

Where great minds collaborate, to power **a better tomorrow**



Discovering the possibilities of a bright new energy future

The electricity industry is undergoing a historic transformation as distributed energy resources (DERs), digital intelligence, and electrified transportation reshape the energy landscape.

Meanwhile, customers are expecting utilities to offer expanded choices and personalized digital experiences like those offered by retailers, banks and the entertainment industry. Recognizing that change brings opportunity, Alectra is embracing innovation to deliver on its vision – to be Canada’s leading electricity distribution and integrated energy solutions provider.

In a groundbreaking move, in 2019 Alectra established the Green Energy & Technology Centre (GRE&T Centre), a dedicated innovation facility that is unique in Ontario’s utility sector. We believe Alectra’s GRE&T Centre will serve as a beacon in the industry as we work to discover the possibilities for a bright, new energy future.

GRE&T Centre Advisory Committee

The Advisory Committee was formed to provide guidance on the GRE&T Centre’s strategic direction as well as to offer valuable input on pilot projects, partnerships and community engagement activities. It is composed of experienced professionals from diverse fields who possess technical knowledge, business acumen, marketing expertise and leadership abilities.



ADVISORY COMMITTEE MEMBERS

Dr. Giuseppina (Pina) D'Agostino (Chair)
Chantel Broten
Lorelei Graham
Dr. Janusz Kozinski
Dr. Brian Mergelas
Nicholas Parker

ALECTRA EX-OFFICIO MEMBERS

Brian Bentz
President and CEO
John Matovich
EVP, Energy Solutions and Services
Neetika Sathe
VP, GRE&T Centre

Where great minds collaborate, to power a better tomorrow

Alectra’s GRE&T Centre makes energy innovations come to life by identifying, evaluating, developing and accelerating emerging, clean and customer-friendly energy solutions.

“By creating the GRE&T Centre, we are changing the industry. We are proud to have a dedicated innovation hub focused on exploring, developing and accelerating emerging low-carbon energy solutions to build sustainable value for customers and shareholders.”

Brian Bentz
President and CEO, Alectra Inc.

“We see ourselves as a catalyst and enabler, unleashing the power of cross-industry collaboration and partnerships – with customers, cities, government, academia and industry – in an open, creative environment that expands our scope beyond the bounds of the traditional utility business model energy innovation.”

Dr. Giuseppina (Pina) D'Agostino
Director, Alectra Inc. Board,
Chair, GRE&T Centre Advisory Committee

“As we forge ahead with curiosity and excitement toward new energy frontiers, we are taking a thoughtful, pragmatic approach to innovation – innovating with intention – in order to deliver on our commitment to provide tried, tested and trusted advanced energy solutions to our customers.”

Neetika Sathe
Vice President, GRE&T Centre



Where energy innovations come to life

The GRE&T Centre is contributing to the design of smart cities, driving grid innovation and delivering value, choice and affordable advanced energy solutions for customers and local communities.

2019 Awards

Canadian Electricity Association Centre of Excellence Awards

Two GRE&T Centre projects have been recognized by the Canadian Electricity Association Centre of Excellence which celebrates Canadian innovation and cutting-edge technology in the electricity sector.

- The **Advantage Power Pricing** pilot project offered customers the chance to voluntarily sign up for one of three electricity pricing alternatives to reduce their electricity costs.
- The **POWER.HOUSE™** pilot project showcased how residential customers can simultaneously generate their own clean energy while working together as a virtual power plant to augment the grid.

Smart Cities – Smart 50 Award for Community Engagement

The Smart 50 Award recognized Alectra’s Advantage Power Pricing pilot program as one of the most transformative and influential smart cities projects. Supported by the Ontario Energy Board, learnings from the pilot will inform decisions on future electricity pricing plans.

2019 Achievements

Alectra’s GRE&T Centre made excellent progress during its first year of operation. The following are some of the year’s highlights:

- **Established the GRE&T Centre** in the Alectra facility in Guelph
- Formed the **Inaugural Alectra GRE&T Centre Advisory Committee**
- **Recruited** some of the best and brightest talents in the energy industry and beyond
- **Collaborated** with government and industry partners to initiate various projects
 - **Power.House Hybrid**
A virtual power plant using smart electrical and thermal energy technologies installed in homes to co-optimize energy bills and household carbon footprint.
 - **GridExchange**
A transactive energy market platform using blockchain technology that enables households to participate in energy markets, where they can earn money and fight climate change.
 - **AlectraDrive @Home**
Smart electric vehicle charging systems for homeowners and multi-residential building operators.
 - **IESO¹ York Region Non-Wires Alternatives Demonstration Project**
Developing a better understanding of how to competitively acquire and operate distributed energy resources to meet local and wholesale system needs.
- **Held a GRE&T Centre launch event**, along with the formal announcement of NRCan funding for various GRE&T Centre projects
- Completed the multi-year **Advantage Power Pricing** pilot which offered alternative pricing plans for customers
- **Provided GRE&T Centre speakers and thought leadership for more than 20 events** on a variety of topics including: smart cities, smart home, smart grid, blockchain, electric vehicles, decentralized energy, digital utilities of the future and green technology

Strategic areas of focus

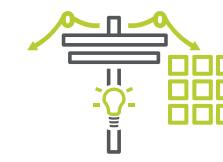
The GRE&T Centre focuses on identifying, evaluating, developing and accelerating emerging, clean and customer-friendly energy solutions in three strategic areas:



Smart Cities

Powering homes, buildings and transportation with smart, clean technologies

Initial focus on **electric mobility**



Grid Innovation

Leveraging grid modernization technologies to enable a more sustainable grid

Initial focus on **DER Integration** and Distribution System Operator (**DSO**) model



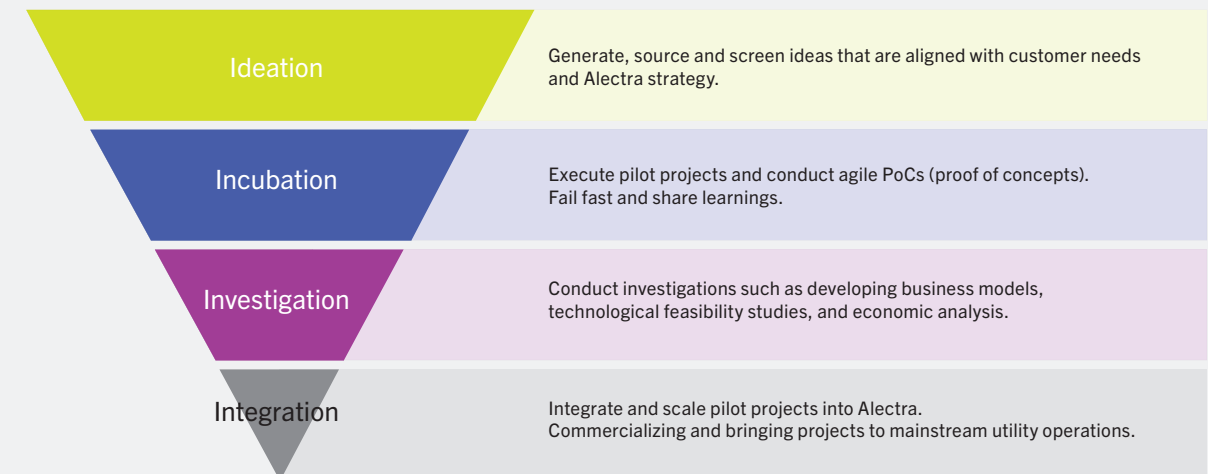
Advanced Planning

Harnessing emerging technologies and cross-industry solutions to enable a digitized utility of the future

Initial focus on **Transactive Energy Platform** and decentralized **Data Governance**

GRE&T i4 Innovation Framework

The GRE&T Centre’s i4 Innovation Framework guides projects from ideation through incubation and investigation to integration.





Smart cities

Smart cities use data and connected technology to enhance the quality of life for those living and/or working in urban areas. The initial focus is to identify, test and assess opportunities for Alectra to support residents, businesses and municipalities with the shift to electric mobility.



Getting ready for electric mobility



Advantage Power Pricing

Alectra recently tested different, new time-of-use (TOU) price plans and their effect on customer behaviour, electricity use and costs. The different electricity price plans were designed to give greater customer control and help Ontario's power system run more efficiently. Alectra's pilot was part of an OEB-led initiative to inform possible changes or redesign of electricity prices under the current Regulated Price Plan.

“ The Advantage Power Pricing program gave us more options, helping us meet our energy needs on our schedule. This was truly a win-win program, giving us more flexibility and a lower bill at the end of the month.”

Ajay Puri and Indu Puri
Advantage Power Pricing Customers

AlectraDrive @Workⁱ

The goal of AlectraDrive @Work is to demonstrate the value of a smart electric vehicle (EV) charging system that manages the flow of electricity needed to serve a building and its EV charging stations, so that electricity costs are minimized while EV drivers have an easy and accessible charging solution at their workplace. This program aims to encourage the adoption of EV technology while helping businesses manage their energy costs and helping the utility manage its infrastructure.

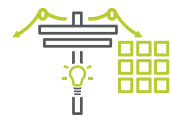
ⁱ The AlectraDrive @Work pilot program was made possible through the financial support of the Independent Electricity System Operator's Grid Innovation Fund and by Natural Resources Canada, through its financial support of the Charge the North Project led by FleetCarma® (a division of GEOTAB). Charging stations at the Markham Civic Centre were powered by Aviva Canada Inc. in 2019. Partners include ChargePoint, Eguana Technologies, Enbala, FleetCarma, Flo Inc., Plug'N Drive, Robertson Bright Inc., Schneider Electric and Util-Assist.

ⁱⁱ The AlectraDrive @Home project was made possible through the financial support of the Independent Electricity System Operator's Grid Innovation Fund and by Natural Resources Canada's EV Infrastructure Demonstration Program. Partners in this project include Enbala, FleetCarma®, Flo Inc., Robertson Bright Inc. and Plug'n Drive.

AlectraDrive @Homeⁱⁱ

Working with industry partners, Alectra is conducting research and initiating pilot programs to gain insight into EV charging behavior in homes and the impact of EV charging on the local grid. A key goal is to better understand and address the barriers to EV adoption experienced by apartment and condominium dwellers.

smart
S



Grid innovation

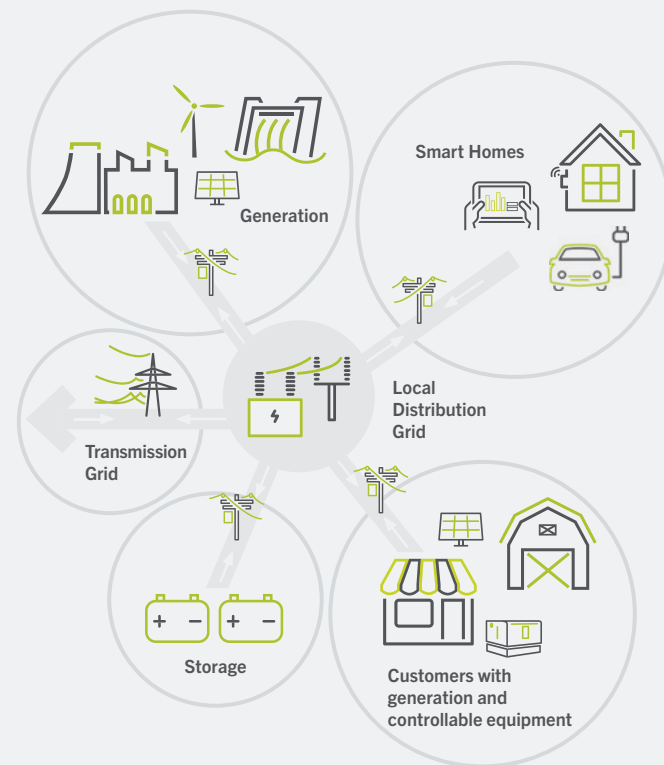
The GRE&T Centre is leading the shift to decentralized, clean electricity generation by leveraging advanced energy solutions for monitoring, optimizing and controlling the integration of local distributed energy resources (DERs) into the grid.

IESO² York Region Non-Wires Alternativesⁱⁱⁱ

Alectra is partnering with the IESO in delivering the IESO York Region Non-Wires Alternatives Demonstration Project, Canada's first of its kind, aimed at designing and demonstrating a distribution-level distribution energy resources (DERs) market that is interoperable with the IESO wholesale market to offset system demand and defer, reduce, or avoid the need for traditional infrastructure investment in wires solution.

This pilot project, formally launched in late 2019, will be completed by the end of 2022, taking place in Southern York Region municipalities, including Vaughan, Markham and Richmond Hill, where electricity demand is forecast to outpace system capability within the next 10 years.

The project is a proof-of-concept, demonstrating how market constructs could be employed to use DERs as non-wires alternatives, while addressing Transmission-Distribution interoperability. The demonstration market will operate in a simulated, test environment that is isolated from the IESO market and system operations. Alectra will act as an Independent Distribution System Operator in the demonstration, facilitating third-party competition to secure and dispatch participating DERs in a transparent and fair manner.



² Independent Electricity System Operator

ⁱⁱⁱ The IESO York Region Non-Wires Alternatives Demonstration Project is made possible by two \$5 million grants from the Independent Electricity System Operator's Grid Innovation Fund and the Natural Resources Canada's Smart Grid Program, along with support from Alectra's non-regulated subsidiary, Util-Assist.



Power.House Hybrid virtual power plant delivers peace of mind

“ Having a solar array with battery backup offers peace of mind for backup power in times of need, helps me reduce my carbon footprint, and ensures that my home is using energy in the most cost-effective way to benefit me and my family.”

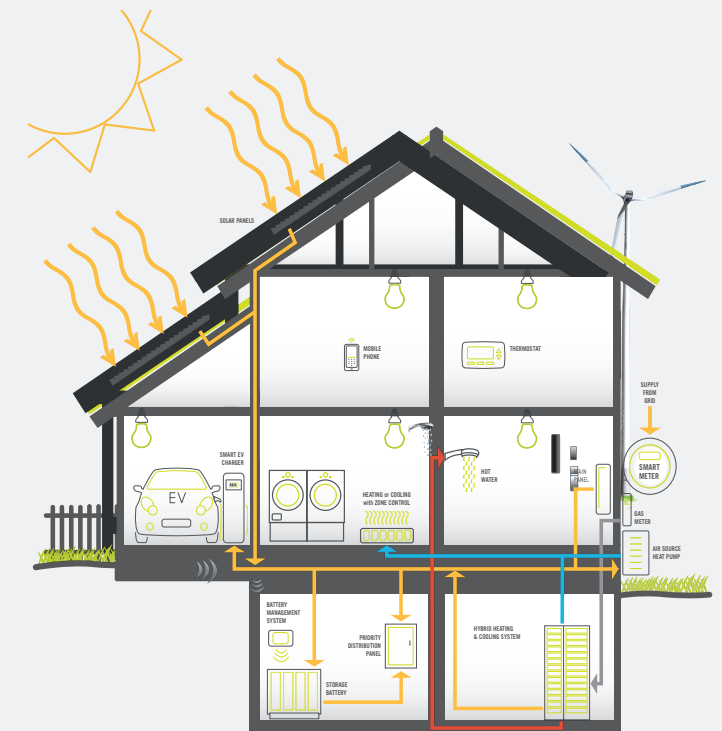
James Tablante
Power.House Hybrid customer

Power.House Hybrid virtual power plant^{iv}

Ten homes in Markham have been equipped with digitally managed electrical and thermal technology, integrated controls and real-time grid greenhouse gas (GHG) signals, to demonstrate how virtual power plants can reduce GHG emissions and lower customer energy bills by optimizing grid integration.

“ Using clean technology to power our homes, our cars, and our communities, is certainly something that I'm looking forward to being a part of.”

Steve Dy
Recent Power.House Hybrid customer



^{iv} The Power.House Hybrid project is funded by Natural Resources Canada's Green Infrastructure Fund. Partners include Enbridge Inc., the City of Markham and Ryerson University.

Sustainable



Advanced planning

The GRE&T Centre is working on harnessing the power of emerging technologies such as blockchain, artificial intelligence, Internet of Things and big data, to enable the digitized utility of the future. The goal is to deliver value, choice and affordable advanced energy options for customers and local communities.



GridExchange transactive energy platform^v

We are developing a transactive, blockchain-backed, energy platform and app that will offer customers the ability to participate in an energy marketplace featuring a secure, real-time energy exchange, and a robust settlement process with compensation and rewards.



Energy can be sourced from anywhere – the grid, solar panels, battery storage, electric vehicles, and more



Real-time tracking of energy available for sale and its \$ value



Live and secure exchange of energy for compensation and rewards

^v The GridExchange pilot is partially funded by Natural Resources Canada's Green Infrastructure Fund and includes Sunverge Energy Inc. as a partner.

Drivers of change in the energy industry

Cities around the world are becoming more digital, data-enabled, decentralized and green. Alectra is responding by evolving the utility business model to be Canada's leading electricity distribution and integrated energy solutions provider.

“The electricity market is being transformed by many forces, including the emergence of distributed energy resources, which requires a change in the way we operate today. To support advancements in digitization, we are looking at Artificial Intelligence and blockchain to revolutionize the way our utility operates. We are using cross-industry learning to digitize the industry.”

Abhinav Tiwari
Head of Advanced Planning, GRE&T Centre

“Climate change and technological evolution call for more renewable energy resources and electrified transportation. Consumer preferences are shifting towards wanting more customized, convenient, flexible and sustainable solutions.”

Daniel Carr
Head of Smart Cities, GRE&T Centre

“We need to unleash the potential of grid modernization technologies. We're looking at Internet of Things, data and other connected digital capabilities which focus on simple, effective, clean energy choices for consumers.”

Geri Yin
Head of Grid Innovation, GRE&T Centre

Drivers of change

Climate change is spurring the need for renewable energy and electric vehicles

Advancements in AI, robotics, the Internet of Things and blockchain are expected to revolutionize many aspects of daily life

Consumer preferences are shifting towards wanting more customized, digital, sustainable and seamless experiences

Alectra's response

- Pledged to reduce greenhouse gas emissions by **20 per cent** by 2026 (from 2016 levels) – a reduction of almost 2,000 tonnes of GHGs in seven years. This commitment includes a reduction in natural gas usage, fleet upgrades, improved policies and more energy efficient buildings
- Established the **GRE&T Centre** as a dedicated innovation hub
- **Surveyed 10,000 customers** to better understand shifting preferences
- Increased focus on developing innovation capabilities in AI, data and other cross industry technologies that will benefit smart cities, enable EV adoption, expedite grid modernization, and facilitate simple and effective energy solutions for customers



connected

Alectra's vision is to be Canada's leading electricity distribution and integrated energy solutions provider, creating a future where people, businesses and communities will benefit from energy's full potential.

Alectra's mission is to provide customers with smart and simple energy choices, while creating sustainable value for our shareholders, customers, communities and employees.

Alectra's values are safety, respect, customer focus, excellence and innovation.

Alectra's GRE&T Centre is where great minds collaborate, to power a better tomorrow.

Alectra GRE&T Centre
395 Southgate Drive
Guelph, ON N1G 4Y1
519-822-3010 | GREAT@alectrautilities.com
alectra.com/GREATcentre

