the electricity system at competing costs. Messaging about how long it will take should be the first step, to keep everyone, especially customers, aware. Also, project management, stakeholdering, and implementation that goes along with prioritizing high-value initiatives first.

Audience Question: Differentiation between Operational and Investment timeframes – How different will some of the timeframes need to be between the capital markets and the operations, and how do you price that and provide some of the necessary certainty while meeting the operational reliability overall?

**Mr. Chee-Aloy:** Power markets have been stretched in terms of how to deliver new investment, coming in chunks as it does. Originally, there was an attempt to build energy-only markets, which evolved to include capacity; daily capacity market, then to monthly, then to multi-year. This has become analogous to a contract. What's complicating things is that there are different resources depending on valuations of capacity and contributions. Different products with different timeframes should together try to meet the real-time operational timeframe, and the other timeframe going multi-year.

**Mr. Dolan:** "Do we need to be restructuring some of the wholesale market to recognize that it may look like demand reduction as opposed to supply increase, even though that might not be the case?

**Ms. Spees:** It will be some combination of the wholesale and retail markets. One direction that will definitely be a part of it is managing the wholesale market to have reliable operations for operability and integrating intermittent resources, meaning increased levels of visibility and control of the resources that are providing that flexibility. Mechanisms must be in place to enable distributed resources to play a big part in operability services. That can be partly done through the wholesale systems themselves, through innovations that enable smaller resources or aggregated resources. Distribution utilities will be a big part in providing those platforms, and it will probably be a mix of the distribution utilities, aggregators, wholesale market operator, and disruptive players.

**Mr. Chee-Aloy**: Distributors want operational control over their distributed assets, as opposed to the IESO reaching down and exercising control. This will need to be addressed. There are 65 very different distribution companies, and because of the regulatory framework, many opportunities are missed between rate-regulation and unregulated growth potential. It is important to think about these fundamental things before laying down the foundation to begin redesigning the market.

**Mr. Dolan:** How do you think we're going to work our way through the near-term cycle of the next 5-10 years, with regards to the changes ahead?

**Ms. Spees**: It will be challenging for everyone from regulators down to individual market participants. Amending contracts, adjusting expectations, and figuring out how to handle the risks will be challenging but very important. The market doesn't always come up with the answer you expect, but as long as the prices are right and the mechanisms are in place, the market will come up with solutions, though it may be disruptive to existing players. Many will have to take on more risk than they're used to, in order to capture all the value that's out there.

**Mr. Chee-Aloy:** Speaking pessimistically, we may just have to muddle through, maintain reliability, price things, and the Government and IESO will make the major decisions. Optimistically, Ontario's supply mix is relatively clean, and if we start to price things effectively and give greater access, the big players could definitely get involved and it would be a mutually beneficial situation.

*— Session summary by Ahmed El Gammal*

**Current Financing Trends & Considerations for Ontario Generators**
**Jake Sadikman, Energy & Infrastructure Partner at Osler**

Mr. Sadikman began with a current outline of the debt and equity capital market, and trends for facilities under contract. In 2017, most of the utility-scale projects in Ontario have achieved commercial operation and financial close under their term financing with senior secured lenders, and are getting into the asset maintenance phase. A handful of projects remain in the construction phase, mostly due to regulatory delays or other types of delays. These are mostly wind farms and hydropower which may have a longer development processes.

There is a fair bit of activity in the refinancing market for projects that have achieved financial close, largely with projects that were financed in the years 2007-2011. Today's lower interest rate environments are providing opportunities for generators to refinance their term debt. This mostly applies to projects

financed by banks and not life insurance companies. In that refinancing, an evolution of issues is apparent that were once seen as risks for the projects during the development phase. Examples include approaching O&M agreements and other risks around production. Most of these projects are now gaining a few years of operational experience. Some issues that had posed risks to the lenders early on in terms of compliance are becoming more comfortable for those involved.

M&A activities are being conducted differently for generation facilities – the frenzy of the last decade is settling into a more process-driven, advisor-oriented process where lots of bidders are seen in the early stage.

Finally, generators are focusing now on optimization, and improving returns.

Different market participants are emerging. Historically, many O&M operators were affiliated with firms that otherwise had a reason to be in the business (examples include a development or construction firm or energy market and trading firm). Some of that has evolved with new entrants to the marketplace. There has been one major insolvency in the form of Sun Edison. There has also been a turnover of O&M operators and transition issues. Earlier, there were 20-year term O&M agreements, and now they are more often shorter term, around 5-year. This means that there are more transition issues including things like physical handover and safety. In cases of refinancing, lenders are increasingly comfortable with an affiliate of the owner providing O&M.

Specific to solar, snow removal is large in the O&M market and making its way into the equity market. Various technologies are still being developed for snow removal.

Another trend in asset management is the advent of third-party asset managers on projects. To date, they have been limited in number and scope, and it's still rare that an asset management agreement is held by someone not affiliated with the equity sponsor, but this is changing. This plays an important role for equity sponsors affiliated with banking institutions that have restrictions with regards to asset ownership.

There is increased penetration by non-Canadian equity sponsors on power projects, predominantly renewables, which is also adding to the appeal of third party asset managers. This can be helpful with records continuity, which is a core function of third party asset management.

Terminal value, post-IESO contract revenue stream assumptions, has become one of the main issues in today's valuation of projects in the M&A market. If it were not for terminal value, most of the sophisticated bidders would be bidding the same thing, and so terminal value serves as the value differentiator in M&A activity. 2-3 years ago, there was almost no value attributed to M&A transactions in this area, because everyone was focused on PPAs and fixed 20-year revenue streams. Now, since there is a market decrease in the number of assets up for sale because of consolidation and because these assets are enough years into their IESO contracts, post-contract revenue becomes significant. Almost all of the M&A processes seen today are driven by a core paper by a technical advisor or consultant that gives a view into the likely post-contract revenue stream. This serves as a hallmark of today's M&A market. Terminal value concepts are not necessarily relevant to secured rentals because their terms are shorter than the end of the contract. It's currently an open question as to whose crystal ball is better. It's something people will have to wait till the mid-2030s to find out.

The Fair Hydro Act has made some changes relevant to the borrowings for global adjustment. One of the Ontario government's principles around the borrowing authorized under the act is that the assets under the 20-year contract have an additional 10 years of useful life that Ontario ratepayers are benefitting from. The result of this assumption is that generators are considering whether this may change the political dynamic around the time the contracts expire. Will the government of the day see to it that the facilities have a life after the contracts expire? Given the experience with the NUGs, it may not be a good assumption.

We have been seeing a focus on opportunities to increase production in a compliant way. In the case of solar, this often is related to replacing modules or adding DC modules and in the case of wind farms, new software and hardware technology opportunities allow for increased production and many questions are surrounding this, from owners and operators. There is a lot of focus on the degree to which these technology changes fall under and are permissible within IESO contracts since power purchase agreements are different between RES and FIT contracts. It gets to the heart of how nameplate capacity is defined, a sometimes difficult technical exercise.

In this context there is a tension between debt and equity sponsors, in that the latter are always eager to find opportunities to enhance their returns, while if there's any uncertainty, lenders are reticent to risk compliance with the contract.

*— Session summary by Lobna El Gammal*

**Panel discussion:**
**Big ideas and challenging concepts**

Panelists:
Jonathan Frank, CoPower
Alec Hay, Southern Harbour
Scott Kessler, LO3 Energy
Francisca Quinn, Quinn & Partners
Moderator: Mabel Fulford, ICF International

To begin with, moderator **Mabel Fulford** asked for a show of hands on three questions:
1. How many see change coming in their particular segment of the energy sector? (At least half of those present raised their hands.)
2. How many feel that those changes have already arrived, in their day-to-day operations? (Almost no hands.)
3. How many feel that their company is well-prepared to take on those changes? (Less than a quarter of the hands.)

**Francisca Quinn** addressed the ways power producers can support large industrial customers reduce the environmental footprint of their energy purchases. Large customers are increasingly interested in power from renewable sources. The RE 100 is an example of this – a group of more than 150 large customers committed to shifting to 100% renewable electricity supply. Climate change and corporate sustainability are drivers for interest in renewable energy and energy efficiency among large customers. Among Fortune 100 companies, 61% have climate change or renewable energy targets; 6 in 10 of S&P 500 companies are incorporating climate change in their corporate strategies. Renewables can be part of a resilience strategy to deal with the threat of weather-related outages or those caused by aging grid infrastructure.

Price is also a driver, as renewables are reaching price parity with fossil fuels. Large customers are entering into PPAs for renewables as a hedge against rising electricity costs. Renewables procurement can support other activities for some large customers; for instance, Goldman Sachs' commitment to the RE 100 goal supports another goal to commit $40 billion to renewable energy financing. Solar and wind technologies show a trend of continued cost reductions – 90% since 2014. This is stimulating further interest, an example being how real estate companies are now looking at powering entire portfolios with renewables rather than single buildings. Regulations and incentives also continue to be important drivers.

Traditionally, the purchasing of renewable energy credits (RECs) or capacity have been options only for large companies. New solutions include PPAs with very large single customers (e.g. Google) or with a group of smaller companies procuring renewables together. Green tariffs are arrangements where utilities offer an agreement with a large customer to procure 100% renewable electricity on the customers' behalf. Going forward, there will be a blurring of lines as companies both procure and invest in renewables – even together with their competitors. Utilities will need to develop value propositions that will keep large companies as their customers. If utilities do not learn about large companies' needs and goals, then these companies will procure electricity on their own.

**Alec Hay:** Proactively including resilience in planning for a company's electricity supply is becoming an increasingly important core corporate strategy. The purpose for which infrastructure systems were designed has changed, but the organizations that operate them are not equally capable of responding to this change. Electric utilities need to keep pace with market changes, but many of them fear they will be unable to.

Three factors redefining the electricity market are:
1. The rapid (development) trend in information and communications technology (ICT)
2. The move towards the electric city
3. The rise of net metering.

Continuing developments in ICT are concentrating value in ever smaller spaces, to the point that for many industries the value of the assets that house the operation are now a rounding error in the value of the operation. Therefore, power outages are far more consequential today than they have ever been. As interruptions become untenable, a crisis of trust with one's utility can be created.

The electric city is a concept that has been touted for many years, but for the first time is becoming viable. It is driving innovations around the world, and will fundamentally change the municipal corporation – in how and where we live, and how we get to work.

Net metering and microgeneration are tangible and have market traction.

These factors are combining to cause the consumer base to ask more of their electric utility. The electric sector has been slow in responding to these changing customer requirements. For instance, one customer was told by their utility that the amount of capacity available during a crisis was strategic information and could not be shared with the customer. There are new shared liabilities in this area, and customers and utilities need to work together to plan how customers can stay in business through an emergency event. This is the essence of resilience – how to recover from a crisis, within a time tolerance dictated by the market and customer rather than by the utility.

One threat facing the electricity sector is that the value of a monopoly commodity supplier is becoming more unwieldy and limited. Suppliers lacking the culture, governance and agility necessary in the new market will soon be leaving it. On the other hand, there is an opportunity for LDCs to become miniature ISOs, regulating voltage and frequency between demand and microgeneration clusters.

All this has several implications:

1. For the way we measure performance. Currently, we measure performance against past performance. But if we want to stay in business, we should be measuring our capability to meet the KRIs {What is a KRI?} for a {I can't make out the word – sounds like "deeping file". – SK}
2. Electrons are becoming currency. In various places around the world, people are trading electricity rather than cash.
3. The more we enable smart metering the better we will understand the customer's needs.

Electricity companies should become service providers rather than commodity suppliers. Suppliers should work with customers to understand not how much electricity they want and where, but why and when they want it and how much is absolutely vital in a critical period.

**Jonathan Frank** addressed the ways innovative financing is bringing more generation online. By 2040, over $12 trillion needs to be invested in new zero-carbon generation worldwide. This would place the power sector on a sub-2 degrees Celsius of global warming trajectory. While utility scale projects still dominate, there is increasing potential and demand for distributed renewable energy and efficiency solutions. However, as many as two thirds of the latter are stalled because they are under-served by existing capital markets and have high upfront capital costs. While the economics of distributed generation might make sense to a homeowner, they face barriers to deployment. These barriers include the inertia of the status quo and the effects of high upfront cost and the opportunity cost of capital in other activities – e.g. marketing for a business or a kitchen renovation for a homeowner.

Slide 4

Traditional financing is hard to access for projects less than $10 – 20 million. But several converging trends will unlock capital for such under-served markets (fig. {slide 4}). Online platforms and "Fintech" models are democratizing and streamlining investing and can help with these problems. Online platforms standardize legal and EPC agreements, credit checks, and can automate processes. In impact investing, institutions and individuals are driving change. Impact investing is expected to reach $30 billion in Canada and $1 trillion worldwide by 2020. A Morgan Stanley study found that up to 70% of individual investors are interested in impact investments.

Slide 6

CoPower provides access to streamlined financing for projects under $20 million. These projects can include deep energy or LED lighting retrofits, or residential geo-exchange. (See fig. {6}) for some examples.) Green bonds are offered to individual investors, backed by pooled senior-secured loans to operating projects. It is especially focused on bringing the structure and standards of traditional project finance to smaller projects.

Developers typically find the first project much harder than subsequent projects. Third party ownership, project aggregation and financing as a service will allow projects to be built faster and at a lower upfront cost to the end user. CoPower is working with building developers on how the additional cap-ex of LEED platinum or net-zero buildings can be separately financed and recovered through the reduced op-ex of the building. Geothermal and geo-exchange ground source heat pumps in particular have a high upfront cost – up to $100,000 for a residential system. An energy service contract with the homeowner can be used to finance such a system, with CoPower covering the upfront cost. They see this model working for other technologies as well.

**Scott Kessler** of the Brooklyn Microgrid and LO3 Energy, addressed the way peer-to-peer markets are expected to change the power sector. Historically, there has been too high a transaction cost for the small values present in distributed energy resources (DERs) to participate in the electricity market. LO3 uses blockchain technology to create a platform that will provide market signals for the control of these grid edge, distribution-connected DERs and allow them market access. This will create new business model opportunities for retailers, ISOs, and IPPs.

Blockchain can be thought of as many nodes of computation all talking to one another simultaneously. Bitcoin was the first time this concept was used at a large scale. Information on a blockchain transaction is updated for all users simultaneously. LO3 uses smart meters to measure energy information and communicate with other customers using blockchain; the result is that peer-to-peer transactions are enabled between neighbours, a DSO, or other markets. Energy supply and demand response can be orchestrated in a single market in this manner. The DSO of the future will know the price preferences for all users and end use devices, and will be able to turn off devices in for demand response in the most cost-effective manner.

Location-based pricing is also enabled by this technology – the price preferences of buyers and sellers and how much of the grid they are using will all be known. The grid can then be seen as a series of local clusters buying and selling with one another. Most transactions will be local for economic reasons but the clusters will also be able to buy and sell with one another. LO3 believes customers of the future want local, clean energy within a circular economy, and that this also makes the most sense for the electric grid.

The Brooklyn Microgrid demonstrated the first peer to peer energy transactions in 2016; it now has 60 solar systems and hundreds of consumers. They believe they are applying the entrepreneurial spirit of Brooklyn's food co-ops and small businesses to the energy sector, and this model will map to other such communities internationally. Similar projects are occurring in Germany and Australia.

While these projects may make sense from a business perspective, they may run afoul of current regulations. It is thus important to show regulators what they will need to change in order to satisfy customer and community demand for these sorts of business models.

Questions to the panel

1. Moderator **Mabel Fulford:** What business models are successful today, and how will they will evolve?

**Scott Kessler:** The business models of DSOs will be completely destroyed by peer-to-peer transactive energy trading. The business of profitably deploying capital in order to produce electricity will be negated by localized production and consumption of electricity. Opportunities will still exist in this traditional model for DSOs, but not at current levels. They should look at business models that could be costly today, to preserve their future. He works with DSOs in Australia and Germany because they are feeling this type of pressure today. US utilities do not believe they will have to examine this problem for 5 – 10 years, he says.

**Francesca Quinn** spoke of a large North American life insurance company that has formed a renewable energy group and taken equity stakes in projects. IKEA is another large investor in renewable energy projects, and produces more energy than they consume in Canada. Their energy related offerings to consumers are also expanding. Large manufacturers like Tetra Pak have become large financers and developers of renewable energy projects in China.

**Jonathan Frank**: Businesses want renewables but some may not have the experience or in-house capital to do so. Renewables or DER service providers can help these companies with no money down solutions. The same is true for residential customers.

**Alec Hay**: The model described by Mr. Franks can also be true for hospitals and municipal customers. For hospitals, solutions are oriented around the purpose of the electricity, rather than the supply.

For municipalities, it is important to justify their role to citizens – especially for energy and emergency services.

2. Do customers have the energy literacy to understand what they are asking for, and are they willing to pay for these services?

**Alec Hay:** His clients are not energy experts and don't know what to specify or ask for, but can recognize successful solutions to these problems. If electricity supplier cannot provide the answer they are looking for, then they will look for solutions elsewhere.

**Scott Kessler**: LO3's Brooklyn project has customers with high energy literacy as a result of its opt-in nature. Even so, they may not know all they need to in order to make the necessary decisions. A simple set-and-forget interface is necessary. Customers will not become energy day traders.

3. What forces will be driving change over the next 5-10 years?

**Mr. Franks:** Consumer demand (as shown in the LTEP) and climate change will be linked drivers. The fundamental economics of DERs will also drive change.

**Ms. Quinn:** Large energy customers are becoming energy literate as demanded by employees and investors. They are seeing a need to take action on the environment, risk and volatility management and shifting energy economics. This is creating an opportunity for service providers to assist large customers.

**Mr. Franks**: The issue is not the energy literacy of the customers, but rather how service providers communicate their value proposition to customers. Service providers need to understand customers' priorities, which can be very different than those of current electricity suppliers.

**Mr. Kessler:** Watch for grid defection trends, as seen in Community Choice Aggregation in California, combined solar and storage products in Australia, or microgrids in other places.

**Mr. Hay**: The costs (of renewables and DERs) are decreasing while accessibility is increasing. Utilities are treating their customers as commodity consumers rather than customers with more complex needs. Electricity interruptions threaten the business of customers, and their existence depends on the reliability of electricity supply. Suppliers need to partner with customers to solve this problem or trust between the two will break down and customers will leave. Cities will fail if new loads do not connect to the grid from the outset, as is now occurring in some cases – the value of maintaining a grid will increase in the future. The relationship of the supplier with its customers is the cause of this trend, and the entire community could suffer as a result.

*— Session summary by Andrew Clare*

**Panel discussion**
**Designing viable market-based mechanisms for gas services in the next business cycle**

Panelists
Steve McGill, Enbridge
Jim Redford, Vice President, Union Gas
Heather Sears, Workbench Corp.
Moderator: John Vellone

**Jim Redford**: There is no magic solution to a low-carbon energy mix. Hydrocarbons can play an important role, particularly as a fuel for power generation.

In 2003, the Ontario government announcement its transition away from coal-fired electricity. The Natural Gas Forum held in the mid-2000's identified natural gas services that support electricity generation as a critical element. In spring 2006, utilities worked with a variety of stakeholders on the Natural Gas Electricity Interface Review to develop unique services for power generators. Union Gas also invested about half a billion dollars to support the development of these services.

The primary needs of power generators are flexibility, reliability and cost competitiveness. From a utility's perspective, a key challenge to creating such services was to change supply to power generation plants in short notices (about 15 minutes). Another key challenge was the ability to meet peak consumption

even though load profile will vary significantly across the day. Services have been developed by Enbridge Gas and Union Gas to meet these challenges.

Slide 4

According to the IESO's recent 18 month outlook, natural gas accounted for about 28% of Ontario's installed power capacity (not including embedded generation) in 2016, while accounting for 60% of total production (figure {4}). Given the amount of installed capacity, natural gas generation has the potential to generate a lot more energy than it did in 2016.

Slide 5

Figure {5} shows how natural gas played an important role in electricity production on a couple of peak days in 2017, complementing many of the other sources of generation in the electricity mix, all on short notice. The Dawn Hub energy storage facility for natural gas is a significant advantage for the province.

Slide 6

Figure {6} from Ontario's Long Term Energy Plan shows that in 2023 Ontario will start experiencing supply shortfalls. Natural gas fired generation can help fill this gap.

Slide 7

The existing gas infrastructure in Ontario is well positioned to continue to provide services needed. The storage facility at the Dawn Hub is robust (fig. {7}). New pipelines are increasing supply and there is greater competition within the market. There is enough natural gas domestically to supply the market for 100 years or more.

The IESO's Market Renewal initiative is changing the way electricity is supplied in Ontario and gas generators are going to face different competitive pressures. Existing infrastructure can be effectively utilized to meet Ontario's demand. Natural gas generation is well-positioned to provide electricity needs in a flexible, reliable and cost-effective manner.

**Heather Sears:** Gas services are defined as the ability to burn natural gas when you need it and where you need.

Slide 3&4.jpg

Most of Ontario's natural gas is purchased from the Dawn Hub, owned by Union Gas, shown by the blue star in figure {3&4.jpg}). Once purchased the natural gas is transported to the various usage locations across Ontario.

Gas is purchased in 24-hour blocks, and is deemed to flow in equal hourly increments between 9:00 am and 9:00 am the next day (lower blue bar graph, fig. {3&4}). However, usage of natural gas for electricity generation is not based on equal hourly increments (upper yellow graph).

Slide 5.jpg

The imbalances in supply and demand (fig. {5.jpg}) are managed by the natural gas utilities. They allow the generator to receive gas with short notice, and they manage the mismatches between supply and usage, through services such as storage, transportation, distribution and balancing. That's not easy and it's not cheap, Ms. Sears emphasized.

Slide 6

Figure {6} shows how gas services allow gas-fired generators (dark blue) to participate in the IESO markets, day-ahead and real-time, with flexible supply of both energy and operating reserve. Gas generation is able to easily adjust its production capacity to reflect market signals from the IESO. It is playing an important role in complementing energy generation from other resources, especially wind (green). Orange is nuclear, pale blue is hydro.

Market Renewal will impact how market participants, including natural gas generators, provide both capacity and energy to Ontario,

A variety of capacity-related initiatives are currently being considered as part of IESO's Market Renewal, including Forward Period, Contract Term, Target Capacity and Performance Obligations.

Ms. Sears highlighted three key capacity related questions that need to be considered as part of IESO's Market Renewal:

- Can lead-time (forward period) and service term be aligned with incremental capacity auction (ICA)?
- Can ICA support the fixed cost of gas services?

• Variation in service costs and requirements across Ontario.
• Can large gas generators meet performance and offer obligations without gas services?

There are risks associated with these considerations including fixed costs and the ability of resources to provide services in a reliable and flexible manner.

Three energy-related initiatives that are currently being considered as part of IESO's Market Renewal, including a Singe Schedule Market, Day Ahead Market and Enhanced Real-Time Unit Commitment.

The Single Schedule Market includes locational pricing and will affect natural gas generators based on where they are located in the province. Generators located close to the Dawn Hub will have greater flexibility in terms of gas services; those farther away will face greater challenges procuring gas. Day Ahead markets will have financially binding day-ahead schedules that work well for gas generators; however, real-time obligations will be challenging to meet given gas supply considerations. Enhanced Real-Time Unit Commitment with multi-hour optimization also needs gas services to respond in real time.

With regard to locational marginal pricing (LMP), service availability and cost varies across the province. Transaction timing in the gas market varies depending on the services procured. Flexibility on the gas side is needed to respond to flexibility demands on the generator side.

The IESO's mission statement for Market Renewal says: "Market Renewal will deliver a more efficient, stable marketplace with competitive and transparent mechanisms that meet system and participant needs at lowest cost."

Ms. Sears stressed that it's important for Market Renewal to align key elements with those of gas services. It will also be important for the gas utilities to redesign the gas services in a way that will meet the requirements of market renewal.

**Steve McGill:** The natural gas and electricity systems are interrelated and both systems need to work together to combat future challenges. Enbridge and Union have about 3.6 million customers across Ontario. But Enbridge is not just a "gas company" and also has a number of renewable investments across North America.

Slide 3
Caption: Different initiatives and reports have contributed to the 2017 Long Term Energy Plan.

The top priorities from Enbridge's point of view for the gas and electric systems should be reliability, resilience and leveraging existing infrastructure. The best technologies to meet the issues will change over time. As a result we need to think about the life cycles of the technologies we put in place.

The current peak market demand in Ontario's gas market is equivalent to about 80,000 MW in electrical terms. This compares to an electrical grid that typically serves a much smaller peak, about 25,000 MW. Enbridge and Union together deliver about 10% more energy annually than all of Ontario's electric utilities combined, at about a third of the cost. As for storage, Enbridge and Union together have the equivalent of 80 TW, or over 13 billion Tesla Powerwalls.

The 2017 Long Term Energy Plan contains a number of initiatives but it does not speak to the related implementation issues such as cost and timeline. It also does not speak much to integration between gas and electric and how the two systems can work together to achieve the province's objectives. New initiatives included in the 2017 Long Term Energy Plan include:

- Enhanced net metering
- Promote development of energy storage
- Provide more leeway to electricity distributors (LDCs) to offer "non-wires" solutions
- Bulk transmission system planning
- OEB to have greater oversight over sub-meter providers
- De-carbonization of fossil fuels
- Focus on electric vehicles

The 2017 Long Term Energy Plan is strongly influenced by the Climate Change Action Plan. The Ontario Planning Outlook, which fed into the 2017 Long Term Energy Plan, included two high emission reductions scenarios, both of which assumed a significant shift from natural gas to electricity.

- CCAP
  - OPO electrification assumptions
    - Convert building heating & water heating to electricity
    - Impact on demand? (trade NG for electricity demand)
    - Little concern expressed over future electricity supply or cost – about $6.5 billion in incremental capital cost, an extra $50 billion/year in additional electricity cost and an additional 12,000 MW in capacity requirement
  - This has been tempered significantly in the LTEP, where
    - NG is to remain relevant in in space and water heating
    - Emphasis on distributed energy and conservation
    - Greater emphasis on EVs
    - De-carbonization of fossil fuel

These two scenarios will have huge impact on consumers, especially related to costs. Under these scenarios, Ontario would also move to a winter peaking jurisdiction. The 2017 Long Term Energy Plan did however temper the extent to which natural gas will be removed from the system, relative to the Climate Change Action Plan.

Ontario-based natural gas generation can replace coal generation in the United States, using natural gas based combined heat and power systems and renewable natural gas and hydrogen.

The following list shows a number of future opportunities for natural gas and electricity systems:

- Increased Electricity Exports to the U.S.
  - In 2015 Coal fired power generation in New York, Pennsylvania, Ohio & Michigan produced 187.0 million metric tons of CO2.
  - Natural Gas electricity production results in about 50% GHG emissions compared to coal.
  - Most green electricity production could attract RINs enhancing its value in the U.S.
- Distributed CHP
  - More efficient & greener than combined cycle
  - Can be geographically targeted
  - Enhanced resiliency because it's local and relies less on above-ground infrastructure
  - Qualifies for renewable identifications numbers (RINs) in some U.S. States

Enbridge is looking at renewable natural gas and hydrogen:

- RNG provides both carbon abatement (methane capture) & fuel substitution GHG value, is interchangeable with natural gas, so there's no consumer capital expenditure or behavioral change, and has the potential to replace up to 18% of Ontario's conventional gas supply
- Hydrogen can be produced with off-peak electricity and used to produce on-peak electricity. Enbridge has such a project in Markham. It's also useable as transportation fuel and can be used as a supplement into the gas distribution system in limited quantities.

There are also better ways to manage the electrification of the buildings sector by retaining natural gas heat for the coldest days and retaining air source heat pumps for the shoulder season and for summer cooling. Electric vehicles can be charged off-peak, and achieve the same carbon reduction as removing natural gas for space heat and hot water.

Questions

Moderator **John Vellone:** What is required to better match electric and natural gas services: regulatory changes, or is it something the utilities need to undertake on their own?

**Heather Sears**: In the immediate term not much needs to be done. Most of Ontario's natural gas generation, over 9,000 MW, is already under contract with the IESO and relies on natural gas utilities to provide gas supply. Going forward with Market Renewal, we will continue to need balancing services. Generators need to continue to rely on the balancing services and be sure they are not be stuck with penalty charges with no way to recover those costs.

Another key element is contract terms. Under the current system, generators are under 15 to 20 year contracts, whereas through a capacity auction, it is envisioned that contract terms will be much shorter. It will be important to ensure that gas services will be able to work within these shorter terms. If not, regulatory changes could be pursued to facilitate participation.

2. Are gas distributors monitoring and participating in the IESO's Market Renewal initiative?

**Steve McGill**: Enbridge and Union are actively participating in the Market Renewal initiative.

**Jim Redford**: Gas utilities are also working with gas generators to provide them with advice and seek their input. All stakeholders, including generators, utilities, IESO and APPrO will need to work together to address the challenges ahead.

*— Session summary by Musab Qureshi*

**Panel discussion:**
**What are the realistic options for strengthening governance of the electricity sector in Ontario?**

Panelists
Vince Brescia, CEO, Ontario Energy Association
Goldy Hyder, CEO, Hill+Knowlton Strategies
Bruce Lourie, President, Ivey Foundation
George Vegh, McCarthy Tétrault & University of Toronto School of Public Policy and Governance
Moderator: Dave Butters, APPrO President

**George Vegh** discussed his recent Report on Energy Governance in Ontario, prepared for the Ontario Energy Association (OEA) and APPrO.

Governance is about who decides what, and by what process. In general, agencies such as the OECD think of governance in terms of decision-making that has transparency and accountability, and Mr. Vegh focused on these elements. In Ontario, governance was an important issue in 2002 in the creation of the electricity market. Now is another good opportunity to think about governance in light of (a) the current climate of sector transformation and market renewal, and (b) the current electricity price freeze.

Regulation is about the transfer of decision-making authority from politicians to non-political agencies. By definition, regulation is a restriction on political discretion and a movement towards a rules-based system. The energy sector is a good candidate for governance because it requires long-term investment decisions by the private sector. To attract private sector investments, decision-making cannot be left to the political process, which tends to operate on a more short-term, opportunistic basis. Longer-term decisions require objective criteria and decision-makers that apply those criteria. Governance is about creating a set of rules and a process for decision-making on the basis of facts as opposed to politics. This is distinct from furnishing more independence or power to the decision-making agencies.

In Ontario, the IESO and the OEB already have fairly strong governance in the form of restrictions on their discretion and decision-making. However, there are still elements of each agency's operations which are less transparent. For example, when the OEB makes rules and codes, it does not follow an adjudicative process. Similarly, the process by which the IESO develops market rules and manuals is somewhat open, but there is no insight into the related communications the IESO may have with the government. These particular functions lack transparency (what the decisions are based on) and accountability (knowledge of who the real decision-maker is). Rather than a criticism, this is simply acceptance of the way the model operates.

The agencies may be seen as moving towards more of a policy advisor role and as such, it is not reasonable to expect them to act as a check and balance on governmental authority. Rather, the IESO and OEB are expected to cooperate with government, to communicate with government, and to implement the government's plans – as in the Long Term Energy Plan (LTEP), for example. The only figure capable of acting independently and speaking truth to the government would be an officer of the legislature, similar to the Environmental Commissioner or the Auditor General.

The Report treats as fact the connection between the government and the agencies and focuses on how these agencies should therefore operate from a governance perspective. Mr. Vegh highlighted two of the Report's recommendations in this regard.

First, the OEB and the IESO should be required to maintain a complete record of all communications and information relied upon in making all non-adjudicative decisions, including all communications with government. This would make the process more transparent and would increase confidence in that process.

Second, all major energy policy decisions, whether made by the government or an agency, should be required to undergo rigorous cost benefit analysis by an independent officer of the legislature. These decisions include long term energy plans. The analysis should be based on credible estimates of costs and benefits and should not be done internally. Rather, only a legislative officer with a specialty in energy can do this truly objectively and hold both the government and the agencies accountable.

In summary, there should be a focus on transparency and accountability in the sector. However, the strategies employed should not rely on the sector's regulatory agencies to act independently of government, but rather should treat them as part of the government and adjust accordingly.

**Bruce Lourie**, President of the Ivey Foundation, concurred with Mr. Vegh that the questions at issue revolve around independence, transparency and accountability and the extent to which those values are embodied in a governance structure. Mr. Lourie examined the history of the electricity market leading to the current governance situation, and offered suggestions for how to move forward.

Often political involvement in the energy sector arises because of public concern about electricity prices. It seems unlikely from past experience that any change can be made in the energy sector without input from the political realm. Notwithstanding pleas for consistency in the electricity sector, each successive provincial government has brought its own ideological position to governance, thereby creating great variability over the last number of decades.

**[Slide 4]**

When one looks back at the 25-year forecasts made in Ontario Hydro's 1992 Demand Supply Plan (figure {slide 4 graph}), it is plain that forecasting demand is very difficult. This graph shows how much higher the Demand Supply Plan's upper forecast for electricity demand was than the actual electricity demand today. Ontario would have required five additional Pickering Nuclear plants to meet the gap in forecasted demand. This demonstrates how difficult long-range planning can be and how difficult it is to design appropriate governance structures for the long term.

Similarly, when one examines the impact of shutting down the coal-burning generation plants in Ontario, it can be seen that that decision, though controversial, reduced the number of smog advisory days in Ontario to 0 from a high of 53 per year, and reduced greenhouse gas emissions dramatically.

**[Slide 7]**

It also created a political dynamic in Canada whereby Ontario has large reductions in greenhouse gas emissions while Alberta has large greenhouse gas emission increases (fig. { 7}). Ontario became a climate leader in closing down power plants that were well beyond their planned lifespan; Alberta will have a tougher time closing down coal-fired plants that were only recently commissioned. 25:03

The *Green Energy Act* was a divisive piece of legislation, depending on one's perspective. Mr. Lourie was involved in the development of the *Green Energy Act* and subsequently became a member of the IESO's Board of Directors, which provided an interesting perspective on the divide between the political and the administrative sides of governance. The question is how to better manage the back-and-forth discussion that follows from the directives from the Minister of Energy to bureaucrats.

**[Slide 10]**

In terms of the political rationale for the *Green Energy Act*, a 2010 survey by the Innovative Research Group showed that the majority of respondents (82%) were in favour of the government adopting a green energy plan that would encourage conservation, replace aging infrastructure, meet new demand and make Ontario's power generation more environmentally friendly (fig {10}).

**[Slide 11]**

Notwithstanding the support for such a plan in principle, however, the number of people in support of the plan decreased dramatically when faced with the addition of the cost of implementing the plan to their electricity bills (fig. {11}).

In Ontario, there is a lot of isolated discussion about high electricity rates. Electricity systems - and the associated rates - are largely based on the resources and economy in that jurisdiction. Therefore it is important to compare ourselves to jurisdictions with like resource options. There is much publicity about Ontario paying the highest electricity prices in North America; however, that is only true when comparing

Ontario to Manitoba or Quebec rather than looking at markets that are more similar in terms of resource base, population and economy. A worldwide electricity price comparison reveals that Ontario's electricity prices are lower than most comparable jurisdictions globally.

Those who manage electricity systems face a "trilemma": one can have an electricity system that is clean, reliable or affordable, but it is difficult to have all three characteristics present concurrently in one system. Canada does about the best job in the world of managing clean/affordable/reliable all at once.

It is true that the industry is fraught with political interference, and that this will always be the case. The question becomes how to design a system that minimizes the opportunity for politicians to become involved in the details. Governance requires expertise and independence. Independence ultimately means de-politicization to the extent possible, because each political party has a different ideology and each creates governance systems that reflect its own perspective. It is better to create durable systems that are acceptable across all political parties.

Long term energy planning is becoming much more difficult in light of massive change across the sector that is beyond anyone's control. The electricity consumer is no longer only a ratepayer but rather someone actively involved in the production of electricity. Electrification is coming faster than current policies, finance systems, and infrastructure can manage. How to model-in disruption in long term energy planning? The sector is in the middle of its largest economic transition since the industrial revolution and it is up to all of us to shape it.

**Vince Brescia**, CEO of the OEA, examined the three provincial political parties' approaches to energy policy considering that high level changes in the governance model will come from the political system. Generally the main focus of politicians is on lowering electricity bills, but there are some other interesting things in each party's platform which suggest which direction they may take if they become the government.

Although the NDP may not form a majority government in the next election, their positions still carry weight. For example, in the past, when the NDP had a balance of power position in a minority government, their goal of creating an independent legislative officer was realized and the parliamentary budget officer was appointed. So the positions of the NDP can be important even if they do not form the government.

The NDP platform is focused on the following:

- Creating an independent panel of energy experts, planners, business, labour, watchdogs, public administrators, consumer and environmental advocates - referred to throughout their platform
- To create systemic changes to lower bills
- Independent fact-based evaluation of when to take Pickering offline
- Cost-benefit analysis for cancelling contracts, which, along with the independent panel, echoes some of the recommendations in the Report
- Review nuclear refurbishments against alternatives - public comparison of alternatives by an independent group is recommended by many groups, including the OEA
- Examine importing renewable power
- Expansion of public ownership
- Expanded role for the OEB, which quite a few people in the sector have also advocated.

The NDP proposal would have the OEB perform the following functions:

- To review government energy policy plans. This recalls the IPSP and echoes the views of some in the sector
- To review the remaining 65% of generation within the Bill, another view shared by some in the sector
- Ratepayers and consumer advocates on the OEB
- Executive salaries capped. The NDP is focused on the entire sector, not only in the Ontario Hydro legacy LDCs. The NDP believes it was a historical mistake to give utilities to municipalities. This will impact on governance because in setting CEO compensation, the NDP would remove a key function from the LDCs' Boards of Directors.

The Progressive Conservative party has yet to publish its official election platform but its membership has recently unanimously voted on resolutions including the following which touch on governance issues:

- Ensure environmental decision-making is rooted in scientific evidence, rather than being politically driven
- Rein in exorbitant executive salaries for provincially-owned agencies
- Restore local planning authority over renewable energy projects

• Show carbon pricing on natural gas bills. This is an interesting concept from a governance perspective because natural gas pricing is set by an independent agency.

The positions do not expressly speak to governance, but governance issues are present in many of them, such as scientific proof of environmental decision-making and local planning. There is also an indication of the party's position in the leader's stump speeches. These speeches contain references to "letting the experts decide" and "transparency." It will be interesting to see what elements of these principles appear in the party's official platform and whether they open a door to discuss governance.

Prior to the election, there may not be serious consideration of governance questions. However, post-election, there will be a good opportunity to have a meaningful governance discussion with whatever party takes office. Now there is a good opportunity to prepare for a discussion by looking for relevant openings.

The Liberal party has not yet released a formal platform, so guidance must come from the current state of affairs. Currently the executive branch leads on policy and planning. Having government play such a leading role in planning is a governance issue for some people. Bill 135 outlined how the Minister will choose with whom to consult on LTEP, which is also a governance issue for some. The executive branch retains directive powers in the government's current governance model. However, the language is changing and now the government is endorsing, in the LTEP, a technology-agnostic capacity auction (which conflicts with the Quebec deal announced at the same time). However, the government is leaning toward endorsing the Market Renewal project as the way forward to find new capacity in the future. The government currently makes limited use of public cost-benefit analysis, likely because it makes life more difficult for decision-makers. Similarly, there is limited comparison of alternatives, which is of concern to stakeholders, but such comparisons also make life more difficult for the government.

Last week, a new organization comprised of 19 industry groups which calls itself the Ontario Electricity Stakeholders Alliance (the OESA) came together solely to support the following principles for governance reform in electricity decision-making:

• The legislature should provide policy direction, as in England
• Long term electricity planning should continue and incorporate policy directions from the legislature.
• Implementation and oversight of system planning should be done by independent agencies. The group recognizes that one cannot remove politics from the system, but it is important to define the roles of the players and create a process by which to hold the implementing agencies accountable. A clear process will prevent lines between policy-maker functions and implementation functions from blurring.
• The independent agencies need to be properly resourced.
• There should be disclosure by the IESO and the OEB of any meetings or communications they have with government officials, as separately recommended by Mr. Vegh in his Report.
• Procurement should be competitive wherever feasible, accepting that it will not always be possible.
• Decision-making should be rooted in objective criteria, with a comparison of alternatives, a cost-benefit analysis, robust stakeholdering, and consideration of economic impacts. Again, this recommendation is similar to those set out in Mr. Vegh's Report.

One of the challenges of this subject area is that it is esoteric. The OESA went out of its way to be apolitical. It avoided commenting on recent policies and tried to be forward-looking. The breadth of that stakeholder group is telling. Nevertheless, it is difficult to organize political action on these issues when the main thing that gets voters' attention is talking about lowering people's electricity bills.

**Goldy Hyder**, CEO of Hill+Knowlton Strategies, considered the challenge of how to strategically engage the public in an industry undergoing rapid change, where long-term investment and planning are required, and where the political timeframe is short-term. The public is now much more aware of, involved and engaged in regulatory decision-making which previously took place behind closed doors. Nevertheless, despite the importance of energy governance, it is difficult to get ratepayers interested in such an esoteric topic. Three things must be present in order to engage the public:

1. You need to make it real
2. You need to make it relevant
3. You need to make it about right vs. wrong

**Real**: To make something real, it must be easily digestible, clear, concrete, and illustrated by concrete examples. It cannot be theory or a debate about industry standards or best practices. The reality is

that these decisions are made behind closed doors. The public should care about those decisions and demand to have transparency.

**Relevant**: This is the answer to the questions, "why should I care? What's in it for me?" Energy governance is ultimately about how energy decisions are made. Recently Ontarians have become more interested in this process because of how these decisions are impacting them personally in terms of electricity bills. Lowering bills only satisfies the short-term public appetite, but we owe it to the public to have a conversation about the long term because the public will eventually have to pay for those plans as well.

**Right vs. Wrong**: There is a way to make this about more than the next election and energy pricing. The issue should be about independence, reliability, fairness, transparency and accountability. One could say that these goals will be advanced when decisions are based on facts and evidence-based science rather than on polls. There should also be restoration of a system of checks and balances instead of unchecked authority - an officer of the legislature is an interesting idea because of that role's ability to speak truth to power. Ultimately the values debate will become about doing the right thing and making good decisions.

**Questions**

1. Moderator **David Butters**, President and CEO of APPrO, asked is it even possible to contemplate the kinds of improvements that have been discussed today? Are we being realistic? How do we achieve alignment among the political parties?

**Vince Brescia**: There is consensus in the sector about a desire for a change in governance. The breadth of that desire is shown in the breadth of the OESA coalition discussed earlier. However, realistically, if the current government wins the next election, there is a low probability for reform - they are comfortable in their current position. There may be some prospect for reform in the wedge issues where the opposition can campaign on governance. However, there also exists ambivalence because most parties will come to office with an interest in directives and direct decision-making, which is inconsistent with the type of governance reforms the sector is seeking. Governance reform is a long term exercise. Change depends on a change in government.

**Bruce Lourie** agreed. Governments use electricity as a political tool, but this conceals the reality that there is a lot of alignment among the parties. For example, the Liberals already provide a process for communities to provide their input about renewable power projects, as advocated for by the Progressive Conservative party. The challenge for the sector becomes how to highlight the commonality among parties in the face of an unusual level of politicization of energy issues.

**Goldy Hyder** pointed out that Mr. Lourie's slide about electricity prices in Ontario relative to other comparable jurisdictions does nothing to change the *feeling* among ratepayers in Ontario that they are paying too much for electricity. Facts do not change the way people feel - that is the fundamental challenge, and it is representative of everything that led to the election of Donald Trump as US President. The sense among voters is that other people are getting ahead and they are not. The sector must find a way to protect itself from those feelings. The political response to that feeling is that voters will feel better if they select a certain party. However, a logical person will point out that any plan designed only to make people feel better is a bad idea and will cause long-term pain. In order to bring that logic into a largely emotional debate, it would be better to frame the discussion of energy policy in terms of the debt left to people's children.

**George Vegh**: Historically, neither of the two major governance reforms that have taken place in the sector was addressed in an election campaign. Both came about when the government took power because the existing structure was politically and economically unsustainable. Creating the market was governance reform, as was putting the OEB in place to be an independent regulator. Also, when the McGuinty Liberals took office, they created an elaborate governance model with the Ontario Power Authority and independent planning. None of it was part of an election campaign but rather was a response to a politically unsustainable existing policy.

2. Can a more robust role for the private sector in all aspects of the electricity system improve checks and balances on the government?

**George Vegh**: Contracts with private sector parties are a check and balance on government authority. Once people have invested, they have property rights. Property rights are a big constraint on

governmental discretion. For a government to get around the legal rights enshrined in contracts requires expropriation.

3. Is the Ontario electricity sector any less "rife with political interference" than the health and education sectors? Why should electricity be non-political in Ontario despite the treatment of these other sectors?

**Vince Brescia**: Removing politics from electricity and energy is neither possible nor necessary in light of the difficult decisions to be made. You need a very engaged provincial legislature and government in that context. Many in the OESA coalition and the OEA see a strong and important role for political decision-makers. They will have tough decisions to make during this technological revolution. There will be winners and losers, as Ron Dizy said in an earlier panel, and this will create political problems which politicians will have to referee. What is needed is to define roles so that the decision- and policy-making are separated from the day to day implementation of those decisions. It is better to have the agencies accountable to the politicians themselves while the politicians act as a Board of Directors - setting policy but not involved in day to day operations.

**Goldy Hyder**: Most politicians would probably happily stay out of daily implementation in a well-designed system where they can point to the implementation agencies as responsible for decisions.

**Bruce Lourie** disagreed with Mr. Hyder. The agencies are used as a mechanism for doing politics. It seems unlikely that the electricity system will ever be de-politicized, but you do not want politicians intervening in and contradicting existing planning processes in which stakeholders have already participated. The challenge is that in addition to professional managers working under the direction of a Board of Directors, there is also involvement from the Minister's and the Premier's offices. In light of that reality, there needs to be a structure that has more political durability - something that is legislated and endowed with a truly independent operating budget that lasts for multiple years and goes beyond the political cycle. We need to depoliticize the individual decisions around technologies.

**George Vegh**: We can look to other sectors for examples of better governance while still recognizing that the government makes the decisions. One example is the transportation sector - the government created Metrolinx at the same time as they created the OPA, and its job was transportation planning. A few years ago Metrolinx's big issue was how to secure funding for the "big build." They prepared a very sophisticated report on different funding mechanisms for presentation to the government. The government chose a different route, but it was a good example of democratic action wherein there was an objective, fact-based presentation of alternatives by the agency, followed by an open decision by the government. My hope for our sector is to have those types of public exchanges.

4. What sorts of decisions are appropriate for politicians to take with respect to the long term of the electricity sector? What are the panel's views as to how far politicians should go in setting policies and what should those policies address?

**Bruce Lourie**: Politicians need to set out priorities. However, there is still a need for structure wherein the government sets targets and entertains competitive bids on those targets. It is up to the government to decide what will be included in those targets.

**Vince Brescia**: The obvious one is climate change policy, and the government has a clear role in defining what that is, the pace, what should be included, how to manage economic impacts.

**David Butters** concluded the discussion by pointing out that in a democracy such as ours, the people have an important role to play in electing governments that reflect their aspirations, desires and needs. The question is how to balance those elements against the technical delivery of policy.

*Session summary by Christine Kilby*

**Speed Mentoring continues to grow**

The Speed Mentoring Event at the APPrO conference continued its upward trend in 2017, attracting more participants than ever before. Hosted by Women in Renewable Energy (WiRE) the initiative is designed to help new professionals entering the energy field by facilitating interaction with experienced mentors who have long careers in the energy sector. The most recent event, the third in a series, hosted 60 participants, and took place at the 29th Annual Canadian Power Conference on November 20th, 2017.

WiRE Speed Mentoring events are designed for students and new professionals, both men and women, to receive mentorship and feedback from experienced industry professionals in Ontario's energy sector. At the November 20 event, mentees came from backgrounds in STEM, R&D, innovation, clean technology and sustainability. Mentees included students and recent graduates who are eager to work in the energy sector, young professionals looking to progress within the industry, as well as experienced individuals who are looking to transition to the energy sector.

WiRE and APPrO first launched the speed mentoring event in 2015. The success of the event led the organizations to remount the event in 2016 and again in 2017. Positive feedback continues to come in, with the number of participants increasing year after year. Mentors report that they enjoy participating as it affords them opportunities to share their sector knowledge as well as to recruit new talent. Mentees benefit by learning about the types of work that are available in the energy sector, as well as finding leads for recruitment opportunities. For many mentors and mentees, the Speed Mentoring event becomes the start of a long-term relationship.

Feedback from 2017 mentors and mentees included the following comments:

"Great initiative with an amazing purpose!" – mentor

"Diversity of mentees looking for change. Very refreshing." – mentor

"Truly support this great initiative! One of a kind in this industry." – mentor

"I love providing information about my many years of experience as a woman in a predominantly male industry." – mentor

"I wrote a thank you letters to the mentors. One of them invited me for a company tour." – mentee

"I enjoyed networking with other individuals (young and female) in my desired field." – mentee

"I enjoyed learning about different roles in the power sector and it was most beneficial for me to confirm the things I wanted to do and didn't want to do in a job." – mentee

"I really appreciated the advice and experience of the mentors. It was beneficial to have the opportunity to meet with more than one mentor." – mentee

"The highlight of the event was the chance to connect with experienced/senior professionals in the field, especially the chance to connect with female professionals of this level." – mentee

After the speed mentoring event, the mentors and mentees also participated in the networking reception hosted by APPrO.

Photos

**Opening comments – Banquet**

Conference Chair **Stephen Somerville**, opening the evening's banquet, observed how APPrO's members have helped introduce key elements of competition into the provincial grid, and reshape the supply mix in important ways over the past quarter century without compromising reliability.

Commenting on the issues under discussion at the conference, he observed that its title, Future+Focus, could also well have been simply Change, the size and scope of which has been immense.

APPrO President **Dave Butters** briefly outlined APPrO's plans for the coming year:

• Market Renewal has been a major undertaking, and will require even more work in 2018 to deal with the details.
• APPrO's Board has put together a strategic planning subcommittee to survey the rapidly changing landscape, and has accepted the committee's recommendation that the organization become less focused simply on generation and more about being power and energy suppliers. This will be part of the business plan for 2018.
• APPrO will be more innovative itself as an organization.

**Banquet Keynote:**
**Ontario Energy Minister Glenn Thibeault**

In his address to the annual conference of Ontario power producers on November 20, Ontario's Minister of Energy Glenn Thibeault outlined the broad directions the government has set for development of the province's electricity sector. At least one thing is becoming clear: Maintaining the ability to adapt and respond to new developments is likely to be a major theme of both policy and planning over the next ten years.

Minister Thibeault began his speech with a brief update on Ontario's energy sector. A key takeaway is that Ontario has built a system with a robust, reliable and diverse supply of electricity. For this position he credited a strong spirit of partnership and collaboration between government and market participants. The province's relatively stable supply situation is largely a result of nearly $70 billion the government has invested in the electricity system since 2003 – most of it paid for by current ratepayers. Future cost increases will be mitigated by maximizing the use of existing energy assets, he suggested. For example, the government anticipates spilling less water and firing thermal resources in a more efficient manner in the future. He added that keeping costs down is the primary task assigned him by the Premier.

The Minister noted that while many of Ontario's generation facilities were built in the last decade, some are expected to be able to generate power beyond their planned contract life.

The Ontario government recently released its third Long-Term Energy Plan (LTEP), titled "Delivering Fairness and Choice," setting out the province's energy development expectations over the next 20 years. Noting that projecting energy-related trends over a 20 year timeframe is particularly difficult, he pointed to the extensive consultations and engagements associated with the planning process. The 2016 planning consultations were the most extensive the Ministry of Energy has ever undertaken.

Addressing the IESO's major current initiative known as the Market Renewal project, the Minister said that the government aims to create a more dynamic and adaptive energy market. Market rules should ensure that all resources, including energy storage and other new and innovative technologies, compete on an equal footing, he said. In the long term, market renewal is expected to provide about $5 billion in savings between 2021 and 2030. He encouraged APPrO and its members to stay involved in the IESO-led Market Renewal Working Group.

He noted that Ontario's electricity system is over 90 per cent free of the emissions that cause climate change, and is forecasted to account for only 2 per cent of Ontario's overall GHG emissions by the end of 2017. Eliminating coal for power generation in Ontario moved the province into a leadership position in terms of combating climate change. It is sixteen years ahead of the federal government's target to phase-out all provinces' use of coal-fired electricity by 2030.

The Minister took pains to stress that natural gas will likely have an important role to play in the years ahead, in part because of the increasing reliance on renewables. Renewables now comprise 40 per cent of Ontario's installed capacity. Ontario has about 4,600 megawatts of intermittent wind and solar resources providing bulk supply and nearly 2,600 megawatts of distribution-connected wind and solar resources. He noted that, "as Ontario continues to build upon our successful renewable integration initiatives, dispatchable natural gas-fired generators will continue to play an important role in balancing our system needs."

Ontario appears to be moving away from prescribing particular sources of supply in future procurements. The Minister cautioned that "blanket policies that target particular forms of generation could be both foolish and costly. If we design our systems and policy approach properly, we can solve for carbon and avoid a prescriptive approach that risks micromanaging Ontario's supply mix." In that

regard he singled out Enbridge for their "positive and productive contribution towards shaping Ontario's public policy framework around renewable natural gas."

Related to the ongoing efforts to decarbonize Ontario's economy, Minister Thibeault highlighted anticipated progress on electrification of the transportation sector. Under the LTEP's forecasts, some 2.4 million electric vehicles will be operating on Ontario's roads by 2035. Hamilton, Mississauga, Kitchener, Toronto and Ottawa are planning to electrify public transit.

The grid is becoming increasingly complex, the Minister noted. Integration of new and emerging technologies into the system, at both transmission and distribution levels, will continue. As a result of these changes, ratepayers can expect to benefit from increasing flexibility and choice as new technologies are rolled out and integrated.

## Awards
## Women in Renewable Energy (WiRE)

Cara Clairman, President of Plug'n'Drive, was the winner of the 2018 Women in Renewable Energy (WiRE) Woman of Distinction Award for 2017. Speaking at the APPrO 2017 banquet dinner on November 20, WiRE's Joanna Osawe and Rebecca Black described how Ms. Clairman had in six years taken Plug'n'Drive from an idea to a recognized world leader in electric vehicles.

In 2017 Plug'n'Drive established the Electric Vehicle Discovery Centre in North York, Toronto – the first facility of its kind in the world, focused entirely on providing an experiential learning environment for EVs. Plug'n'Drive's initiatives have played a key role in the electrification of transportation as a way of addressing climate change, Black said.

Ms. Clairman has over 20 years experience in the environmental and sustainability fields, including service as Vice President of Sustainable Development at Ontario Power Generation, and practicing environmental law at Torys. She has authored numerous articles and given hundreds of speeches on climate change and related topics. In addition, Ms. Clairman has mentored many students and young professionals.

Plug'n'Drive conducts research and provides infrastructure support for electric vehicle adoption, one of the solutions to decarbonizing Ontario's energy system. In 2017 Plug'n'Drive established the Electric Vehicle Discovery Centre, the first of its kind in the world focused entirely on providing an experiential learning environment for EVs.

WiRE Women of Distinction Awards recognize and celebrate professional women working in the energy sector who go above and beyond business-as-usual, consistently demonstrate outstanding leadership, and have contributed significantly to the expansion and improvement of the power sector. WiRE presents three Women of Distinction Awards annually: Wind Power, Solar Power and Woman of the Year.

## Hedley Palmer Award

<H>Rob McLeese recognized with the Hedley Palmer Award
<B>Rob McLeese, President of Access Capital, was the winner of the APPrO 2017 Hedley Palmer award. APPrO Chair Michael Bernstein, introducing Mr. McLeese at the Canadian Power Conference banquet on November 20, noted that Mr. McLeese had assumed a wide range of responsibilities during his career. The roles he has mastered include that of entrepreneur, developer, senior executive, and government policy leader. After funding four power projects in ACI Energy Inc., the US-based company that Mr. McLeese and his father founded, he started Access Capital Corp in 1990, to help other people do much the same thing in the power business.

Over the last 25 years, Access Capital has been involved in over $2.6 billion of independent power project financing. It has worked on gas fired cogeneration, hydro, biomass, waste coal, wind, other renewables and district heating and cooling. Mr. McLeese joined APPrO in 1990, and over that period he has served as President, Treasurer and a Director. "He always guided the organization with integrity and passion, and his insight was highly valued," Mr. Bernstein said.

"Those who know Rob are keenly aware of how much he loves dealing with other people globally on power projects and working on committees and industry associations exchanging ideas and finding solutions to issues."

Mr. Bernstein pointed out that this kind of dedication has led Mr. McLeese to serve as a director of the Creststreet Power and Income Fund, Pristine Power and Fengate Infrastructure, as well as a board member of the Ontario Centre of Excellence and Chair of the Toronto Board of Trade's Electricity Task Force.

Rob currently serves on the Board of Export Development Canada and is the incoming Chair of its Audit Committee. He is also on the Board of Pond Technologies Inc., an Ontario technology company that is a finalist for the X Prize, a US$20 million prize offered by NRG and Elon Musk, by virtue of its highly successful CO2 capture technology.

In his acceptance speech, Mr. McLeese highlighted how the sector is much more complex than it was in the 1980s and 1990s. "The variety of market opportunities, various market pricings, and the day-ahead and real-time pricing, as well as the security requirements, have made operating in the environment much more onerous." Financing of merchant and near-merchant plants is next to impossible in Ontario today, he said. However the sector will always require a diverse set of technologies and locations to make up an efficient and reliable grid, he said. Multiple forms of storage will be needed to enable more renewable power. "There will always be opportunities, as long as one is prepared for the long game and ready to size up the opportunities."

Mr. McLeese has also been awarded the Probyn Prize for innovation in sustainable energy finance and the 2012 Queen Elizabeth II Diamond Jubilee Medal.

**Breakout session:**
**The latest moves in Carbon Markets: Issues and opportunities for generation and storage**

Panelists
Michael Berends, ClearBlue Markets: Carbon risk management and forecasts
Jamie MacKinnon, Blue Source Canada: Ontario's offset market
Julie Desjardins, Desjardins & Associates Consulting Inc.; FSB Task Force on Climate-related Financial Disclosures (TCFD)
Katie Sullivan, IETA: Regulatory developments and investor considerations
Moderator: Lisa DeMarco, DeMarco Allan LLP

**Katie Sullivan** provided a "stage-setting" for current greenhouse gas reduction initiatives under the most recent Conference of the Parties (COP 23), where she had been a participant.

She briefly described IETA, a business association bringing together 150+ businesses that are either developing clean and green projects or are embracing the fact that carbon emissions reduction is a necessary part of business now. IETA has 10 staff and has recently opened an office in Beijing. Real reductions, policy certainty and lowest cost form IETA's core principles.

A quick summary from "Fiji on the Rhine:" It was a procedural event, about getting down to business. The parties continued work to operationalize the Paris Agreement, and are on track to deliver the Paris Rule Book by COP24 (December 2018). There was progress on markets, reporting, transparency and finance. IETA and Canada, including the provinces, kept close watch on Article 6. Outcomes included the Fiji Momentum for Implementation, a "Talanoa Dialogue as a method for reaching agreement, a Gender Action Plan, a local communities and indigenous peoples (LC&IP) platform.

"Talanoa is a traditional word used in Fiji and the Pacific to reflect a process of inclusive, participatory and transparent dialogue. The purpose of Talanoa is to share stories, build empathy and to make wise decisions, which are for the collective good. The process of Talanoa involves the sharing of ideas, skills and experience through storytelling. During the process, Parties build trust and advance knowledge through empathy and understanding. Blaming others and making critical observations are inconsistent with the building of mutual trust and respect, and therefore inconsistent with the concept of

Talanoa. Talanoa fosters stability and inclusiveness in relation to dialogue, by creating a safe space which embraces mutual respect for a platform for decision making for a greater good." (http://unfccc.int/items/10265.php.)

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In other highlights:

• Michael Bloomberg and California Governor Jerry Brown offered a pledge to fill the void left by the current US administration.
• Canada and Mexico signed a joint US Climate Alliance Declaration, forming a new North American Climate Leadership Dialogue, progress to be shared in the San Francisco @Global Climate Action Summit (Sept 2018).
• There are 25 signatories to date to the UK-Canada alliance to phase out coal.
• Canada has offered climate finance support to Pacific Alliance Countries.

Slide 8

Caption: Timeline for build-up to COP24 where a "Paris Rulebook" should be finalized. There should be business consultation in Q1-Q2 of 2018.

Slide 9

Caption: Countries with Individual Nationally-Determined Contributions to GHG reduction

Slide 10

Caption: Countries with carbon pricing. The approach is fragmented with some countries using cap and trade, others using tax, others using hybrids.

Slide 11

Caption: The approach in North America is especially fragmented. Oregon has draft cap and trade legislation seeking passage by February 2018. Washington will have cap and trade top of mind in their next legislative session. California with post 2020 regulations now in place, rulemaking ramps up. Virginia has joined RGGI with New Jersey ready to rejoin.

A question from the floor about the pan-Canadian framework.

**Katie Sullivan:** There are still a lot of questions to answer, but the pricing component has more meat on it than the rest. IETA has a proposal, but is waiting for legislation, to come into effect in 2018. Those provinces without their own pricing scheme are working to develop one. The Canadian Council of Ministers of the Environment (CCME) had adopted some provisions. A competitiveness report was expected out shortly.

**Michael Berends** provided an Ontario perspective. The biggest news was the linkage between Ontario, California and Quebec, effective January 1, 2018. The sense was of a rush to join California, and now the emphasis is on understanding the impacts.

Slide 3

Even though the markets are linked they are different in terms of when and how market participants receive allowances and meet obligations (fig. {3}).

Slide 4

Even though the markets are linked, they are different (fig. {4}). Allowances in the different jurisdictions are received at different times and different ways; timing on when to submit for compliance is also different. California has an annual compliance of 30%; Ontario has a one-time true-up at the end of the compliance period (four years in Ontario). The top line is when the allowance is received, the bottom when it the recipient gives it. The rising graphs at the right indicate increasing certainty. Mr. Berends' opinion is that cap and trade is the preferred solution among industrials, at least when compared to a tax.

Slide 5

More participation in the secondary markets is anticipated due to increased market certainty (fig. {5}). There was only one, very large trade between June and November. In a post 2020 market, where will the regulation be? Ontario is unique in that gas companies are responsible for cap and trade while in other markets, it's the power sector. Change could come with Ontario aligning itself with other markets.

Slide 6

The Ontario market is short while California is long (fig. {6}), so the political discussion has been that money will tend to flow to California where allowances are cheaper.

Slides 7-9

A linked market is forecasted to be long in the short-term, where allowances are sitting with governments right now, short in 2025, with companies holding on to their allowances {figs. {7-9}).

Question: Prime Minister Trudeau has suggested a price of $50, how does that overlay the provincial systems?

**Mr. Berends**: The federal government will allow provincial governments to retain their own system if they attain their reductions and will impose a $50 price.

Moderator **Lisa DeMarco**: The carbon backstop ($50) doesn't apply if the federal government finds there is "equivalency" and they've found there is equivalency in Ontario for the period ending 2022. After 2022 there is uncertainty. If reductions are hitting targets, then the cap and trade market will continue.

**Katie Sullivan:** The Ontario market will therefore not have to be a price-taker. The federal government has given the provinces the option – choose between a cap and trade market where price is set by the market versus being a price-taker.

**Jamie MacKinnon** began by explaining how offsets work. Ontario is working with 13 different protocols for determining what is eligible and how to quantify offset credits. Some have more potential than others. One with greater potential is sustainable forestry and sequestration of carbon through reducing the conversion of forested lands. Another is organic waste digestion and management. To this end, Ontario is taking the highest common requirements already in place in both California and Quebec, which may lead to the exclusion of some opportunities to generate credits. There is a lot of potential but some risk in excluding opportunities.

Other categories including landfill gas utilization and planting trees.

Scale is a big deal in generating and procuring offsets. Larger-scale activities carry a premium over smaller-scale activities since the smaller-scale activities will need to be collected for sale in blocks.

Offsets are intended to provide flexibility to capped industries in dealing with emissions reductions requirements and to provide carbon finance to industries not normally included such as agriculture, forestry and land use.

There is a demand for offsets in the California market because they trade at a discount to allowances and offer a savings to capped entities, giving an option for managing costs.

As a compliance entity seeking to reduce compliance costs, there is an estimated 42 million offsets (tonnes of $CO_2$ equivalent) available to purchase from Ontario emissions reduction programs.

Forward trading is available to mitigate project risk.

Things to look out for include whether the MOECC allows early actions that achieve compliance ahead of full market opening to qualify as offsets. If not, the volume of available offsets may not be present early on. Will they seek to establish very strict baselines by using the highest common denominator? Is the forest carbon protocol timely and workable? That protocol represents 60% of the market in California.

Moderator **DeMarco** asked about the limits to using offsets for meeting compliance requirements.

**Mr. MacKinnon:** Up to 8% of emissions may be met by offsets. California started at 8%, and the figure has since been reduced.

**Julie Desjardins**: Transactions made under cap and trade must be recorded in a company's financial statements. Even if allowances are received free of charge, their value must be recorded. The accounting is not straightforward, and CPA Canada has published a guide to assist.

Accounting for these offset transaction means that not only verifiers will get involved, but so will the CFO and accountants and financial statement auditors. Desjardins' advice is to get internal systems and controls ready now. Guestimates and back of envelope calculations will not suffice.

Regarding the Taskforce on Climate Related Financial Disclosures – The G20 Financial Stability Board Chaired by Mark Carney, current Governor of the Bank of England, concluded that "climate change poses a threat to the global financial system." They established the task force, well-supported financially

and intellectually, to identify items for financial disclosure that all companies should provide. Desjardins' advice is to provide these disclosures now even though it's voluntary.

Investors, bankers, capital providers, insurance companies and others will increasingly want this information. Insurance companies will start to refuse to insure some properties based on impacts of climate change. There may be less investment or even divestment based on these disclosures. The Ontario Securities Commission is investigating the recommended disclosures.

All companies, including all asset managers and asset owners, are to provide disclosure on climate change governance and climate change risk regardless of whether it's thought to be material or not. If the disclosures are found to be material or may be material, further strategy and mitigation measures must be disclosed including scenario planning.

Ms. Desjardins believes these requirements are here to stay for several reasons, including the reality of climate change, political will and because capital is global, and investors want these disclosures to assess risks and opportunities.

A recent study by CPA Canada of top 75 companies found less than a third of companies disclosed board or senior management oversight of climate change-related risks despite that being not so hard to achieve. You can get out in front of it or you can leave it to catch up later and find that investors have put a target on your back.

Question: Do we see rating agencies providing ratings related to climate risk?

**Ms. Desjardins:** Canadian ratings agencies have been slow on this issue. There has been a lot of data and discussion about where ratings agencies get information about companies, from third-party providers. This represents a risk. Companies should want to tell their own story including on climate change.

**Mr. MacKinnon** related an anecdote from when he managed emissions trading compliance for a large oil and gas company in Europe. His activity was at least 25% accounting. He got a call one day from a major financial institution that claimed they had information from a third party that the company's exposure to carbon was risky and they felt the company's shares were over-valued by 2 Euro. That got the company's attention, but because it was out in front of the issue, it was able to respond successfully.

Questions

1. Given that 12 years ago a carbon disclosure initiative was released on a voluntary basis with only 40% of listed companies reporting today, what do think the uptake will be for the Climate Related Financial Disclosures?

**Julie Desjardins**: There will be a higher uptake because "investors are all over this" and there is a major buzz owing to investors' beliefs that there are huge opportunities and risks. Disclosures about governance and risk should be easy to do. Capital markets are going to push it.

2. Regarding potential change in governments, is there a risk that California might change its position impacting cap and trade?

**Michael Berends**: California has set in place commitments and certainty out to 2030. A new Governor could change that but with great difficulty.

**Jamie Sullivan**: In July 17, 2017, the post-2020 cap and trade and air quality bills were passed and free of legal threat. It passed with a "super-majority" of 66% which makes it "near-bulletproof" [making it certain – **Ms. DeMarco**]. A dismantlement or pulling out is "not a concern for California anymore". Business supported cap and trade over legislated emissions regulations, or other more intrusive measures.

3. Moderator **Lisa DeMarco:** There is a choice that Ontario has between cap and trade, and a tax.

**Mr. Berends** related a meeting with industry that started with hostility towards cap and trade and in the end, once they saw the benefits and opportunities, welcomed cap and trade v. tax or other solutions.

4. In the Long-Term Energy Plan, there seems to be an attack on CHP. Does that square with these efforts in reducing emissions in the most economical way?

**Lisa DeMarco**: Through additional incentives LTEP specifically encourages the use of waste gas for new CHP that would otherwise be released but not the use of utility-supplied natural gas. She views that as

consistent policy in that the government doesn't want to be offering incentives for something that is also going to be taxed. Industrial CHP that captures heat from a process would be eligible for incentives. But there will be free allowances for natural gas in CHP.

5. A question about decarbonizing the rest of Ontario's economy.

**Ms. DeMarco:** Ontario's emissions from its electricity sector are an order of magnitude below those of our neighbours. But we have done a poor job of decarbonizing the other sectors, like transportation and we need to get on to that.

6. A discussion took place about financial commitments made at previous COPs and not yet honoured. Discussions on that subject at COP 23 broke down. If those financial commitments (funds effectively transferred from developed countries to developing countries in support of a variety of projects and initiatives) are made, progress on that front will continue. The lack of US leadership on that subject is really slowing it down.

7. Will the costs of decarbonizing not simply be passed on to the consumer?

Discussion (various speakers): Costs will go up, Ontario just needs to be better at it than its competitors.

There may be some short-term pain due to compliance costs, especially if competitors don't have those costs. But Ontario is well-placed to compete.

Some competitors may not be facing carbon costs now, but they will be. Right now Ontario is one of those designing the rules of the game. Those who aren't, will have to work under rules designed by others.

**Ms DeMarco:** It depends on the sector, and there's the question of rate base versus tax base. There are also examples of costs not going up, in the cement industry and aluminum production, for example, through various energy-saving innovations. Once the proper market signals are in place it unleashes great creativity, and often net system savings.

*Session summary by David Cheung Atkinson*

Day 2

**Keynote: Patrick Brown**
**Leader, Progressive Conservative Party of Ontario**

Ontario's energy sector has changed since the previous year's conference. Specifically, the Conservative Party has watched as the anger of Ontario ratepayers reached a "fever pitch," anger that has forced action from the Liberals to deal with "skyrocketing" rates. The province's Auditor General herself has criticized the Liberals for hiding the true cost of government policies and for compromising the independence of agencies in the electricity sector.

A healthy energy sector in Ontario has to include a truly independent regulator. Yet too often, independent agencies, whether it's the Energy Board or the System Operator, are forced to follow through on a new directive or initiative from the Minister's Office. The government cannot, on the one hand, claim that it believes in market renewal, while at the same time go cap-in-hand to Hydro Quebec for another sole-sourced backroom deal for power the province doesn't need.

On the Hydro Quebec file, APPrO has advocated that the Energy Board conduct an independent review of the 2016 Hydro Quebec deal for two terawatt-hours of electricity. Two members of Mr. Brown's team, Todd Smith and Vic Fedeli, have also asked the province's Financial Accountability Officer to look into this deal.

During Mr. Brown's last two years as Ontario PC Leader he has travelled across the province and heard from people working harder, paying more, and getting less. When Ontario families get their hydro bill at the end of each month, they know that yesterday's mistakes have led to today's energy policy – and it's being paid for with tomorrow's money. The hard work of getting bills down involves taking real, tangible

steps to remove costs from the system. The Liberal government had years to make the right choices: and only when it came down to the wire, they locked us into a scheme that Mr. Brown calls 'unfair'. The province's independent financial watchdog has said Ontario will be on the hook for up to $93 billion dollars because of this scheme. Then last month, Ontario's Auditor General accused the Liberals of making up accounting rules to hide the true costs of their hydro plan, adding another $4 billion unnecessarily.

Mr. Brown identified three principles that make up the core of energy policy under a PC government:

1. The ratepayer has to be put at the centre of our decision-making. Anything that makes life harder or more expensive for ratepayers has no place in Ontario.

2. Any energy policy that makes it harder to do business in Ontario is an energy policy that is going to put Ontario out of business. In a world where capital is more mobile than ever, we have to face the reality that businesses are tying energy policy to economic policy.

3. The PC policy would be to work with the experts. It's a matter of governance. If you don't have a clearly defined role for regulatory expertise, then the Minister's office becomes the regulator. If you don't have a clearly defined role for the system operator, then the Minister's office becomes the system operator. If you don't have a clearly defined role for expertise in the electricity system, then politicians start thinking they're experts. Then you have an energy system that isn't solving problems. You have one that's lurching from one political crisis to the next.

The previous month, the PC party published over 130 policy resolutions online for members to review and vote on – the result of the largest, most inclusive policy process in the Party's history. In the present context, two in particular:

1. Stop signing contracts for power we don't need. Ontario currently exports twice as much electricity as in 2005, almost all from renewables, at a loss. The Society of Professional Engineers now pegs this cost as a net loss to Ontario of up to $1.25 billion dollars. The Ontario PCs believe in clean, green, renewable power, but not in selling it to Michigan and New York at a loss. The previous year, the Wynne Liberals allowed 4.7 terawatt-hours of hydroelectric power to be wasted in Ontario, including the station at Niagara Falls.

2. Ending bad contracts, e.g. contracts for projects that haven't been given notice-to-proceed, or may have been built in breach of key terms and conditions that were in their contract. If you've negotiated an operation date with Ontario, then you have a deadline to meet. If the terms of your Renewable Energy Approval sets limits on bird or bat deaths, then you have limits you have to hold to. The party is going to be reasonable and fair but also strict. If you signed on to the terms, then you're going to meet them.

It's about the contracts, not the technology involved. Mr. Brown calls the Green Energy Act the Bad Contracts Act. Competition is necessary for markets to function and deliver real results for customers. The cost of solar technology is plummeting around the world and Ontario ratepayers are seeing no benefit from it, thanks to prices that were locked in almost ten years ago. Two years ago, the Auditor General said that hydro customers are overpaying $9.2 billion for wind and solar projects – as a result of the Liberals' 20-year guaranteed-price program for renewable energy. Competition forces companies and technologies to innovate. You don't innovate and compete by signing sole-sourced, backroom, twenty-year deals.

Touching in particular on Northern Ontario – there are thousands of First Nations residents and dozens of remote communities still using diesel generation. We need to harness to bright minds in this room to come up with the best, long-term cost-effective electricity plan for those communities. We need the right competitive framework in place to bring reliable and affordable electricity to remote parts of Northern Ontario.

In closing, Mr. Brown recognized that much of the audience is awaiting more detail on a PC Energy plan. The PCs are taking the time to get it right. People will be seeing the results of that work rolled out ahead of next spring's campaign.

Despite all the challenges, Mr. Brown is optimistic. An Ontario that has a strong, stable energy system that returns our province to being the economic engine it once was.

*— Summary by Lobna El Gammal*

**Market Renewal: What will the electricity marketplace look like?**

**Len Kula**
**Chief Operating Officer; Vice-President, Planning Acquisition & Operations, IESO**

Mr. Kula began by assuring the audience that Market Renewal is a high priority for the IESO.

The current marketplace is almost two decades old, implemented when large central power plants ran the system, and is no longer as efficient as it could be. But since the market opened in 2002, the electricity landscape has seen an unprecedented pace of change, with new technologies emerging and more engaged consumers wanting to see their environmental priorities reflected in government action. Fundamental structural changes to the market are required to create a robust foundation for the future. Previous band-aid fixes are no longer sufficient.

We now have a stable supply of electricity to meet demand well into the 2020s, a full understanding of the market's inefficiencies and design flaws, and the benefit of the experience of other ISOs that have undertaken similar change.

The market has long been mostly about energy – but our supply mix has changed and so have our needs. By unbundling the different services that we need, such as flexibility, the IESO is introducing efficiencies and more competition into the market. The IESO is focusing on three work streams: energy, capacity and operability. The goal of each of these is to send clear and transparent price signals for those different products.

• In energy: scheduling and dispatching electricity resources day-to-day, hour-to-hour and in real time, based on accurate, transparent price signals that are established on a locational basis. This will help to reduce overall system costs. Specifically, stakeholders are working with the IESO to create a Day-Ahead Market based on a Single-Schedule System, as well as an Enhanced Real-time Unit Commitment to improve dispatch in real time.

• In capacity: improving the way Ontario acquires supply to meet medium- and long-term needs with the introduction of a competitive auction in which a wide range of technologies can compete.

• In operability: increasing the operational flexibility of existing and new resources by making better use of those resources and the interconnections with other jurisdictions.

Work began on the plan in early 2016, really ramped up in the fall of last year, and accelerated to a "remarkable" degree in the past few months. It started with the creation of the stakeholder engagements tasked with designing a Single Schedule Market and an Incremental Capacity Auction. Both have finished the first – or fundamentals – phase when participating stakeholders get up to speed on the underlying design considerations. They are now well into phase two, with an in-depth review of the design options and preliminary design decisions are being made. It's a lengthy process because for each design element a wide range of options exist, with trade-offs between overall market efficiency and impact on individual participants.

More recently, the IESO added two new, more long-term stakeholder engagements – Day-Ahead Markets and Enhanced Real-time Unit Commitment. A recent addition under this heading has been capacity exports to New York. The IESO is also working to enhance its demand response auction and operating reserve market to drive greater efficiencies.

As the market renewal initiative progresses, the IESO is making sure that all elements are aligned.

Mr. Kula emphasized that ongoing engagement with stakeholders is critical to success, for example in the issue of existing contracts. "Market renewal is about the facilitation of the move to the new market, not about extracting value out of those contracts." Similarly, a separate working group was formed to address the concerns of non-emitting resources in the design of market renewal.

The new marketplace will be able to adapt more nimbly to an electricity landscape that we know will continue to evolve and change. It will also be one that fosters more innovative approaches to providing electricity to Ontarians. It will flexibly accommodate more engaged consumers, new and innovative technologies, and changes in demand or to the resource mix. It will be a stable market on which both consumers and market participants can rely. And, it will be one that provides certainty for those who want to invest with confidence and one that rolls easily with policy changes.

Mr. Kula promised to reach out to hear first-hand the perspectives of market stakeholders, but urged the audience not to wait to hear from him, but to join the ongoing discussions.

**Panel discussion**

Panelists
Colin Anderson, President, Association of Major Power Consumers of Ontario
Len Kula, COO, IESO
Paul Norris, CEO, Ontario Waterpower Association
Vinay Sharma, Chair, Electricity Distributors Association
Moderator: Jonathan Erling,

Moderator **Jonathan Erling** opened the discussion with some remarks: Somewhere along the road in the implementation of market competition, the Ontario electricity sector lost its way, becoming a relatively expensive and complicated instrument for unit dispatch and short-term scheduling. Buyers and sellers rarely transact in the market and it has become almost irrelevant to investment decisions.

- New generation was built through direct procurement processes, either competitive or in the nature of Feed-In-Tariffs.
- Existing baseload generation, such as nuclear and large hydro, became rate regulated rather than dependent on market prices for their revenue stream.
- We re-contracted the existing NUGs, recognizing that merchant generators could not obtain economic return at prevailing market prices.
- Beyond the mechanics of the market itself, repeated course changes by multiple governments have raised concerns over the stability of policy choices.

**Colin Anderson:** Electricity prices have risen steadily over the years, in all sectors – in industrial class A, by almost 30% from 2012 to 2016, and by over 40% in class B. This makes it difficult for industry to remain competitive. Many of what Ontario's industries produce are commodities, meaning they are price takers in volatile markets and can't simply pass along increased costs.

The 2017 LTEP states that Ontario's electricity price is lower than the average for the Great Lakes region, as reported by the US Energy Information Administration. Mr. Anderson rejects that statement as incorrect. The data in no way supports that claim, he said, perhaps because of some confusion between transmission- and distribution- level rates. Ontario electricity pricing is not competitive, he contended.

AMPCO supports Market Renewal, and participates in many of the working groups. Many of its processes have gone well. Project management fundamentals have been put in place. The market belongs to all participants, not just generators or loads, and all should have a voice.

On the other hand, market renewal is not about to change the current reliance on contracting, or its inherent costs. Nor will it change the existing regime of rate regulation. There is very much a timing consideration involved. It will not yield any benefit until the 2020s at the earliest. It will not be all things to all people.

There are at least three problem areas market renewal will not solve in the short term: competitiveness, capital attraction and carbon. Mr. Anderson had already made the first point; so moving to the second – Volatility in policy and pricing kills investment. Ontario needs a stable policy environment. As to the third point, putting a price on carbon adds yet another obstacle to industry's ability to compete. We do not yet have a blueprint for the post-2020 compliance period. We need to consider how clean Ontario's electricity system already is.

The devil will be in the details in continuing to deal with market renewal.

**Vinay Sharma:** Driven by factors like the declining cost of renewable energy and storage, increasing customer participation, the Climate Change Action Plan, and IESO's Market Renewal Initiative, the energy landscape is changing. (figure {2}). Continuous technological change will revolutionize the utilization of energy.

Slide 2

LDCs have been dealing with a number of these developments (fig. {3}), like microgrids, including storage. There is a need for standardized time-series data, so that it can be transparent and accessible to all. LDCs have already been experimenting with or deployed some of them. Issues are as simple as managing the distribution system or as complex as a fully islanded subdivision or industrial plant.

Slide 3

A recent paper by the EDA, "The Power to Connect: Advancing Customer-Driven Solutions in Ontario," endorses innovative solutions, from small generation to storage to electrical vehicle charging etc. The question is how to create an environment to facilitate that, without undermining the safe and resilient operation of the system.

Like AMPCO, the EDA wants to improve efficiencies across the board. Customers are also worried about the rising slope of the price curve. Again, the EDA wants to see the IESO procuring resources through market mechanisms without micromanagement from government. LDCs see themselves as market operators passing market opportunities to their consumers.

**Paul Norris**: The IESO has tried to keep market renewal a technical discussion, but it's become a political conversation. That's apparent in the LTEP and in the Minister's statements, especially at the OWA's own recent conference. While not *the* solution, market renewal is a path toward improvement.

All the rate-regulated and contracted assets are moderating prices today; they're not an either/or matter versus market renewal.

The OWA sees three fundamental principles of particular interest:

• Make the most of what you have. Patrick Brown earlier referred to some 4.7 TWh of hydro potential being spilled the previous year. That's a trend that's been increasing over the last five years, with no end likely until 2023-24. We're also not using the flexibility the existing hydro fleet offers through storage, or the integration of other renewable sources. Ontario has 220 hydro assets in the ground.

• Plan now for what we need. First Nation communities in Northern Ontario have significantly increased their participation in recent years in building hydro assets. The gateway to the 1200 MW in the Moose River basin is open. It takes 10-12 years to get through the regulatory process to build a hydro asset, large or small. Do the constructs in market renewal contemplate the buildout of hydro in northeastern Ontario? We should have started preparations for new hydro already.

• Remember the context we're in. Ontario has been building socioeconomic policy as well as contracting for new resources. That means the equity participation of Aboriginal communities in northern Ontario. Capacity has been set aside for such partnerships. Loan guarantee programs have been set up. There are 21 First Nation communities with an interest in building small hydro for the new power line. Will market renewal include a set-aside for First Nation projects?

Question from the floor: How can the IESO maintain a capacity market while the government is executing out-of-market deals with Quebec? Is the biggest risk to the market renewal process a government that undermines its credibility?

**Len Kula:** The world has evolved since market opening in 2002, when resources and demand seemed to be stable matters. Now, how do we combine a one or two-year capacity auction with resources with lifetimes of up to a century? The capacity auction can't solve all problems. It's a matter of balance.

With respect to the question, market renewal is a first step to build upon, not the answer to all problems. Markets can't so rigid they can't accommodate change. We need a flexible market framework to accommodate policy changes.

**Jonathan Erling:** Some of the elements in market renewal are about market mechanics to bring Ontario level with other jurisdictions in North America. How do the various parts of the process fit together? Are they an all-or-nothing integrated package?

**Len Kula:** A lot of it is about the mechanics of dispatch and the like, but there are aspects that also address broader considerations in the sector. The incremental capacity auction is less about mechanics and includes policy tie-ins. There are still open questions. We have to be cognizant of the evolving world.

**Jonathan Erling:** Some of North America's other capacity markets have encountered challenges around procurement of renewables, to achieve environmental goals, resulting in low marginal costs which undermine the markets' pricing mechanism. Is that going to be a problem here?

**Vinay Sharma:** This isn't a new problem. When Ontario Hydro owned all the generation, they also would shut down some of their plants to match supply to demand. You have to build in extra capacity. The only new factor is an operational inflexibility that today's renewables have created, but we've always had to absorb the cost of unneeded capacity. It's just that now the cost is apparent.

**Paul Norris:** There will be another Hydro-Quebec deal, or another out-of-market political opportunity. The problem people had with the Quebec deal was that it was sole-sourced and not transparent, not over the price of the commodity. The lesson is that we need to have a response the next time one of these comes along.

**Colin Anderson:** The various working groups have coined the phrase "little-G governance," to cover how the various elements within the IESO's purview dovetail together, versus "capital-G governance," that illustrates for example the Hydro-Quebec deal. The question is how to make the market so robust as to discourage such intervention.

**Len Kula:** In some ways Ontario is late to the game in designing a capacity auction. In other ways we're ahead of the game, whereas the US markets are trying to use capacity markets to drive their resource mix to the robust mix that we already have in Ontario. What now are the other factors that we need to incent here? The non-emitting working group is working to that end.

**Jonathan Erling:** Will we ever be able to use the price of carbon offsets or a carbon tax as an incentive for renewables? Can we move away from procurement for renewables and just use market mechanisms?

**Len Kula:** That would be an admirable goal. It's something the working group is addressing.

**Colin Anderson:** The LTEP should talk about three things: cleanliness, reliability and affordability. So the system is pretty reliable, with maybe some power quality concerns in certain locations. We have also achieved a very green system. Now it's time to look at the third one.

**Vinay Sharma:** In Ontario we've been building the grid according to cost-based solutions rather than market-based solutions. We started to get there in 2002 but government shut that approach down and we're paying for that today. Now with market renewal we have the opportunity to create robust market signals.

**Colin Anderson:** In 2002 the spikes in electricity prices were blamed on the market. In 2017 it's being blamed on contracts. Be careful not to throw out the baby with the bathwater.

Question from the floor (Lisa DeMarco): The process is actually solving for carbon rather than solving for price. How likely is Ontario to be able to solve our surplus capacity problem by labelling our largely decarbonized generation fleet, and the products that are made with it – particularly when our neighbours have a much higher carbon emissions rate per unit product? {Perhaps Ms. DeMarco could review the wording of this question better than what I've been able to make out – SK ed.}

**Len Kula:** In addition to the ongoing discussions, there needs to be another conversation around how to value things in this market beyond energy and capacity, to value the type of system we operate.

Other panelists agreed. The Ontario system is already cleaner than most. We need to recognize that.

*— Session summaries by Steve Kishewitsch*

**Panel discussion: Is it time to deregulate local generation?**

Panelists:
Anthony Haines, Toronto Hydro
Gordon Kaiser, NGEIR Deregulation Panel
Adonis Yatchew, University of Toronto
Moderator: David McFadden, Gowling WLG

Moderator **David McFadden** asked: Does the development of micro-grids and distributed generation pose an opportunity for or threats to LDCs? What kinds of business models should be considered by LDCs to ensure successful and appropriate energy development throughout the province?

He also noted the 2017 LTEP focuses on LDCs.

**Dr. Adonis Yatchew** first described the forces determining the structure and regulation of the electricity industry. Historically, increasing returns to scale drove the development of larger and larger generation units and utilities. Transmission and distribution grids were natural monopolies, but at very different spatial scales. Economies in the distribution segment consisted of three types: economies of scale, economies of density, and economies of contiguity. In the latter, providing service in a contiguous area was seen as so important that exclusive franchises were granted to distributors. Vertical economies of scope caused single entities to provide generation, transmission and distribution. Ontario Hydro provided this vertical model to remote areas, while numerous municipal utilities provided distribution in urban areas. Other industries were also vertically integrated for economies of scope; for example, phone companies provided both local and long-distance service. These four economies were centripetal – that is, they caused the electricity industry to be centralized.

Economies of scale in generation began to level off in the 1970s, and the minimum efficient scale began to fall. The trend towards greater regulation also began to reverse. Deregulation, and emphasis on markets and privatization followed. For technological and political reasons, centrifugal forces gained prominence – those that promoted decentralization. Natural monopoly segments of the market were separated from those that could be potentially competitive, and vertical unbundling in electricity followed that in telecom and gas markets. This led to the breakup of Ontario Hydro. Incentive regulation of monopolistic components replaced cost of service and rate regulation.

We are presently in a revolution in energy markets. Scalability is the common theme in this revolution. For instance, in oil markets fracking has brought the scale of investment in oil wells much lower than previously – up to one thousand times less. The strategic power of OPEC has been weakened, and market behaviour has been changed. In electricity markets, solar, wind and (soon) storage are new decentralizing forces. Even grids themselves are being thought of as scalable with the advent of microgrids. Variable and distributed resources might be seen as an argument for retaining grid networks as natural monopolies. In order to assess this, one must examine whether there is still a separation of monopolistic and competitive activities in the industry.

Over a decade ago, the OEB held a hearing on the potential for creating new embedded distributors. The Board decided against the application, as it would have created a patchwork distribution network and that it would undermine the economic efficiencies listed earlier of the incumbent distributors. Enabling IT technologies and the proliferation of Distributed Energy Resources (DERs) may now have changed that calculus.

It was also argued a decade ago that regulatory arbitrage or "cherry picking" would be possible between traditional distributors and embedded distributors. Similarly, it will become a challenge to establish reasonable tariffs for connection of microgrids to the existing distribution system, and for distribution rates charged to microgrid customers. Microgrids could aid with resiliency in the face of threats from either weather or cybersecurity. For example, a microgrid near Tokyo provided uninterrupted service during the Fukushima disaster. With centrifugal forces now pushing towards decentralization, Mr. Yatchew thinks harmonious decentralization should be the goal – with balkanization to be avoided. Scalable technologies are transformative and potentially disruptive.

**Gordon Kaiser:** Now is the time to deregulate local generation, particularly to help mitigate the high costs faced by commercial and industrial customers. The IESO's Conservation First framework has subsidized CHP facilities, and by its end in 2020 there will be 230 such distributed CHP units in place. Customers install CHP at their facility in order to reduce the electricity costs. Energy storage costs are likely to fall 15-20% over the next 5 years, and these will serve a similar purpose for these customers and will grow the self-generation market. These technologies are limited to self-generation as an artifact of 16th century property law, but this is not the most efficient approach. Small customers do not have the capital or expertise to deploy these technologies themselves – they want to be able to share facilities with fellow customers.

LDCs are beginning to see DERs as opportunities for important new revenue streams. DERs can reduce infrastructure needs and costs for LDCs, and with Virtual Net Metering (VNM), LDCs can reduce the cost of system peaks. External organizations like Florida Light and Power or others will compete with local LDCs to provide DER solutions. Toronto Hydro and other LDCs should be able to offer DERs as either

regulated or unregulated services. If the goal is to deliver the low-cost energy from DERs in the quickest way possible, then the abilities, expertise and capital of LDCs should be harnessed.

An example of rate-based DER deployment through the local utility is SoCal Gas's recently approved CHP case before the California Energy Commission. Additionally, smaller customers like having a regulated service offering because they can complain to the regulator in the case something goes wrong. Small customers do not want to become generators, they want to go about their existing business. Regulated utilities can use the new revenue streams from DERs to balance out any costs from stranded assets they might also face, thereby easing the transition to a new DER paradigm.

Mr. Kaiser then asked if the regulator is prepared to manage the transition to a distributed electric grid. He suggested that they have to, and that it will be an interesting time in the near future for them. Ontario's Minister of Energy has directed the OEB to file an information plan by January 31 2018, identifying barriers to the development of DERs at scales and locations that provide value to transmitters, distributors and customers. Mr. Kaiser proposes that the primary barrier is the restriction of local generation to behind the meter solutions. LDCs that do not participate in the new DER market will be absorbed by LDCs that choose to participate. LDCs will be able to make money from VNM and renting their wires to others for network access.

**Anthony Haines:** The "integrated grid" has arrived – one where electricity is produced and stored more locally and used in new and different ways. LDCs are becoming more responsible for the balancing of the electricity system as a whole – taking supply sources and balancing them with local demand. Thus, Ontario will eventually end up with an electric grid where LDCs fill the role Load-Serving Entities (LSEs).

Climate change is upon us. As 70% of greenhouse gases are produced in the places we live – mostly large cities – the solutions will come from these cities as well. As such, LDCs will play a critical role in combatting climate change. They will do this by providing electric vehicle (EV) charging, and in the heating and cooling of buildings. The capacity of distribution systems will come under enormous stress in the face of these demands.

The traditional method of renting system capacity through rates is outdated, and customers will increasingly pay for the service in a transaction-based pricing model. In a residential home, the uses of electricity will become more diverse, and the ways in which the customer engages with the grid will reflect this diversity. Prices will reflect this diversity in service.

Mr. Haines described a tendency for entrepreneurs and those pitching him at Toronto Hydro to want to partner in the development of their new offering. This implies that the entrepreneurs need certain attributes of the grid, but cannot pay for them. Ontario's electricity system has experienced huge transformation over the last 10-15 years, and at a large cost. These costs have been socialized, and imposed on future generations. Those proclaiming grid parity may not be including these sorts of socialized costs. Microgrids and distributed generation are neither a threat nor an opportunity – they are simply the new distribution model that must be adapted to. Putting a fair price on transactions occurring on the distribution grid will drive change within LDCs, but will not be the end of the LDC sector.

**David McFadden** asked the panel if LDCs are worried about stranded costs in the transition to a new electricity grid, and whether policy makers are aware of new cost claims.

**Mr. Haines** doesn't believe in the "utility death spiral" concept and instead believes this is a high point in the LDC industry. He does not worry about stranded costs, but rather worries about having the capacity to meet growing demand. For instance, a charging Tesla EV can double the load of a house. EV quick chargers can draw as much power as a 30-story condo tower. Combined with other climate change initiatives, load will grow and the average cost will shrink as fixed costs are spread more widely.

**Mr. Yatchew:** There are utilities that are worried about stranded assets. A recent confrontation between Elon Musk and Warren Buffet's utility (that he is invested in) provides an example.

The transportation sector is the hardest to decarbonize. A number of car manufacturers from the past have not survived; similarly, many utilities may not survive. There are opportunities for forward looking utilities, but the regulator cannot hold them back. Regulatory innovation is needed for LDCs to take advantage of these new opportunities and avoid stranded assets.

Question from the floor: How it would be possible to maintain a level playing field between LDCs and others considering the advantages LDCs have in terms of cost or customer control?

**Gordon Kaiser**: It would not be possible to have an entirely level playing field, but some rules could help. For instance, in the SoCal Gas rate case in California, the regulator insisted that cost of service pricing would be instituted, and that any losses would be covered by the utility's shareholders.

**Anthony Haines** differentiated between utility activities and monopoly activities within an LDC. EV charging is an activity that an LDC might participate in, but not necessarily have a monopoly in. An LDC might give to the charging market an honest price reference and an early service offering push. Maintaining the correct balance of demand and supply resources will allow for the right price at the right time. He contended that market forces at the distribution level would prevent monopoly abuse.

**Mr. Kaiser:** LDCs might also try to limit choice in a new market, as became evident with certain smart meters in Toronto.

**Adonis Yatchew**: Monopolistic and competitive functions have traditionally been separated from a regulatory standpoint.

Question from the floor: What protections would be needed when LDCs (apply to) put local generation into their rate base.

**Mr. Kaiser:** The usual protections surrounding a rate-regulated product would be appropriate. SoCal Gas had originally wanted market prices on their rate-based CHP units, but the regulator insisted that if they were to be rate-based they would need to have a regulated rate of return. If a utility is instructed to put something into their rate base, then they will promptly do so.

**Mr. Haines:** If Toronto Hydro proposed a particular solution to the regulator for rate base treatment, and if a better solution from either Toronto Hydro or a private entity were available, then the original solution should be denied. Better outcomes will result in opening up more integration and flexibility around which solutions a utility is allowed to put before a regulator.

**Mr. Kaiser** noted that an energy storage facility is being installed to support transit services in Toronto as an example of how a regulator can be more flexible in what solutions are allowed to be rate based..

**David McFadden** asked the panel how the transition to a distributed grid can be financed.

**Mr. Haines:** Toronto Hydro recently did a bond issue for under 3%. Investors like utilities. With these new utility activities come a new risk profile for investors, and so the cost of capital may change somewhat to reflect that. The question in his mind is through what legal entity the new activities will be performed, and how existing customers will be protected. With either a higher cost of capital within a single entity, or a model where these activities are put into a new entity, the governance model of utilities will have to be revisited. Municipal utilities will struggle to come to terms with the new governance and risk profile issues, and whether they want to participate or instead exit the market.

Question from the floor: would Mr. Haines elaborate further on his vision for LSEs?

**Mr. Haines** would duplicate the model in Ontario's natural gas market, where the gas utilities procure a range of portfolio solutions in order to serve their load. The portfolio can then be managed and hedged on a day-to-day basis, and enhanced with long- and short-term contracts. While storage might look different in the electric grid, there are demand response capabilities that can look like storage. Long-term supply could be handled by a centralized body initially, with shorter term supplies through the LDC in regulated and unregulated distributed generation, battery storage systems, and demand response customers.

Mr. Haines proposed that the 27,000 supply contracts in Ontario be distributed to the corresponding LDCs. Some of these could be renewed at the end of their term if they continue to be the least cost solution, and some might not be renewed. If all contracts remain centralized at the IESO, then system management will become very difficult as the grid operator will not have visibility into the distribution system (as compared to how LDCs would). To give the IESO visibility into all distributed loads and suppliers would be inefficient. He predicted that these sorts of solutions would be inevitable given the market forces now present, and that it was only a matter of how much pain is experienced in the interim before the system arrives at these solutions.

**Mr. Kaiser**: In the case of VNM, the IESO and LDC need to work together in order to match local load and supply as is the case in a railroad.

Question from the floor about what regulation would be necessary in order to allocate cost and value appropriately in the face of new loads from the electrification of transportation and space heating.

**Gordon Kaiser**: The LDC is the natural party to charge EVs.

**Adonis Yatchew**: The cost of EVs currently means we are not yet at a tipping point in the electrification of transportation.

**Anthony Haines:** Climate change targets (limiting warming to 2 degrees Celsius) will only be achieved if 50% of vehicles are electric by 2030 and 100% by 2050. This suggests a conversion of about 5% of the fleet each year; each driver would on average get the change to buy about one more fossil fuel vehicle before they have to go electric.

**Mr. Haines:** Most cars will have an electric plug version available within the next 3 years, and so the barrier to adoption will become the charging infrastructure and where to charge. Toronto Hydro does not play the only role in ameliorating range anxiety, but it does play a key role. Toronto Hydro could promise drivers that they do not have to go more than two blocks to find a charger. Just as people do not have a gasoline tank at home, why would they buy a home charger? With a Tesla fast charger in a downtown condo, a driver could be pushed into a commercial account by the volume of electricity used and thereby subject to demand charges; Mr. Haines related just such an example where said driver received an $810 electricity bill for the month. Of this $810, $10 was for the electricity commodity and $800 for the demand charges. Rate design applicable to EV charging may have to be redesigned. Mr. Haines also proposed that a stationary battery might be useful as a buffer between an EV and the grid. This stationary battery – and charging solutions in general – could either be deployed by Toronto Hydro or others, but will need to be deployed soon.

Question from the floor: How can the massive sunk cost of contracted generation be balanced with a vision of DERs and LDCs as LSEs? Will this new vision end up being less expensive than today's system?

**Mr. Haines:** Although Ontario is in an oversupply situation at the moment, the electrification of transportation and building heating and cooling will increase system load. Stranded assets will thus not be a problem; the problem will instead be how to keep up with demand in an environmentally responsible way. The equivalent of 5 Darlington nuclear plants would be needed in order to fulfill the new demand created by Toronto's TransformTO climate plan.

In the short or medium term, over-contracting of supply is a problem. The closure of Pickering will reduce this oversupply in the medium term.

Mr. Haines believes the flat demand in the LTEP is fundamentally wrong.

**Mr. Yatchew** is concerned that Ontario is spending a lot of money to decarbonize its economy, but these solutions are not transferrable to China or India or other high demand and high carbon economies because they are too expensive.

*— Session summary by Andrew Clare*

**Panel discussion**
**Powering the bottom line: Diversity solutions for Canada' energy sector**

Panelists
Rebecca Black & Joanna Osawe, Women in Renewable Energy (WiRE)
Michelle Branigan, Electricity Human Resources Canada (EHRC)
Lyne Parent-Garvey, chief HR Resources, Hydro Ottawa
Lisa Marshall, OPG
Moderator: Reena Goyal, IESO & Young Professionals in Energy (YPE)

**Rebecca Black:** Would a business like to achieve significant growth through one specific business initiative, increase its internal innovation, be more successful than its competitors through one key differentiator – inclusion of diversity? A recent result from Deloitte's research show that when firms bring people together with different experiences, mindsets and skill sets, they outperform the rest.

**Joanna Osawe:** Look at what voices are missing from your organization. WiRE provides opportunities and contacts for qualified women, but it cannot act alone. It's everyone's responsibility to integrate diversity strategies.

**Michelle Branigan**: The Minister in his remarks the previous evening said Canada has a strong and diverse energy supply. But the same cannot yet be said of our workforce. Women's participation in the energy sector hovers around 20%. In the trades, that drops to around 5%. We need to go beyond talk and good intentions to support the industry in improving those numbers.

In March 2017 EHRC launched the Leadership Accord for Gender Diversity. Those at the top of the industry need to set the standard for others to follow, to be visible for all stakeholders and to incorporate into their organizations' business strategies.

The Accord is a public commitment by employers, labour organizations and by educational stakeholders to promote diversity and increase the participation of women in the sector – particularly in the trades and technical positions.

The signatories undertake internal baseline assessments of their own policies and practices. Every two years the companies will review progress and report on actions. EHRC will maintain an oversight function and provide assessment tools by way of support.

EHRC isn't looking to find organizations doing things wrong. Companies will progress at different rates. The focus is on measuring progress.

The Accord is available at electricityHR.ca {please verify – SK}

**Lyne Parent-Garvey:** Hydro Ottawa developed its first diversity plan in 2013, by a working group of front-line employees. It included targeted initiatives for specific groups: women, minority groups, persons with disabilities, youth, LGBTQ, new Canadians and First Nations. 70% of the initiatives have been completed, 20 brought forward and 10% abandoned. A key component was the formation of a Diversity Council. In 2016 members of the Diversity Council and its three subgroups shaped the next, 2017-2020 plan. Hydro Ottawa has joined the Leadership Accord.

Girls and women need to see other women in training, technical and leadership roles. 40% of the Board of Directors and 20% of the executive management team are women. The organization offers a program, 'Taking the Stage,' focused on leadership roles for women. A partnership has been formed with the Ottawa Catholic School Board to educate and encourage young women at high school level to consider a career in technical roles.

[Ms. Parent Garvey played a video]

**Lisa Marshall:** OPG is a member of the Leadership Accord and has a diversity and inclusion strategy, with a corresponding program. OPG has been providing coaching and training to its hiring managers on diversity and inclusion. It has created an Indigenous recruitment and retention working group. It has recently started a Mentoring Plus program for visible minorities, an initiative by one of OPG's senior executives, who have been stepping forward. OPG is partnering with the Canadian {something???} for Diversity and Inclusion.

In 2008-09 OPG launched an Empowered Women Program to develop leadership and communication skills, putting about 600 participants through. About 20% got some kind of promotion just after graduating. After joining the Accord in 2016 OPG reached about 100 women in the company, growing to about 800 in 2017.

Finally, Bridging the Gap moves women through the authorized nuclear operator program.

Question from the floor: What advice would you have like to have when just starting out?

**Lyne Parent-Garvey:** When starting out, I was given some great advice: be fair and be consistent. But the advice I would have needed more is that change takes time.

**Michelle Branigan:** Be authentic and don't try to be one of the boys.

Moderator Reena Goyal: What is needed to bring about real change?

**Lyne Parent-Garvey:** Everyone working in the industry needs to support this change. Everyone in the industry has a role to play, to act as a mentor and support those coming through. Set targets, or we'll be having the same conversation thirty years from now. This is not about affirmative action, though I'm not an opponent of that, this is about levelling the playing field. At the end of the day we're evaluated on performance.

*— Session summary by Steve Kishewitsch*

**Panel: Alberta's design process**
**What's necessary to keep the market moving forward?**

Panelists
Kris Aksomitis, Power Advisory LLP
Evan Bahry, Independent Power Producers Society of Alberta
Janene Taylor, TransCanada Energy
Moderator: Pelino Colaiacovo, Morrison Park Advisors

**Evan Bahry** introduced the subject. Twenty years ago, Ontario and Alberta were both racing to open their power markets focusing on energy markets. Both are now considering capacity markets. Ontario left the energy market race early, while Alberta stuck with it for 17+ years. It had the fastest growing demand for power in North America and the energy market was the prime vehicle for meeting demand. Prices reflected the profound level of competition and have traded along with the price of natural gas, which has fallen in recent years.

Two years ago, the Government of Alberta published the Climate Leadership Plan and decided to retire 5-6 GW of coal-fired generation over the next 13 years, while adding 5 GW of renewables. Alberta effectively left the energy market behind with these policy decisions impacting capacity. The environment for private investors also became difficult with the government's dictation on the fuel mix.

For its part, Ontario is a highly contracted market now looking for the efficiencies of a capacity market. Alberta had an efficient market and is migrating voluntarily to a capacity market. There are several working groups now studying and advising regarding the potential evolution of the capacity market. Considerations include the existing and future thermal supply, future renewable supply (fully contracted, approximately 400 MW each year over 13 years where costs are recovered under 20-year contracts), capacity market (with revenue risk and variable cost recovery), community generation commitments (smaller scale solar and CHP) and existing renewables.

Existing renewables is the constituency most challenged by a capacity market. How those projects will continue to recover their costs is an open question. IPPSA's members are very involved in the working groups and the government's policy construct.

Moderator **Pelino Coliacovo:** Alberta now has three streams of activity: capacity market, new renewables procurement and community energy market, with existing renewables as an orphan in the background. Shades of Ontario with the compartmentalization of different contract styles and types of resources.

**Janene Taylor**: With Napanee coming online in 2018, TransCanada Energy will have 5000 MW operating under long-term contracts in Ontario. It is currently operating 460 MW of cogeneration in Alberta. Prior to the termination of coal-fired contracts in 2016, TransCanada was the largest participant in the Alberta energy-only market.

Markets are very sensitive to policy interventions. The announcement of the Climate Leadership Plan at the end of 2015 has led to major changes being contemplated. The Alberta ISO launched a review to look at the sustainability of the market design, and determined that less private capital would be available for investment, at a higher cost. The ISO looked at longer term contracts and cost-of-service models but ultimately landed on a capacity market as the most attractive option and this was endorsed in 2016, setting off a consultation period featuring five working groups.

The Government of Alberta wants to introduce new legislation by the spring of 2018. There is an almost unmanageable number of interdependencies to consider – the eligibility of demand reduction resources, energy efficiency, etc. A seemingly endless list of questions needs to be answered; such as, how will the demand curve be set? What is the cost of new entry? How will the energy only market be modified to facilitate a capacity market? What type of penalty structure is required to ensure delivery?

The ISO has recently switched gears and will consolidate the five working groups into three new stakeholder groups in January 2018, dealing with the capacity market, energy and ancillary services market, and technical issues. The ISO and Brattle Group will chair the stakeholder groups and publish reports including the first in January setting out the new structure.

Expectations for the Brattle report in January are:

- Plan for few rounds of stakeholdering followed by a comment period for industry
- 3-4 year forward capacity market with 1-year terms
- Energy market mitigation
- Aggressive penalty structure

TransCanada's view is that 1-year capacity terms will not achieve the ISO's goal of attracting low-cost capital investment. They will not provide revenue certainty under longer term contracts, like the approach taken with renewables and like those markets in the UK and New England.

TransCanada is also heavily involved in the cogen working group. Cogen gives consumers and operators a chance to work closely together.

Alberta has a healthy reserve margin. If new capacity is required for 2022-2023, signals need to be sent now to attract low-cost of capital investment then.

**Kris Aksomitis**: Power Advisory has been working with the Cogen Working Group to consolidate the view of a dozen or so cogen operators regarding the capacity market, and to make recommendations regarding new market design. The intention is to ensure the benefits of cogen are properly recognized and that no obstacles to efficient investment are introduced. Cogen is the easiest way to decarbonize today, especially in the oil sands. Open access investment has worked for cogen operators to sell excess generation to the market after supplying their own needs or providing a hedge to the market. This has allowed companies to manage their business in their own way under what are effectively bilateral contracts, either under a self-supply model or a host + third-party utility model.

One third of generation capacity installed today is cogen. The cogen model has been successful.

The ISO published a paper in November 2016 citing a problem with the energy market – too much volatility – and citing potential solutions – increasing the price cap. Capacity markets were not being discussed in November 2016, the focus was on coal retirements and lawsuits, renewable energy procurement (REP) and a carbon tax. There has been dramatic change in the past year.

In the next month through to Q1 of 2018, the REP will result in new contracts, the new carbon tax will be established, the ISO will release its draft market design to be filed with the regulator and introduced in new legislation. In this time, the ISO will go from being the facilitator and rule-maker to be the counterparty to all contracts and therefore a market participant.

How all the different incentives and levers (capacity market, energy market, carbon tax, REP) will ultimately influence investment over the next 20-30 years is yet to be understood.

Questions

1. Regarding existing coal plants that could be converted to gas, how would the capacity market incent those conversions?

**Evan Bahry:** TransAlta, Capital Power and Atco (the "coal owners") have all announced plans to convert some or all their coal assets. The conversion costs are relatively low, such that the converted coal plant can do well in a capacity market where the capacity price is set by new entrants because they are largely if not completely depreciated assets. Those coal owners were appropriately compensated for their truncated contracts and so there is confidence among those investors that they can again invest in the market.

**Kris Aksomitis**: The working groups are trying to incent low cost of capital investment, low operating costs, flexibility to integrate renewables and a lesser carbon footprint. The particular design choices will decide whether coal to gas conversion is more or less competitive. It's relatively inexpensive to

do and can be back in the market fairly quickly but, relative to a new plant competitor, will fall short in other areas. Will all the levers remain stable over time, or will one goal become more important than others and therefore be incented more?

2. Alberta has supply adequacy today, but for how long?

**Janene Taylor**: That was one concern I was raising, that to ensure supply adequacy later, we need to incent new investment from now. If the ISO isn't careful about its design choices or acts too slowly, it may inadvertently back itself into a corner over the technology needed to deliver the program on schedule. The longer Alberta waits to act, the less reserve adequacy and the less competition it may have.

3. How will demand response fit into the new market design? Will it be incorporated in the capacity market, left in an energy market or treated as renewables are set to be contracted for? Similarly for storage.

**Janene Taylor**: The working groups are tackling the question of which technology groups would be eligible to participate and how demand response and storage are included and subject to the same rules of the capacity market. The details have not been worked out. The question of whether those resources will show up or not is still open.

**Kris Aksomitis:** The goal is to allow universal participation, but performance requirements must be created for all types of assets. In the US, demand response was an early participant in various markets but participation from that sector diminished as market performance requirements tightened up.

4. APPrO is considering include storage and demand response suppliers. Is the same planned for IPPSA?

**Mr. Bahry**: That is still to be determined while some of the market rules are still being designed.

5. Alberta is adding a carbon tax at the same time as the market re-design – is the predesign energy price going to net out the same later as it is today, with carbon price added into the mix?

**Mr. Aksomitis**: Today's carbon price is not a representative Alberta price. It's averaged $60/MWh since market opening, but year-to-date it's in the low twenties. The price on carbon will cause an immediate price jump due to the coal plants, but in the longer term will have less impact. There is an existing carbon tax, it's just that it will increase for coal, decrease for new combined cycle and be a wash for simple cycle. The carbon tax will have an immediate but short-term impact on pricing; it will have greater impact on dispatch such that coal plants will operate less.

**Mr. Bahry**: A new floor will be established, up from $20/MWh. The ability of consumers to adapt to and perhaps avoid price spikes will mitigate pricing.

6. Regarding governance and the AESO as a market participant; what governance has there been and what issues do you see going forward?

**Janene Taylor**: Up until 2008 AESO made rules without consultation from industry and subject to approval of the ISO Board. After 2008 the legislation was amended to require AUC (Alberta Utilities Commission) approval, subject to lengthy market participant interventions. The process became very expensive and cumbersome. The ISO is setting out new rules, and market participants have had more upfront involvement such that what will be submitted to the AUC will hopefully be less contentious and already acceptable to market participants. {Is there some confusion here between AESO and ISO? Hard to tell from the recording. – sk}

**Mr. Aksomitis**: The Government of Alberta published a 200-page report on governance in other markets and has given two weeks for review and submission of comments, possibly too quick a pace that may result in bad decisions.

**Mr. Bahry**: The Government of Alberta planned to reduce the carbon footprint of the province over a very short time. The objectives of the Climate Leadership Plan were very clear from the outset and just a few policy items were targeted for change that are rightfully theirs to deal with, (reserve targets, improving stakeholder engagement and cost allocation), and left a great deal of market structure for AESO to deal with. There have been a few unintended consequences: the PPAs that were returned due to elevated carbon tax and the market design change in power.

In contrast, Ontario has had the Feed-In-Tariff, Long-Term Energy Plan, the Samsung deals, the Hydro-Quebec deals, where the IESO has been forced to react. There seems to have been much more government interference in Ontario than in Alberta.

One concern is that Alberta has opened the issue of cost allocation despite the ISO's 100+ year experience dealing with that item. Hopefully the government will leave it to the experts and not favour one customer class over another on the eve of an election.

The market is much different from before. It is no longer commoditized where buyers and competitive sellers can check the price. The AESO and AUC are making and approving rules so that the market becomes "you and the rulebook" rather than "you and your competitor" who determine price.

7. If market circumstances remain as is, what will the split be between capacity and energy market revenues?

**Kris Aksomitis:** Public statements have indicated a split between energy at 80%, capacity 20%, roughly the same historically as other markets. That will be subject to the final version of rules that are put in place and dependent on whether the target is to recoup all capital costs from the capacity market (more a 50/50 split) or not (80/20).

**Janene Taylor**: I think there will be more mitigation than afforded by an 80/20 split but there are mixed signals coming from government and AESO.

**Evan Bahry**: There are 5 GW of $0, price-taking renewables, another 5 GW of $0, price-taking cogen and 5 GW of price-taking of potential coal-to-gas conversions. This is like the Ontario market with all the contracted assets including nuclear. There will be pressure on the capacity market for assets to be able to recover costs and this will look like higher fixed costs to the public.

8. In the pre-market redesign era, the one kind of capacity that still looked like it would get built in a competitive energy market, was gas peakers. In the capacity market world, how do peakers recover their costs? Does the 80/20 split get reversed?

**Kris Aksomitis**: In a low-gas price world, the likely price when everything is completely mitigated is $20-$25/MWh, reflecting fuel costs. On a smoothed-out basis, the cost of capacity for a new build is $15-$20/MW. If the prices are supposed to reflect cost recovery, it's hard to get past 50/50.

**Evan Bahry**: Flexibility can be procured through reserves, if enough volume isn't available through ramping to respond to the renewables. If you can't procure it through elegant design, do so bilaterally.

*— Session summary by David Cheung Atkinson*

## Political drivers building for Election 2018

Panelists
Greg Lyle, Innovative Research
Tim Murphy, McMillan LLP
Tom Parkin, Sun national columnist
Will Stewart, Navigator Limited
Moderator: Sean Conway, Gowling WLG and Ryerson University

### Opening presentation: Greg Lyle, Innovative Research

Greg Lyle shared the results of recent public opinion research conducted in Ontario. He explained that his presentation combines the results of two online surveys and a telephone study conducted between late October and mid-November 2018.

Slide 5

Overall, public opinion that the provincial government has a good electricity plan has increased. In a previous November 2016 survey, only 10 percent of respondents indicated that the government has a good plan for electricity, while in November 2017 that number rose to 16 percent.

Slide 6

Most survey respondents indicated that there needs to be more accountability in the energy sector.

Slide 7

People are divided on who should set long term goals for the energy sector. About 39% indicated the regulator should play this role while 36% indicated that the government should play this role. However, it is clear that people prefer regulators be in charge of putting plans in place to achieve long term goals.

Slide 8

In terms of ways to create more accountability, 60% of respondents indicated that more needs to be done to inform the public of major decisions in the energy sector. It is not just a matter of doing the consultations, rather it is a matter of being seen as doing consultations. Mr. Lyle cited an Ottawa based example where a consultation was done that determined there should be a power line. However, when the powerline was announced there was significant public backlash.

To create more accountability, survey respondents generally agreed that more can be done to increase opportunities for groups that represent different types of consumers and policy, to create competition between energy suppliers and to increase the power of independent regulators to police energy suppliers.

Most survey respondents were, however, not supportive of giving more power to politicians to directly intervene in the electricity system.

Slide 9

There is a clear endorsement from survey respondents for governments and regulators to undertake cost-benefit analysis before making significant energy project decisions. About 67% said cost-benefit analysis provides important information that should be considered in every energy decision.

Slide 10

A majority of survey respondents feel that regulators, as experts, make better choices than politicians. But despite the interest from survey participants in seeing increased regulatory involvement, most would vote the government out if electricity bills reach an unacceptable level. This is why politicians stay involved in the electricity sector.

Slide 12

Provincial vote tracking by political party going back to 2000. The PC party appears to have a cap around a third of the vote- generally one in every three person say they are willing to vote for the PC party. What is also interesting is that the Liberal party in recent months has been moving up and down in polls and it is generally the NDP with whom the vote trading has taken place. The NDP has an opportunity to benefit from this trend.

Slide 14

The Liberal party is particularly having difficulty holding on to the "mushy middle" segment of their voting base, which includes left liberals and business liberals. What is perhaps concerning for the NDP is that individuals with left minded values appear to be continuing to stick with the Liberal party.

Slide 16

Mr. Lyle highlighted the importance of party leadership and the dramatic role it can play in elections. Slide 16 shows that Kathleen Wynne has seen a significant drop in popularity while Andrea Horwath appears to be stable. Despite being relatively unknown, Patrick Brown appears to be leading the poll by 8 percentage points. It is interesting to note that Andrea Horwath has not been able to capitalize on Kathleen Wynne's drop in popularity.

Slide 17

There is a strong relationship between the degree to which survey respondents identified themselves as feminist and the degree to which they like Kathleen Wynne. Those that are strongly feminist tend to give Kathleen Wynne a break and have a higher chance of having a favourable view of her. Those who are less than strongly feminist, and who identify with another party, don't like her.

Slide 18 to 22

The above five graphs and word clouds show which words survey respondents used to describe Kathleen Wynne, Patrick Brown and Andrea Horwath. For Kathleen Wynne, majority of the words were negative like liar, corrupt, crook and incompetent. For Patrick Brown, the most common word was "who", suggesting that he is still relatively unknown across Ontario. Andrea Horwath's most common word was "invisible/irrelevant", which was, however, followed by a number of positive comments.

The key take-aways from this research could be summarized as follows:
• The heat is coming out of the electricity issue in Ontario.
• Ontarians say they want regulators to lead on decision-making, but at the end of the day will vent their frustrations on politicians.
• The PCs have a real lead but seem to have plateaued with the support of one in three Ontarians.
• The Liberals remain in the race because Ontarians hold pluralistic values. However, recently they have been losing moderate Ontarians to the NDP. This effectively strengthens the PC's prospects.
• On leadership, Wynne is in a deep hole but this is no love-in for her opponents. For the Liberals, dragging Brown down may be easier than lifting Wynne up.

**Panel discussion**

Moderator **Sean Conway** kicked off the panel discussion by asking each of the panelists how they would react to Mr. Lyle's presentation.

**Will Stewart**: The coming elections will present a challenge to all three parties, especially the Liberal party given Kathleen Wynne's poor personal ratings. It is easier for the Liberal party to tear down Patrick Brown or build up the Liberal brand, rather than build up Kathleen Wynne. However, negative campaigns against Patrick Brown could have the effect of boosting Andrea Horwath's chances. Any of the three political parties could win the election. A majority Liberal government is highly unlikely, though a Liberal minority is possible.

**Tim Murphy**: In the last few elections, despite being behind in the polls, the Liberal party managed to succeed on election day. There is a fair degree of focus on the leader in today's times and unquestionably Kathleen Wynne suffers from comparison to ideal alternatives. She is also carrying the baggage of the prior Liberal Premier. Andrea Horwath has been relatively quiet over the past couple of years and has not shown leadership on any significant policy issues. She is however an experienced campaigner and I expect that she will do a fine job in the next election. Patrick Brown has an unknown factor and it will be interesting to see how he performs on a debate platform, which could have a larger impact than previous elections. The government has a lot of good progress to share on the social and economic front. Going forward, the government is trying to put together a policy agenda from the "Centre centre left" perspective that responds to growing feelings of isolation and being left behind on the economic progress front.

**Tom Parkin**: There are a number of factors coming together that are laying the platform for a good performance from the NDP party. The underlying issue is the general dislike towards Kathleen Wynne. The Liberal party has now moved to being the third choice for many PC and NDP members, who have traditionally considered the Liberal party as their second choice. There are also resurgent issues relating to healthcare, energy and education, which the Liberal party is struggling to manage. Conservatives also have a historic issue with these issues. Combine this with negative ads against Patrick Brown and people start leaving the Conservatives for the NDP.

2. **Mr. Conway** noted that in the recent US federal election many traditionally Democratic states voted for a Republican president. Keeping this in mind, Mr. Conway asked the panelists what key policy offerings should individual parties offer to bring together a new coalition of voters to enable electoral success.

**Tom Parkin**: American politics is very different from Canadian politics. There is not the same kind of social support system and there is little spending on education and healthcare. Hence, the voting issues are different. The voting issues here in Ontario will be education, healthcare and electricity, and the Liberal party has a poor record on all three fronts.

**Tim Murphy**: Education and healthcare have always been important issues in Ontario and all over Canada. The extent to which they are vote drivers, however, is questionable. Particularly on healthcare, there is public skepticism on the extent to which politicians can help solve problems. The government has done a lot to ensure that electricity does not become an issue in the next election. The other political parties do not have meaningful plans for the electricity sector. The Liberal party will focus on pocketbook issues like minimum wage and free tuition. The Liberal party will have other political offerings but I am not in a position to share them with the audience at this point.

**Will Stewart**: I am also not in a position to share specific policy offerings. However, I will note that the Liberals have a legacy of overspending and increasing public taxes. The Conservative party is fiscally prudent and will manage spending in a responsible manner.

3. What one positive or constructive comment would the panelists like their respective parties to mention regarding energy or the electricity sector in the 30 day campaign in May/June of next year?

**Will Stewart**: Patrick Brown has three core principles for the electricity sector; make the ratepayer central to energy decisions, energy policy is economic policy, and rely more on experts and increase the role of the regulator. The current government has a legacy of mismanagement and wasteful spending and this legacy will play a key role in the next election.

**Tim Murphy**: The message from the Liberal party will be consistent with that outlined in the 2017 Long Term Energy Plan, including commitments to Market Renewal, innovation and a stronger regulator. The party will defend its achievements in the electricity sector and communicate that it has made significant progress in tackling energy prices. Issues in the electricity sector are fundamentally managerial and that will be the Liberal focus.

**Tom Parkin**: The Liberal party's "Fairytale Energy Plan", combined with the sale of Hydro One, will lead to high costs in the electricity sector. The Fairytale Energy Plan has to go away and there has to be a plan to tackle the underlying causes of high electricity costs.

4. Given the decreasing visibility of electricity, is the message to the government and opposition parties that they should stop talking about electricity and the need for new investments?

**Greg Lyle**: The focus of campaigns is to recruit swing votes. No one has an easy answer to electricity. There is a role the NDP can play and possibly win the election, benefitting from Liberal and Conservative negativity. The Conservatives will likely be looking for political scandals from the government which will give them a boost going into the election. From the Liberal perspective, the west GTA will be crucial and one strategy could be to attack Patrick Brown and use a gasoline tax to paint him as "anti-west GTA". If the Liberals run an *effective* negative campaign on Brown the NDP may never get their moment.

5. How do you push towards decarbonization without increasing electricity prices?

**Tom Parkin**: Decarbonization is a reality and all political parties are committed towards it. Ontario has gotten rid of coal and other Canadian provinces are currently struggling to follow suit. In terms of electricity, Ontario's grid is fairly clean and the issue of decarbonization has largely been dealt with.

**Tim Murphy**: Ontario has gotten rid of coal and implemented a cap and trade program. It is extremely unlikely that Kathleen Wynne will attack Patrick Brown on his carbon policy that will result in increased gas prices given that she herself is committed to the environment cause.

**Will Stewart** agrees that decarbonization is likely not going to be an electoral issue. The PC perspective will be about more tax dollars going to the government.

6. Has the time not arrived when the government should stop aggressively subsidizing electricity, whether it be for poor people, rural communities or the industrial sector?

**Tim Murphy**: Subsidies should continue. From a political perspective, any party will have to respond to pressures to manage the costs of electricity. The Ontario Fair Hydro Plan has done a good job of balancing what portion of electricity costs should be paid by the taxpayer versus the ratepayer.

**Will Stewart**: Subsidies are not an issue, but rather it is ongoing overspending related to electricity. We need the economy to respond to market forces, not political forces. Nobody is going to demand that we should pay the market rate of electricity tomorrow – that would ruin the economy. But as new technologies come along, how do we use energy storage, for example, rather than subsidies, to smooth out the curve? The interventions and subsidies by the Liberal government have not worked and as a result Ontarians are paying higher costs. This is especially true in cases where we have to export power to our neighbours at a cost that is well below the average cost of production.

Parking slides 1 - 4

**Tom Parkin**: Figure {1} shows the components of the total cost of electricity. In fig. {2}, note how production is above demand while the wholesale price is decreasing and exports are increasing. Fig. {3} shows that difference is the global adjustment. Fig. {4} shows what people should be concerned about. The

green dotted line is the Liberals' 25% reduction. The thick blue line is projected cost without the Fair Hydro Plan. The result will be an increase in costs in the future, and something people will be angry about. {This point might benefit from further explanation by Mr. Parkin – SK, ed.}

7. A decade ago Ontario created the debt retirement charge to pay for previous nuclear costs. That decision has similarities with the government's recent Fair Hydro Plan. How do we get better governance in the sector that can independently look at the costs and benefits of rate modification proposals? A key related question is whether the government has fairly apportioned costs through the Fair Hydro Plan?

**Tim Murphy**: Many of the green energy contracts have assets well beyond their contract lengths. At the end of the contract time frame, many green energy suppliers will already have paid off their capital investments and their resources will likely need relatively small investments for upgrade and maintenance purposes. Hence, the cost of electricity may not be where it is projected to be right now. Meanwhile, you never want to have productive capacity fall below demand. Rates will always represent a compromise between cost and what citizens are prepared to pay. In terms of transparency, the key is providing information in an accessible and easy to understand manner.

**Tom Parkin**: The Liberal party has added significant borrowing costs to the system to keep the price of electricity down. It will drive up costs in the future. Ontario should move towards a market-based system of pricing. Ontario no longer has a purely publicly-owned generation system, so proper regulation of a system where most power comes from private businesses is the number one priority. Someone will look at the contracts and decide there's too much supply – contracts for some of the assets may not continue. The Auditor General has also criticized the complexity of the $20 billion loan, which itself cost $4 billion. The Fair Hydro Plan should have been paid for through general revenues.

**Will Stewart**: The "Unfair Hydro Plan" has used an unnecessarily complex accounting scheme to finance the Fair Hydro Plan. Doing it through OPG instead of on the government books resulted in higher interest charges. The financing was done in a complicated way to keep it obscure, to hide the fact that it was done for political purposes rather than social policy.

8. Question from the floor: There is a difference between managing costs to the system and managing the electricity bill. Most political parties have failed to acknowledge this. Will political parties start making this distinction or is this too complex for voters to understand?

**Tom Parkin**: The topic is likely too complex for voters to understand, but it doesn't mean that the energy sector should not bring this up to the political parties.

**Tim Murphy**: The costs to the system are often long term and hard for a governing party to talk about in a four year mandate. As opportunities for innovation are created, customers will play a greater role in managing system costs.

Taking $9 billion and buying back Hydro One would be the wrong thing to do. The government sold the sale of Hydro One the wrong way. The right way would have been to bring in some private sector management efficiency and get its cost profile down. The sale of Hydro one was the right thing to do and it will add financial discipline to the organization.

**Will Stewart**: Liberal decisions have led to increases in both system costs and electricity bills.

9. During the last federal election, there was pressure on political parties to renovate the regulatory bodies for more effective oversight. Is there a need and opportunity to have a serious look at the regulatory environment in Ontario and the role of the regulator?

**Tim Murphy**: The 2017 Long Term Energy Plan speaks to the role of regulator and the need to continuously evolve. The federal context, however, is different from the provincial context, had more to do with social license and often involves intervention on an indigenous and environmental front. In Ontario it's more of a technical issue, including managing costs, and is part of the ongoing question about the appropriate level and type of government intervention.

**Will Stewart**: The regulatory system has to be more responsive to ratepayers and the role of Premier's Office and Minister's Office has to be reduced. The role of the OEB and IESO has to be promoted and valued.

**Tom Parkin**: With so much of the system's capacity being provided by private companies, Ontario needs the regulator to be able to operate transparently rather than decisions being made behind the doors of the Minister's office.

*— Summaries by Musab Qureshi*

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