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EXECUTIVE SUMMARY

How the Proliferation of DERs is Driving Grid Optimization & Innovation

Andrea Nuesser, Director, Customer Strategy & Experience, Hydro One
Stefan Zschiegner, Vice President, Product Management, Itron

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KEY TAKEAWAYS

- The energy transition in Canada will increase energy demand.
- Becoming a trusted energy advisor is key to unlocking a new value proposition.
- Itron's distributed intelligence platform brings computing to the edge.
- Itron's technology addresses the use cases of today and the future.

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How the Proliferation of DERs is Driving Grid Optimization & Innovation

OVERVIEW

Resiliency starts with managing the distribution network. The rapid adoption of distributed energy resources (DERs) and electric vehicles (EVs) is changing the delivery landscape and impacting how utilities operate their grid and engage with their customers. Developing an intelligent grid can help utilities manage increasingly dynamic challenges by operating, optimizing, and controlling energy resources at the grid's edge. Through distributed intelligence (DI), Itron brings computing to the edge, treating every meter as a grid sensor, a grid control point, a home gateway, a data streaming device, an on-board application platform, and more.

In addition to technology changes, the journey toward an intelligent grid overall requires a significant internal culture shift. To support this transition, a comprehensive solution approach for all stakeholders is necessary. Itron draws on 40 years of experience to leverage lessons learned, best practices, and expertise to engage in any stage of the transition, from planning and advisory, to installation and operations, to design and execution.

CONTEXT

Andrea Nuesser discussed challenges introduced by the energy transition and how Hydro One is evolving to address those challenges. Stefan Zschiegner explained the technical and business value of Itron's distributed intelligence platform.

KEY TAKEAWAYS

The energy transition in Canada will increase energy demand.

Hydro One, Ontario's largest electricity transmission and distribution service provider, serves 1.4 million customers in predominantly rural areas. Hydro One's transmission system includes 30,000 kilometers of transmission lines, with its local distribution system covering approximately 75% of the 400,000-square-mile geographic area of Ontario.

Ontario's electricity is 94% carbon neutral and primarily comes from a combination of nuclear power, hydroelectric power, and renewables. Although there are still some gas plans on the system, Canada has set a goal to decarbonize the entire system in the country by 2030. The energy transition required to meet this goal and to continue adjusting to the impact of climate change will lead to a major transformation in the energy sector.

The energy transition includes increased adoption of EVs, electrifying heating and manufacturing processes, and increased investment in DERs, such as renewable energy and storage solutions, as customers look to reduce their carbon footprint and gain greater energy resiliency. For distributors and transmitters, this means a significant increase in demand on Ontario's distribution, transmission, and supply systems.

To meet these capacity challenges requires investment in three primary tracks:

1. **Build new assets,** including power plants, transmission lines, and "poles and wires."
2. **Optimize existing assets,** such as through adding storage to existing renewable generators and developing an intelligent distribution grid with visibility and control.
3. **Customer participation** through incentivized energy efficiency programs, demand response, and "prosumerism"—a model in which customers are not only consumers of electricity, but also generate and feed electricity back into the grid. This requires an intelligent grid and increased visibility to the grid edge.

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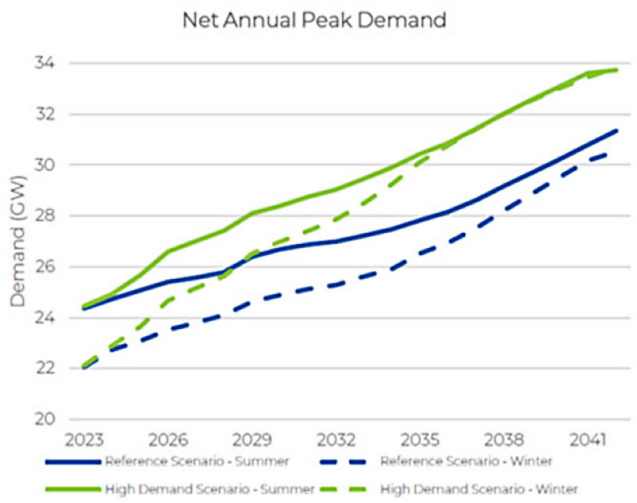
> We have to build an intelligent grid that allows us more visibility and more control so that we can actually optimize the grid by operating it in . . . near-real time, to take advantage of all the capacity that is there and not just . . . planning for peak demand.
>
> *Andrea Nuesser, Hydro One*

Figure 1: A constant increase in energy demand is projected beyond the next decade



Source: IESO

Becoming a trusted energy advisor is key to unlocking a new value proposition.

Hydro One is in the process of replacing all of its smart meters and the entire supporting infrastructure in its transition from Itron Advanced Metering Infrastructure (AMI) 1.0 to AMI 2.0. The project goes beyond simple asset replacement, with a focus on enabling future customer energy needs by providing a platform for customer engagement and choice while ensuring accurate and reliable billing operations.

AMI 2.0 is a critical component of Hydro One's intelligent grid, providing visibility, monitoring, and control to the entire Hydro One low-voltage (LV) distribution network. Itron's meters are equipped with a DI card that allows grid edge computing in support of not only information gathering, but information analysis—right at the grid edge—to provide more information to and about Hydro One's customers. This advanced, near-real-time analytical capability will allow more DERs to connect to the grid, optimize the distribution network, enable customer participation and choice, and improve system reliability and enable faster outage detection.

The energy transition presents a real opportunity to improve Hydro One's brand value, driving the development of a new brand proposition through products and services that help customers through the transition. Customer engagement is key. Success depends on shifting from a reactive to a much more proactive relationship with customers, becoming a trusted energy advisor to customers. and providing help even before problems arise.

> The idea is that we're moving the solution closer to the problem . . . The goal is to . . . optimize grid operations, improve safety and efficiency, but also transform the customer relationship because we will have a much more real-time opportunity to connect with our customers and a lot more data to share with them.
>
> *Andrea Nuesser, Hydro One*

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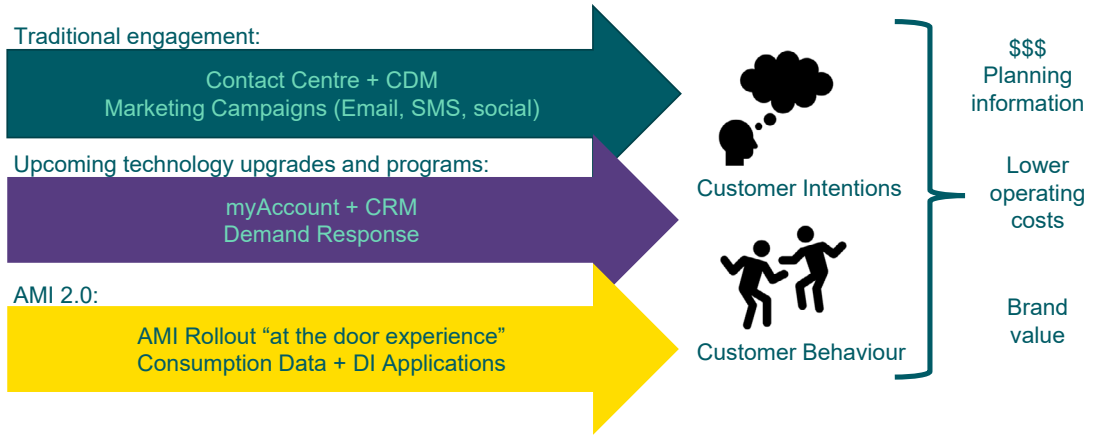
Figure 2: Customer engagement at all levels is key to the success of the energy transition



Active customer participation allows for a two-way flow of information, providing updates to customers on Hydro One's initiatives, while at the same time gathering critical information from customers to support lower operations costs and increase brand value. The replacement project of 1.4 million AMI meters throughout the vast province of Ontario requires Hydro One technicians to knock on everyone's door, offering a unique opportunity to engage with customers at their homes. As a result, Hydro One is developing an "at-the-door" customer experience to maximize this touch point with its customers by leveraging five core value propositions: inform customers, collect accurate information, introduce new customer features, recruit demand response participants, and offer new products and services.

Itron's distributed intelligence platform brings computing to the edge.

Beyond Ontario, the adoption rate of renewables, electrification, and other changes varies between locations, but ultimately the energy transition in any area follows the same two primary drivers as Hydro One has identified: enabling grid safety, resiliency, and reliability; and transforming consumer relationships.

Itron's customers throughout North America realize that a new systems approach is needed for the energy transition. In response, Itron created its DI technology platform to provide edge compute, enabling utilities to adopt and drive the changes needed to address the challenges of the energy transition.

In developing AMI 2.0, Itron focused on addressing use cases beyond data management for billing or traditional demand response, evolving the technology to meet the requirements for use cases from behind the meter all the way to the substation. With a fully integrated systems approach to help manage the edge of the grid, Itron significantly innovated the data and analytics platform to connect devices to real-time analytics and improve scalability. And Itron's comprehensive strategy and approach to AI leverages the DI platform for ongoing learning, profile development, and quick action at the edge, which supports a low-latency response to events when and where they occur.

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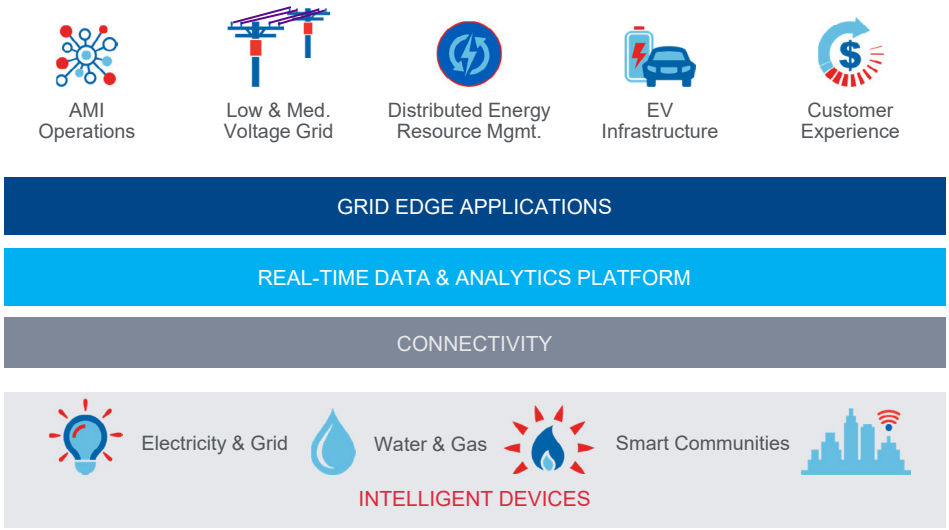
Figure 3: End-to-end solutions for every stakeholder extend existing investments



> We really manage the integration of distributed resources on behalf of the central systems that already exist in the utility . . . We provide real-time control in sub-seconds locally, but also we can provide control within seconds and minutes using real-time management in the back office.
>
> *Stefan Zschiegner, Itron*

Itron's technology addresses the use cases of today and the future.

In every engagement, Itron focuses on four pillars:

1. Hardening the grid and grid assets against natural disasters.
2. Increasing intelligence, automation, and control throughout the grid.
3. Integrating DERs, diversifying the energy mix, and improving monitoring and control of energy distribution.
4. Encouraging energy efficiency and demand management, including visibility into the low-voltage distribution system.

Through its engagements and partnerships, Itron has already achieved key use cases in support of the energy transition, including:

- **Consistent customer engagement.** To enable more rapid innovation, Itron opened its DI platform to partners. The building blocks of an end-to-end customer solution start with accurate, high-resolution data through third-party apps, enabled and powered by distributed intelligence. Through partnerships with select companies, plug-and-play experiences that solve load disaggregation and customer engagement challenges deliver business results, which in turn help define and achieve business objectives.

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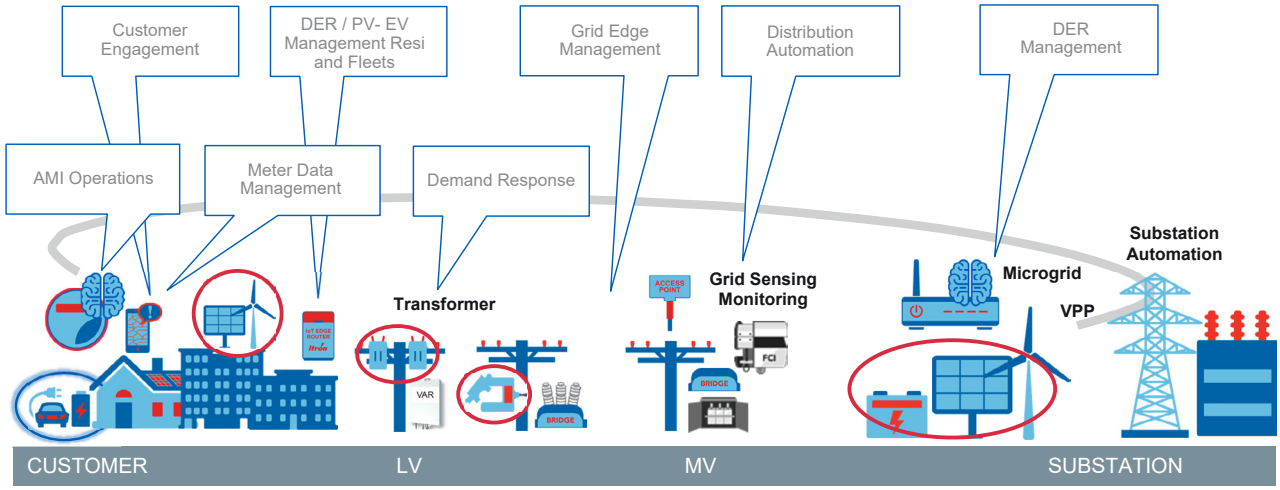
Figure 4: Grid Edge Management use cases



- **Real-time grid analytics allow proactive engagement to enable affordable electricity by deferring infrastructure upgrades.** Leveraging the peer-to-peer communication between meters, meters can compare measurements in real time among themselves, determining the setting relative to a transformer and phase (this requires bi-directional integration with a GIS system to both download GIS information and upload new information to update tables). With connectivity and visibility behind the meter, utilities can achieve dynamic optimization of local capacity and compelling, real-time customer engagement in support of the distribution management and marketplace integration needed for the energy transition.

> We're looking at the use case in the business result and driving it all the way back to technology.
>
> *Stefan Zschiegner, Itron*

ADDITIONAL INFORMATION

- To learn more about Hydro One visit www.hydroone.com
- To learn more about Itron, visit www.itron.com

DISTRIBUTED INTELLIGENCE PLATFORM

The Itron distributed intelligence platform helps utilities achieve a new level of distribution system visibility by combining granular data from the grid's edge with secure, open-enterprise applications. With edge computing capability, distributed intelligence efficiently processes distribution-level data in real time, effectively identifying where those decisions—and actions—need to take place. This unique capability provides unprecedented insights into power quality, voltage monitoring, high impedance detection, transformer load management, meter bypass detection, EV and solar (PV) awareness, and much more. There are over 11 million Itron distributed intelligence-enabled meters under contract, over 10 million licensed DI apps issued, and over 900,000 meters in production running DI apps across three utilities. Distributed intelligence is available as a hosted solution and is integrated with Microsoft Azure.

Microsoft Azure

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BIOGRAPHIES

Andrea Nuesser
Director, Customer Strategy & Experience, Hydro One

ndrea Nuesser is the Director of Customer Strategy & Experience at Hydro One. In her role, she is responsible for developing and implementing strategic initiatives to build the grid of the future and serve the needs and expectations of Hydro One's broad customer base. Nuesser is an experienced leader, outside-of-the box thinker, and engaging strategist who is passionate about shaping the future of energy. In an evolving utility landscape, she provides thought leadership and drives collaboration through various industry working groups to enable innovative energy solutions and help customers with their energy transition. Nuesser has a broad background in social sciences, marketing and customer behavior. Before joining Hydro One, she was a Vice President at Innovative Research Group, a public opinion research and consulting firm. Nuesser holds a Ph.D. in Political Science from the University of British Columbia.

Stefan Zschiegner
Vice President, Product Management, Itron

Stefan Zschiegner joined Itron in March 2020 as VP Product Management for the Outcomes business. Prior to joining Itron, he held product business leadership roles driving digital transformation in telecom (leading Mitel's Cloud business) and in manufacturing (Velo3D). Previously Zschiegner held product leadership positions in energy solutions at Enphase Energy and driving global growth with grid connected solutions for First Solar. Earlier in his career Zschiegner held various technology business leadership roles in the semiconductor equipment including at Hewlett-Packard. His education includes the Executive Marketing Management Program at the Stanford Graduate School of Business, and a masters equivalent degree in electrical engineering from Technical-University Hamburg in Hamburg, Germany.