

# THE POWER TO CONNECT

Advancing Customer-Driven Electricity Solutions for Ontario

**An Overview**



*The Voice of Ontario's Electricity Distributors*

February 2017

# AN OVERVIEW

Throughout the last decade, Ontarians have seen significant shifts in the generation, delivery and consumption of electricity, influenced by changing market demands, emerging technologies and evolving consumer dynamics. Declining costs of distributed energy resources (DERs), digitization, data analytics, rising customer empowerment, and climate change policies have increasingly challenged the status quo. Buttressed by legislation that has enabled expanded scope for Ontario's local distribution companies (LDCs), the time has come to take a closer look at the future of the sector to ensure its continued resiliency.

Central to this future, LDCs are ready to play a pivotal role in three dimensions: as enablers, integrators and orchestrators of DERs. That's the premise of a new vision for Ontario's electrical utilities, an insightful document by the Electricity Distributors Association (EDA), which lays out a rational, attainable and optimistic future for Ontario's distribution sector in this era of transformation that meets customers' evolving needs.

As stewards of the province's distribution system, LDCs remain central to these changes and are well suited to define where the sector is going and how to manage that evolution to the benefit of Ontario electricity consumers. LDCs are the incumbent owners and operators of Ontario's electricity distribution network and serve as a crucial link between the transmission grid and the customers. By leveraging their existing customer relationships, expertise, brand recognition, and knowledge of their local distribution networks, LDCs are uniquely positioned as the most efficient and cost-effective service provider to lead the transition to a cleaner, more distributed and more intelligent network.

## Addressing anticipated changes to prepare for tomorrow

EDA's vision paper, ***The Power to Connect: Advancing Customer-Driven Electricity Solutions for Ontario***, addresses anticipated changes in the next five, 10 and 15 years, offering valuable insights to government and regulators – as well as the EDA's member LDCs, enabling them to better prepare for this rapidly evolving landscape.

The fulsome report for which EDA retained the services of Navigant Consulting, offers evidence to suggest that the electricity utility of tomorrow will take its place as the nucleus for a diverse mix of networked generators, distributors, and managers of power – able and agile to meet consumer demand with reliable, safe and cost-effective electricity. Representing eight months of research, the report findings are based on interviews with over 50 of Ontario's utility CEOs, reviews of other jurisdictions both in Canada and the United States, as well as case studies of innovations that provincial distributors have already embraced.

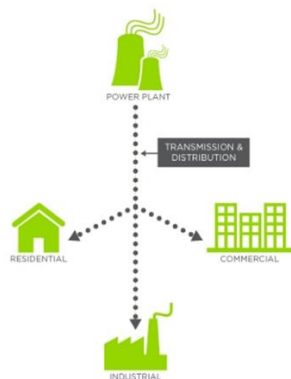
DERs are small-scale power sources (usually in the range of 3kW to 50 kW) located close to where electricity is used. Available for many years, they are parallel to the electric utility or stand-alone units and are known by different names such as generators, back-up generators, or on-site power systems. DERs will factor more prominently in power generation, distribution, and management, and by their nature offer significant potential for new technologies to support grid modernization, micro grids, more energy storage and improved

conservation efforts. The growing presence of DERs will certainly bring LDCs even closer to the core of the province's electricity system.

This rapidly unfolding energy landscape will pose both threats and opportunities that will require new strategies and approaches to both current and emerging industries. There will continue to be significant changes in the energy landscape that will drive transformation of the utility business model. Successful utilities will adopt more holistic and strategic principles, boosted by strong customer-centric thinking, an attribute that has already earned them a reputation for excellence in customer service. In summary, over the next decade innovative LDCs will advance from primarily one-way deliverers of power to two-way, networked generators, distributors, and managers of electricity – all in support of customer demands. Their ingenuity will trigger an ecosystem of integrated power flows and digitally enabled intelligent grid architecture.

### An Ecosystem of Integrated Power Flows

**TODAY: Central, One-Way Power System**



**EMERGING: Distributed, Two-Way Power Flows**



- Large, primarily centrally located generation facilities
- Designed for one-way energy flow
- Utility controlled
- Technologically inflexible
- Simple market structures and transactions
- Highly regulated (rate base) and pass through

- Distributed energy resources
- Multiple inputs and users, supporting two-way energy flows
- Digitalization of the electric-mechanical infrastructure: smart grid and behind the meter energy management systems
- Flexible, dynamic, and resilient
- Complex market structures and transactions
- Regulation changing rapidly around renewables, distributed generation (solar, microgrid, storage), net metering, etc.

Source: Navigant Consulting

The changing energy landscape requires all market players to reassess their situation and adapt to new strategies. Business as usual is no longer an option as it does not sufficiently reflect policy goals and customer demands. Traditional ways of doing business will need to be revisited and revised as DERs become more abundant and markets become more competitive and complex. The roles and responsibilities of LDCs, as well as the Independent Electricity System Operator (IESO), should evolve in parallel to changing market conditions and demands as DER penetration increases.

## Valuable observations gleaned from other jurisdictions

In studying several other jurisdictions, it quickly becomes apparent that Ontario shares common goals with other Canadian and American jurisdictions in addressing climate change and facilitating the penetration of cost-effective DER. Like these jurisdictions, Ontario is committed to pursuing conservation, energy efficiency and fuel switching through its Climate Change Action Plan to reduce the use of fossil fuels and boost clean electricity and clean fuels. LDCs are critical to enabling DER in the province's energy system and to cost-effectively satisfy increased demand for clean electricity through the electrification of transportation and fuel switching.

Ontario's LDCs continue to expand their hold on leading edge technologies and to build their capacity in connecting DERs across their network within the current regulatory framework. However, to maintain this momentum, a more flexible regulatory environment will be essential for LDCs to keep up-to-date with rapidly evolving market conditions, while ensuring public and worker safety and customer reliability and responsiveness.

There will still be a need for investment in traditional distribution infrastructure, hence regulatory reform must be prudently balanced to ensure cost-effectiveness. One of the key challenges will be to develop fair and transparent rules for an appropriate balance between traditional regulated investments and those that enable and accelerate the development of new, competitive markets.

## The future in three dimensions

With local distribution companies at the core, tomorrow's LDC will evolve successfully within three key dimensions:

### 1) *DER Enabling Platform*

With the rapid growth of distributed energy resources, the LDC of the future will be in a key facilitating and enabling role to orchestrate DERs across the system – from distribution-level generation down to individual customer-generated power. The *DER Enabling Platform* variable refers to the extent to which LDCs provide an intelligent integrated network where DER third-party providers and customers can “plug-n'-play.” Part of an LDC's role will be to ensure that the distribution network can accommodate DER connections, while maintaining the stability and reliability of the grid. To facilitate this development, foundational investments in updated distribution such as network controls, automation and communication systems will need to be deployed.

LDCs must be central to providing DER enabling technologies due to operational and planning practicalities. Their knowledge and experience with the distribution network will give insights for optimal DER locations for customers and will help maintain system integrity and reliability as DERs increasingly take hold in tomorrow's electricity system.



## 2) *DER Integration*

The DER Integration variable refers to the degree to which LDCs expand their scope of business beyond possessing traditional poles and wires to broader DER assets ownership. DER could include solar, wind, energy storage, EV charging infrastructure, combined heat and power cogeneration (CHP), fuel cells, demand response, and conservation and demand management. The extent of DER integration will vary for each LDC given the diversity in size, location, and hosting capacity.

DER Integration by LDCs does not necessarily mean that market innovation will be dampened or that customer choice will be limited. LDCs are well positioned to stimulate DER market development. As regulated entities, they can invest in areas where a private company might not be able to earn an immediate return on investment. Beyond the cost advantages, strategic use of outside resources by LDCs can also garner increased efficiencies, savings to infrastructure and technology, and free LDCs to focus on the development of new energy solutions, ideas and services. *DER Integration* does not prevent other market players from owning and operating DERs. With LDCs at the core, DER planning will be more predictable compared to an exclusively market-based structure, and will allow more certainty in achieving public policy goals and in ensuring system reliability.

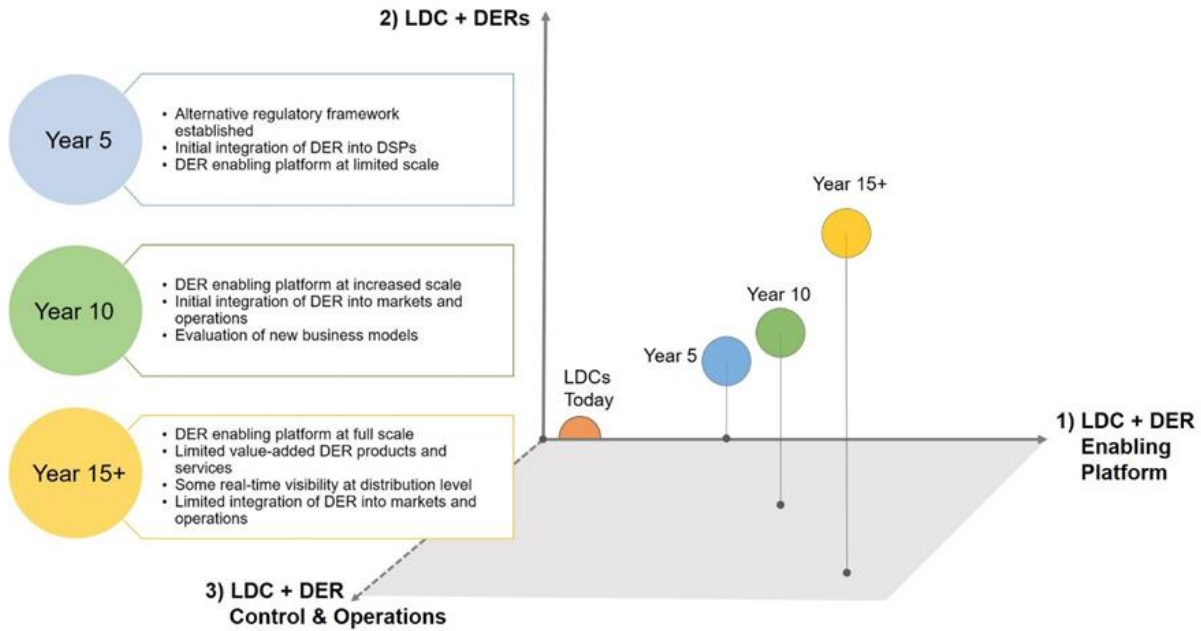
## 3) *DER Control and Operation*

The *DER Control and Operation* dimension refers to the degree to which LDCs control and operate DERs that are connected to their distribution network. The ability of the LDC to serve as a fully integrated network orchestrator, through its operations and interaction with DERs, makes it valuable to the larger system and to all customers.

Elements within the *DER Control and Operation* variable also move beyond the traditional LDC “poles and wires” model to include real-time visibility, DER price signals, and new products and services such as virtual power plant aggregation, load management, and grid services.

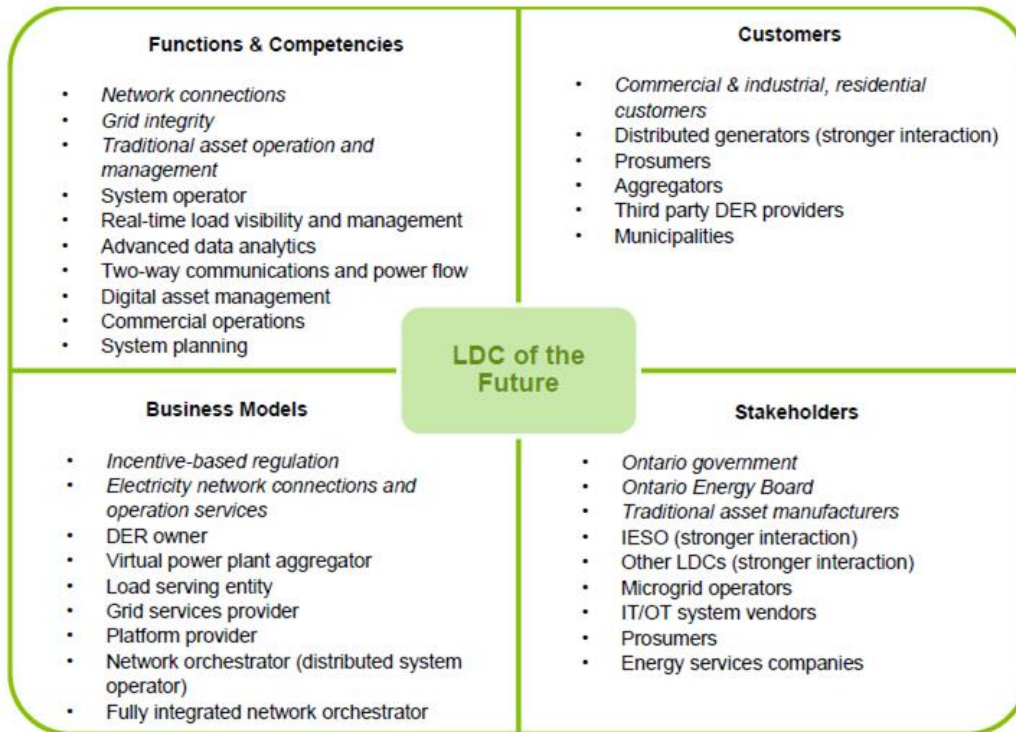
Among the critical building blocks for *DER Control and Operation* is a DER Management System (DERMS). DERMS capabilities typically include real-time network visibility, asset monitoring and control, scheduling and dispatch, active and reactive power import and export control, voltage control, forecasting, resource valuation and optimal demand response. Another fundamental component is the implementation of DER price signals. Appropriate price signals are needed so that investments behind-the-meter are economic for consumers and achieve maximum value for the system. DERMS and DER price signals permit LDCs to ensure efficient use of both centralized and distributed resources. Coordination between IESO and LDCs will need to be clarified to utilize resources efficiently.

## LDC of the Future Snapshot



Source: Navigant Consulting

## Characteristics of the LDC of the Future



Source: Navigant Consulting

As LDCs progress along the three DER dimensions, the EDA stands firm in its conviction that the LDC of the future will assume a critical function in Ontario's energy transition as a Fully Integrated Network Orchestrator (FINO). In this capacity, the LDC of the future will enable, control and integrate DERs within its distribution service territory. Each LDC will evolve to a FINO at a different pace and to a different degree and there will need to be significant collaboration amongst LDCs related to DER enablement, control and integration as they evolve into network orchestrators over the next ten to fifteen years.

## Overcoming key barriers

Choreographing a desired future can be a daunting task without assessing potential barriers to success and the risk of missed opportunities. Some of the current challenges impeding the sector from realizing its future encompass regulatory issues; the unique and changing qualities of customers and stakeholders and potential operational obstacles.

### *Regulatory*

The regulatory structure in Ontario will need to be flexible to allow LDCs to adapt. A regulatory framework should reward LDCs that build their capacity as orchestrators and enablers of DERs. A potential solution could be to adopt Earnings Impact Mechanisms (EIMs) tied to performance as a platform provider, facilitating the market, and advancing policy goals. Metrics can include peak reduction, energy efficiency, customer engagement and information access, affordability, and timely interconnection. EIMs would supplement LDC earnings and can be re-evaluated as the market develops and market-based earnings become a stable source of revenue.

### *Customers and Stakeholders*

A key challenge for transitioning to a clean, distributed and intelligent energy grid is managing the pace of investments to mitigate rates and support customer needs. Creating an enabling platform and facilitating the DER market will clearly require significant investments. Therefore, LDCs should prioritize opportunities and gain an understanding of what capabilities are vital to maximize customer value. Such activities can include examining whether distribution assets are fully optimized or whether the LDC could lower costs by investing in data analytics instead of a physical asset. LDCs can also consider which areas of the business would benefit from a shared services model with other LDCs. The goal is to prioritize and manage the pace of investments to improve the business while also positioning for new growth.

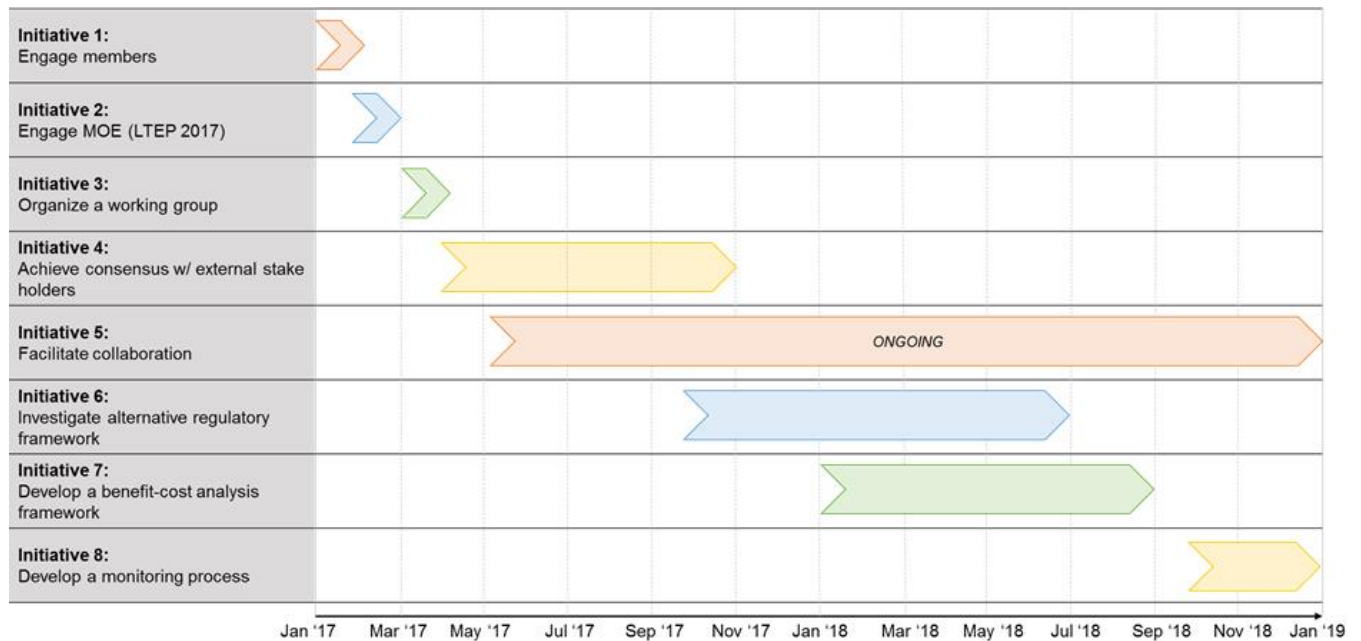
### *Operations*

Introducing new technologies into an organization presents challenges to business processes, cultural adaptation, and workforce constraints. New policies and procedures will need to be developed in response to these emerging technologies. Sharing operational knowledge and best practices among LDCs can help ensure that investments are maximized. Leadership and support for innovation are necessary to allow for time to make changes, adjust, and gain understanding of the technology. LDCs will need new competencies and skills in data analytics, communications, cyber security, and digital asset management.

## Next steps

LDCs must be at the forefront of transformation to capture value in an energy system that is increasingly becoming clean, distributed and intelligent. To achieve this desired future and realize the benefits, it is imperative for the previously discussed challenges to be addressed. The initiatives outlined in this section are intended to begin the discussion on necessary policy development and implementation that would best suit the needs of Ontario. These EDA initiatives are early actions that should ideally occur within the next two years as portrayed in the following chart.

**Timeline of EDA Initiatives**



Source: Navigant Consulting

### 1) Engage EDA members to seek support on the *Power to Connect* vision.

*Challenges Addressed:* Coordination with Stakeholders

EDA members, consisting of LDCs across Ontario, will be engaged to seek support on the direction of the *Power to Connect* vision. This sets the stage for collaboration and for moving the vision forward.

### 2) Engage the Ministry of Energy and advocate for LDCs' critical role in Ontario's Long-Term Energy Plan 2017.

*Challenges Addressed:* Regulatory Framework, Coordination with Stakeholders

The EDA will engage the Ministry of Energy (MOE) in its development of Ontario's Long-Term Energy Plan (LTEP) 2017. LDCs are the incumbent owners and operators of Ontario's electricity distribution system that interfaces with and integrates the transmission system and customers. By leveraging their existing customer relationships, expertise, brand recognition, and knowledge of their local distribution networks,

LDCs are uniquely positioned as the most efficient and cost-effective service provider to lead the transition to a cleaner, more distributed and more intelligent grid. The goal of this initiative is for the provincial government and LTEP to acknowledge the critical role that LDCs will play in Ontario's shift to a low-carbon economy.

**3) Organize a working group to develop a plan to guide the *Power to Connect* vision.**

*Challenges Addressed:* Regulatory Framework, Coordination with Stakeholders

A transparent, holistic approach is vital to fully addressing broader industry and business model challenges, changing customer needs, and adaptive regulatory structures. This starts with organizing a working group that will focus on developing a plan that will guide accomplishment of the *Power to Connect* vision. The working group should be highly diverse consisting of representatives from LDCs, OEB, IESO, MOE, Advanced Energy Centre and other interested stakeholders. Identifying other groups or stakeholders with overlapping mandates may also provide opportunities to leverage efforts in addressing the challenges of the future energy grid in Ontario.

**4) Collaborate with external stakeholders to seek support on definitions, guiding principles, and essential regulatory shift to help navigate the process of achieving the *Power to Connect* vision.**

*Challenges Addressed:* Regulatory Framework, Coordination with Stakeholders

This initiative will provide a basis for developing a strategy to carry out the *Power to Connect* vision, and give stakeholders ample opportunity to provide input in the process. It includes establishing common definitions and baseline knowledge linked to grid modernization; achieving mutual understanding of the economic costs and benefits of DER to the system; and seeking support on the shift needed in the regulatory framework resulting from new business models. Another potential task under this initiative would be a Line of Sight exercise to map out the connections between public policy objectives and enabling technologies. This exercise can also help with foundational and conditional investments and capabilities that LDCs will require in the future.

This initiative will inform development of DER cost-benefit analysis framework, alternative regulatory framework, LDCs' business strategies, and ensure alignment with public policy goals. Business model parameters should be defined as well to help clarify relationships with other stakeholders.

**5) Investigate an alternative regulatory framework that would incentivize LDCs to integrate DER, where doing so brings economic and/or system efficiencies.**

*Challenges Addressed:* Regulatory Framework

The working group will need to investigate regulatory changes and alternative regulatory frameworks that will incentivize LDCs to integrate DER within their networks. This may include use-of-system charge, an alternative reconciliation mechanism, and monetized performance metrics. Changes to the Distribution System Plan review criteria should be considered to encompass impact on overall system costs, as opposed to only distribution rates. The changes and alternative frameworks must augment and complement the existing, well-proven regulatory framework for LDCs since investments in traditional



distribution network infrastructure will continue. The goal is to create an adaptive regulatory structure that reduces barriers for LDCs to become Fully Integrated Network Orchestrators.

**6) Develop a cost-benefit analysis framework for evaluation of DER and DER enabling technologies.**  
*Challenges Addressed:* Regulatory Framework, Coordination with Stakeholders

A cost-benefit analysis framework will be required to guide LDCs in evaluation of DER and DER enabling investments. The working group will need to identify the key parameters and inputs to be included in the cost-benefit framework, as well as methodology for determining and updating parameter values and an approach to applying the framework to LDCs across Ontario. The framework shall also be adaptive to evolve with market conditions, and new products and services as they become available.

**7) Facilitate collaboration amongst LDCs, DER third-party providers and energy solutions vendors to accelerate efforts, and promote cost-effectiveness in deployment of DER and enabling technologies.**

*Challenges Addressed:* Maturing Technology, Lack of Interoperability, Business Processes and Cultural Adaptation, Workforce Constraints, Financial Constraints

The diversity of LDCs in Ontario presents an opportunity to share unique experiences and lessons learned from the many innovative projects that LDCs are pursuing. LDCs should share information beyond operational or technical knowledge, including their experiences and insights on new business models. LDCs could accelerate their efforts to create economies of scale by investigating potential areas for shared services or joint ventures with other LDCs. Collaboration with third party DER providers and energy solutions vendors can help accelerate these efforts and enhance interoperability. The EDA may be able to promote collaboration efforts whether it be through a forum or an online project database to exchange ideas and solutions.

**8) Cooperate with the OEB to develop a process that will monitor the responsiveness of the regulatory framework to the energy grid transformation.**

*Challenges Addressed:* Regulatory Framework, Financial Risk with Competitive Activities

Market conditions will ultimately influence the pace of the LDCs' evolution to FINOs. If more DER materializes in the market faster than expected, then a more advanced and intelligent grid will be required sooner than expected. The working group should coordinate with the OEB to identify a process that would monitor and encourage flexibility in the regulatory framework as the market develops.

## Conclusion

Due to the rapid changes in technology, and how they can empower the end user, the LDC of the future will likely look vastly different than the LDC of today. Local utilities have a unique opportunity to be at the vanguard of transformation by deploying enabling technologies and developing a service platform that provides new innovative offerings to meet customers' needs now and in the future.

We encourage you to read the entire report, and to embrace the opportunities that the future holds.

## About the EDA

The Electricity Distributors Association (EDA) is the trusted and vital source for advocacy, insight and information for Ontario's local electricity distributors – the municipally and privately owned companies that safely and reliably deliver essential electricity services to over five million homes, businesses and public institutions.

The association's high-performance team collaborates with industry subject-matter experts to support member business success through advocacy, policy analysis and opportunities for networking and professional development.

Through commercial, associate and affiliate membership, the EDA draws together a broader community of stakeholders, providing opportunities for information sharing and collaboration to advance the sector.



*The Voice of Ontario's Electricity Distributors*

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