alectra
GRE&T Centre

GRE&T Centre Report 2023

Where great minds collaborate to power a better tomorrow

IGNITING SUSTAINABLE CHANGE

The Alectra Green Energy and Technology (GRE&T) Centre stands as a symbol of innovation, fostering collaboration to unlock new possibilities in energy transition. At the GRE&T Centre, we recognize that innovation extends beyond technological advancements alone; it encompasses new business models, regulatory frameworks and societal attitudes.

By embracing cutting-edge technologies and exploring new methodologies, we redefine the energy landscape and pioneer solutions that resonate with energy consumers. Through strategic partnerships and stakeholder engagement, we leverage collective expertise to drive progress in the energy industry. By cultivating an environment of collaboration and knowledge sharing, we accelerate the pace of innovation and amplify our impact.

> “The Alectra GRE&T Centre stands as a beacon of ingenuity within Alectra. Fueled by relentless passion for innovation, the GRE&T Centre not only advances Alectra’s vision of fostering a sustainable and brighter future but also spearheads transformative change within our sector.”

Brian Bentz, President and CEO, Alectra Inc.

We prioritize four strategic areas of focus

Smart Cities:

We help power homes, buildings, and transportation with smart, clean technologies. Electrification of transportation is integral to our sustainability journey, necessitating utility transformation to offer new customer experiences. Through pilot projects and incentives, we facilitate adoption of electric transportation in homes, businesses, and communities.

Grid Innovation:

We explore technologies, strategies and policies aimed at enhancing the reliability, efficiency, and sustainability of the energy grid while empowering consumers to take control of their energy usage. We work with industry stakeholders to demonstrate ways for utilities to enable a more versatile and innovative grid.

Advanced Planning:

We navigate disruptive technologies to achieve tangible results. We study the latest market intelligence, analyze emerging megatrends and research changing customer expectations to build the capabilities necessary to deliver innovative energy solutions.

Data & Enterprise Architecture:

We help build the blueprint for a data-informed tomorrow through strategic integration of technology and business strategies. This ensures that investments in digital transformation support and enhance customer experience. We help the utility get ready to support transformative initiatives.

Expert Advisory Committee guides GRE&T Centre’s Strategic Vision

The Alectra GRE&T Centre Advisory Committee guides the strategic trajectory of the GRE&T Centre. Comprised of seasoned professionals spanning diverse fields, the Committee brings a unique outside-in perspective to the GRE&T Centre. Leveraging their extensive technical expertise, business acumen, and leadership capabilities, members provide both local and global perspectives that are essential for sparking innovation.

From left to right:
Dr. Janusz Kozinski, Dr. Giuseppina (Pina) D’Agostino, Nicholas Parker, Julia Zhu, Dr. Brian Mergelas, Lorelei Graham, Neetika Sathe, Chantel Broten, Brian Bentz

Driving Meaningful Impact:
The Year in Review

In 2023, the Alectra GRE&T Centre underwent a significant period of transition and transformation. With the conclusion of many of our pilot and demonstration projects, 2023 became pivotal for gathering insights and leveraging them to drive change. The year also marked a significant leap as we embraced generative AI and ventured into the 'Data and Enterprise Architecture' domain.

It was also a year of deep collaboration, we actively engaged stakeholders and industry leaders in advocacy efforts and participated in fundamental studies that are critical to the groundwork for grid modernization in Ontario. In addition, our teams focused on customer engagement, whether by expressing gratitude to our residential customers for their involvement in our pilot programs or facilitating our business clients for participating in helping us demonstrate North America's first local energy market.

> "The Alectra GRE&T Centre isn't just keeping pace with the evolving energy landscape; they are actively shaping it. With a focus on decarbonization, electrification, digitalization, and grid decentralization they are helping drive sustainable energy solutions for the communities we serve. "
>
> **Norm Loberg,** Chair, Alectra Inc. Board of Directors

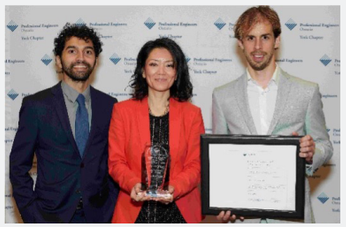
> "The Advisory Committee is eagerly poised to continue steering the Alectra GRE&T Centre, particularly as we embrace new technologies like AI. With innovation as our compass, the road ahead promises an exhilarating journey of growth, impact, and boundless possibilities."
>
> **Dr. Giuseppina (Pina) D'Agostino,** Alectra Board Member and Chair of the GRE&T Centre Advisory Committee

Awards and Achievements

Zero Carbon Building Certification:
Alectra's Southgate office in Guelph, home to the Alectra GRE&T Centre, received the 'Zero Carbon Building' certification by the Canada Green Building Council (CaGBC).

2023 Centre of Excellence Award:
The IESO York Region Non-Wires Alternatives demonstration project delivered by Alectra, in partnership with the Independent Electricity System Operator (IESO) and Natural Resources Canada (NRCan), received Electricity Canada's Centre of Excellence award in the Distribution Category for 2023.

Clean50 Individual Award:
Geri Yin, Head of Grid Innovation at the Alectra GRE&T Centre was honoured with the 2024 Clean50 Award in Traditional Energy & Generation category.



2022 Engineering Project of the Year:
Power.House Hybrid (PHH) project was awarded the second prize in the Engineering Project of the Year (Medium Project) Category by Professional Engineers Ontario – York Chapter.

Enhancing the eMobility Experience

Electrification of transportation is crucial for our sustainability journey. We concluded several projects and initiated new endeavors that reinforce Alectra's commitment to driving positive change in the Electric Vehicle (EV) landscape for our customers.

"Customers seek trustworthy partners committed to the EV transition. For years now, Alectra has been shaping the industry with insightful eMobility projects, advocacy, and customer feedback opportunities. Be it through Alectra GRE&T Centre's innovative pilot & research projects, or Alectra Energy Solutions' comprehensive commercial & transit offerings. Alectra remains invested in bringing value and establishing itself as the preferred long term eMobility partner."

Ariel Bautista, Director, eMobility, Alectra Energy Solutions

Completion of AlectraDrive @Work and @Home Project:

The AlectraDrive @Work[1] project showcased the benefits of smart EV charging in commercial environments, proving its technical viability and economic advantages. By integrating managed EV charging with solar power, battery storage, and building energy demands, the project illustrated the potential for cost-effective and reliable solutions for building owners, while enhancing EV charging accessibility for drivers.

The AlectraDrive @Home[2] project applied a similar approach to residential customers. Through pricing incentives and distributed energy management, the project showcased the effectiveness of scheduling and demand response in ensuring a positive user experience.

Empowering eMobility Customers:

Expanding upon our success with AlectraDrive @Home, we are helping Alectra launch a new customer engagement platform tailored for residential customers. The Sustainable eMobility Platform[3] aims to elevate Alectra's customer relationships by enhancing ease of access and providing them support throughout their electrification journey. It seeks to provide customers with insights as they consider going electric and helps simplify the transition by bundling charging infrastructure and management into a seamlessly interconnected experience.

Transitioning Fleets to Electric:

Electrifying fleets can significantly increase electricity demand, potentially necessitating infrastructure upgrades. However, by harnessing the flexibility in charging EV batteries we can leverage opportunities for cost optimization. Our emphasis lies in collaborating with fleet operators, providing awareness and tailored charging management solutions. By understanding their requirements, we aim to devise programs that not only facilitate managed charging but also aid in customers' broader electrification journey.

200 Businesses Participated in Alectra EV Fleet Survey
30+ Stakeholders, Customers Provided Key Insights through Interviews

Driving eMobility Adoption:

Our commitment to advancing eMobility remains strong through active participation in government initiatives such as the federal Zero Emission Vehicle Incentive Program (ZEVIP). The GRE&T Centre has been instrumental in delivering incentives for electric vehicle chargers across various sectors, including public, workplace, multi-family and fleet customers. Insights from our pilot projects have informed Alectra's comprehensive EV strategy.

Key Milestones:

$1.93M Invested in Ontario's EV Charging Infrastructure via NRCan's ZEVIP

327 Chargers Installed in 53 Projects

64 Preapproved Projects for $3.97M in Incentives, Aiming for close to 600 Stations by 2025

* as of December 2023

[1] The AlectraDrive @Work pilot (2018–2022) was made possible through the financial support of the Independent Electricity System Operator's Grid Innovation Fund and by Natural Resources Canada's Charge the North Project led by GEOTAB/Fleetcarma. Partners included Flo, ChargePoint, Generac Grid Services, Schneider Electric, GEOTAB, Plug'N Drive, Robertson Bright Inc., Util-Assist, Guidehouse, and Eguana Technologies.

[2] The AlectraDrive @Home pilot (2019–2023) is 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 include Generac Grid Services, Geotab, Flo, Plug'N Drive, Guidehouse, BracerEV, Robertson Bright Inc., and Smith & Long.

[3] This project was made possible through financial support provided by the Ontario Energy Board under the Innovation Sandbox Challenge. The Innovation Sandbox Challenge was a one-time funding opportunity for innovators in Ontario to submit proposals for solutions that advance the energy sector's understanding of how innovation can benefit consumers.

DECARBONIZING THE GRID FOR A SUSTAINABLE FUTURE

The Grid Innovation team at Alectra GRE&T Centre is actively involved in exploring innovative solutions that enhance the resilience of the energy grid. By focusing on solutions that reduce peak demand and maximize the utilization of renewable energy sources, the team plays a key role in helping steer Alectra's transition from a traditional distribution network operator (DNO) to a forward-thinking distribution system operator (DSO).

"As Ontario embraces electrification, Alectra GRE&T Centre initiatives are proactively charting pathways for meeting escalating energy demands while ensuring grid safety. Strategic innovation, substantial investments, and collaborative efforts are crucial for utilities to lead the evolution toward a more efficient, interconnected, and sustainable energy landscape."

Hisham Omara, VP, Grid Modernization, Alectra

Insights Drive Innovation and Impact

The GRE&T Centre continues to integrate lessons and insights drawn from our pilot projects into strategic planning processes to ensure that Alectra's future initiatives are well-informed, forward-looking and support decarbonization of the grid.

The completion of two-year **York Region IESO NWA Demonstration Project**[1] marks a significant milestone. In 2021, this groundbreaking project established North America's first distribution level electricity market, paving the way for a more sustainable, resilient, and customer-centric grid. NWA Project Evaluation report, that captures methodologies for procurement of distributed energy resources (DER) procurement and insights into their strengths and challenges, is planned for 2024.

Power.House Hybrid[2]:

This pilot demonstrates the potential to achieve net zero emissions in a residential home by integrating a hybrid array of electrical and thermal equipment into a virtual power plant platform. By showcasing the transition of single-family homes towards sustainability, one home at a time, this initiative lays the foundation for empowering customers in the journey towards a cleaner energy future.

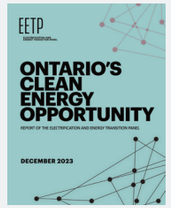
Advocating for a Future-ready Grid

The GRE&T Centre continues to collaborate with stakeholders and thought leaders to leverage collective expertise to help navigate the complexities of the evolving energy landscape. Notable partnership studies include:

DER Scenarios and Modelling Study: (In collaboration with the IESO and EPRI). This study explores the impact of DERs on distribution operations at the Transmission-Distribution (T-D) interface, addressing factors such as losses, network switching, and contingencies. The research investigates the implications of bi-level participation of DERs on the local distribution systems on both local networks and broader grid dynamics. The Study also examines coordination protocols among stakeholders, including the Independent Electricity System Operator (IESO), Local Distribution Companies (LDCs), potential future DSOs, and DER owners/aggregators.

Electricity and Energy Transition Panel (EETP):

EETP was established as a short-term advisory body to help Ontario's economy prepare for electrification and the energy transition. Alectra was one of the utilities consulted to provide insights that led to the development of new operating models for LDCs. We collaborated with our Government Relations Team and provided strategic guidance to assist in the formulation of actionable recommendations that aim to ensure that LDCs are equipped to adapt and thrive in a rapidly changing energy environment.



Distribution System Operator (DSO) Study by Ontario Electricity Association:
In collaboration with Ernst & Young LLP (EY) and Ontario-based LDCs, the OEA study explores the benefits and challenges of implementing a DSO model in Ontario's electricity sector. The study underscores the importance of immediate grid modernization investments to unlock DER benefits. The LDC Working Group, including representatives from Alectra, Elexicon, HydroOne, Hydro Ottawa, and Toronto Hydro, contributed to the study.

Transmission and Distribution Working Group (TDWG):
Alectra is an active part of the TDWG, a collaboration that is exploring innovative business models that will help feed into the IESO's Market Vision and Design Project (MVDP), a crucial component of the IESO's 10-year DER roadmap for the province. The outcomes of these collaborations will shape the operationalization of coordination protocols, communication interfaces, and shared platform.

[1] This project was developed by the IESO and Alectra Utilities Corporation and supported by funding from the IESO Grid Innovation Fund and the Natural Resources Canada Smart Grid Program. Alectra is the delivery partner for this demonstration with contributions from EPRI and Util-Assist.

[2] Power.House Hybrid pilot was funded by Natural Resources Canada's Green Infrastructure Fund. Partners include Enbridge Gas Inc., City of Markham, and Toronto Metropolitan University.

Leveraging Technology for Optimized Energy Transition

The Alectra GRE&T Centre is committed to exploring effective ways to embrace emerging technologies that enable a digitalized utility of the future. The Advanced Planning team at the GRE&T Centre navigates the latest market intelligence, studies emerging megatrends, investigates changing customer expectations, and tests the latest digitalization tools to build the capabilities necessary to deliver new energy solutions of the future. Our innovation projects are firmly anchored in the exploration of emerging clean energy trends and sought-after technologies, positioning Alectra at the forefront of the energy transformation.

As part of this journey, we are exploring ways to integrate artificial intelligence (AI) and visual intelligence technologies into our operations, in order to enhance our capabilities and ensure sustained excellence in service delivery.

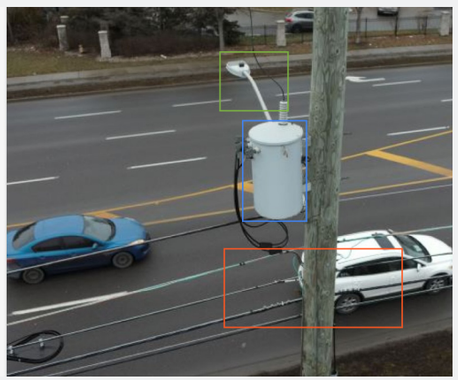
> “Alectra GRE&T Centre’s Visual intelligence pilot has shown us the benefit of using AI to transform our asset management operations and to identify and address potential issues proactively. AI has the potential to revolutionize our approach to asset inspections and to fortify our commitment to delivering reliable services to our customers.”

Chris Hudson, SVP, Network Operations, Alectra

Visual Intelligence for Infrastructure Management:

We are actively exploring the integration of AI into our predictive asset management framework, harnessing machine learning algorithms to analyze high-resolution images and detect potential asset issues.

This initiative has the potential to provide greater insights into aging infrastructure, increase the speed and efficiency of identifying defects and assist engineering and maintenance staff in developing maintenance plans. In 2023, the GRE&T Centre embarked on a pivotal pilot project, venturing into the realm of AI by exploring the use of computer vision for defect detection. This pilot marked our initial foray into AI and has paved the way for further explorations in this transformative field.



Pilot location: Vaughan, Ontario, Canada

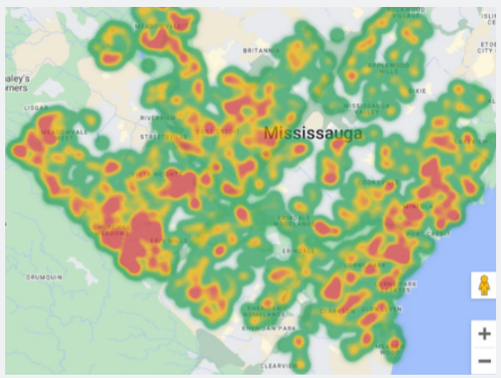
EV Charger Detection for Enhanced Load Forecasting and Grid Management:

The increase in Electric Vehicle (EV) ownership presents both opportunities and challenges for Alectra. As more individuals transition to EVs, it is critical to ensure reliable energy distribution. We are exploring the use of advanced machine learning models trained on energy consumption profiles of known EV households, to proactively identify potential strain on feeder lines and individual transformers.

By analyzing consumption patterns and correlating them with EV charging behavior, it is possible to anticipate increased demand and optimize our grid infrastructure accordingly.

This initiative aims to:

- Enhance our load forecasting capabilities, ensuring efficient resource allocation and grid stability
- Preemptively address infrastructure challenges and minimize service disruptions, by identifying potential strain points on feeder lines and transformers.



Harnessing the power of data and AI, our EV detection algorithm analyzes Mississauga meter data to accurately predict EVs in the territory. The resulting heatmap graphic showcases concentration of EVs.

HARNESSING DATA TO TRANSFORM CUSTOMER EXPERIENCE

The Data and Enterprise Architecture team, being incubated at the Alectra GRE&T Centre, holds the mandate for orchestrating, strategizing, and overseeing Alectra's technology infrastructure and data ecosystem.

Guided by stringent data architecture principles and robust governance processes, we ensure operational excellence and stay at the forefront of delivering future-ready energy solutions tailored to evolving customer and community needs.

"The Alectra Data Office (ADO) has been instrumental in bringing new data insights to our metering operations. In addition to providing executive level Dashboards, ADO has been able to assist with creating dynamic analytics that allow staff to self-serve and drill down on KPIs to complete root cause analysis and perform corrective action. ADO is a partner that understands our operations, provides intelligence that aids in decision-making and accelerates our time to deploy."

Shelley Parker, Vice President, Metering, Alectra

Data-Driven Decision Making:

In 2023, the Alectra Data Office (ADO) relocated to the GRE&T Centre. Here, we prioritize providing timely access to quality data, fostering transparency, objective decision-making, and innovative outcomes. Utilizing robust data visualization tools and expert analysis, we are committed to offering a comprehensive overview of business performance, spotting trends, making informed decisions, and forecasting future outcomes. Through data automation initiatives, we are helping Alectra in unlocking the full potential of our data assets, optimizing operations, fostering growth, and enabling smarter, data-driven decisions.

Fueling Efficiency and Customer Satisfaction Across Operations:

By leveraging data analytics, we continue to unlock efficiency benefits across our organization, particularly in the realms of reports and data curation. This empowers us to streamline internal operations, enabling swift responses to service requests, prompt issue resolution, and optimal resource allocation. Additionally, integrating data analytics into our business processes allows us to anticipate customer needs, optimize service delivery, and enhance reliability, ultimately culminating in a superior customer experience.

Fostering Capabilities to Support Transformation:

The Alectra GRE&T Centre aspires to enhance processes to a degree that amplifies our capacity to support transformative initiatives. This endeavor is achieved by establishing a symbiotic relationship between technology and business, strategically aligning investments in digital transformation with Alectra's overarching business objectives. We accomplish this by adhering to enterprise architecture principles, upholding elevated operational standards, and deploying robust governance processes. We are implementing a capability-centric approach that acts as a universal language that propels Alectra's corporate vision – Strategy 2.0 – forward.

By leveraging data analytics to improve operations, Alectra saved 8.5 months of full-time equivalent effort in 2023*

*To calculate time savings, time taken for tasks in the updated process is subtracted from that in the original process, accounting for business hours worked

Celebrating 5 Years of Innovation and Impact

Since embarking on our journey on January 01, 2019, the Alectra GRE&T Centre has reached numerous significant milestones:

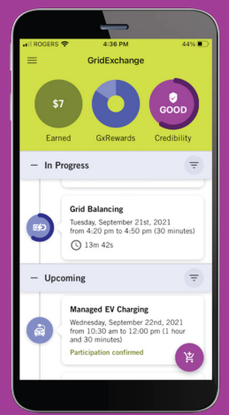
- Our Advantage Power Pricing (APP) project set the groundwork for the Ultra-low Overnight (ULO) pricing plan that positively impacts EV drivers in all of Ontario.
- The IESO York Region Non-Wires Alternatives Demonstration Project made history as North America's inaugural local energy marketplace, showcasing our dedication to pioneering solutions.
- Initiatives such as POWER.HOUSE® and Power.House Hybrid have empowered households to actively participate in the ongoing energy transition.
- Programs like AlectraDrive have been instrumental in driving Alectra's emobility strategy forward.
- The journey of the GridExchange platform, developed and piloted by the GRE&T Centre, from concept to commercial reality represents another significant milestone.
- In 2023, we reaffirmed our commitment to environmental responsibility and leadership by undertaking the ambitious endeavor of retrofitting our office building to achieve Zero Carbon certification.

"As stewards of innovation, the GRE&T Centre has seen an incredible journey. The trust placed in us by Alectra's leadership ignites our passion to push boundaries and pioneer transformative solutions that help shape a better tomorrow. As we celebrate five years of innovation and impact, we are inspired to forge ahead and leveraging our collective expertise to continue making a difference in the energy transition landscape."

Neetika Sathe, Vice President, Alectra GRE&T Centre

ZERO Carbon Certification:

Alectra's Southgate office in Guelph, home to the Alectra GRE&T Centre, was selected as a showcase for zero carbon building pathways. This LEED-Certified facility, boasting a geothermal heating and cooling system since 2011, attained Zero Carbon Building status from Canada Green Building Council (CaGBC). This notable achievement distinguishes it as Guelph's first retrofit project to receive such prestigious certification from CaGBC.



GridExchange: From Concept to Conmmercialization:

GridExchange[1] is an innovative cloud-based transactive platform facilitating the engagement of customers equipped with Distributed Energy Resources (DERs) in an energy marketplace alongside their utility provider. Accessible via both web and mobile platforms, the GridExchange App boasts a secure, real-time energy exchange mechanism coupled with a robust settlement process offering instant financial compensation and rewards.

This pioneering application was conceived, developed, and piloted entirely within the Alectra GRE&T Centre. Supported by collaborative efforts and invaluable inputs from key members of Alectra SLT, we successfully navigated the project toward commercialization readiness.

The GridExchange platform was acquired by SEW, a global leader in AI-Powered Connected Customer (CX) and Workforce (WX) Experience Industry Cloud Platforms.

From Pilot to Policy: APP[2] to ULO

On April 11, 2023, Ontario launched its third electricity price plan, the Ultra-Low Overnight (ULO) plan, signaling a step towards sustainable energy. For Alectra GRE&T Centre, this moment validated our work and a signaled a momentous achievement for innovation hubs like ours everywhere. From May 01, 2018, to April 30, 2019, we conducted the Advantage Power Pricing (APP) project, examining three Time-of-Use (TOU) pricing models with a diverse pool of over 8,000 consumers.

This milestone showcased the journey from a pilot project to a significant policy change. As an innovation hub, witnessing this transition serves as a reminder of the impact that is achievable when new ideas effectively meet a societal need. This journey also reinforced our belief that when great minds collaborate, we can shape a better tomorrow and drive meaningful impact.

[1] The pilot was partially funded by Natural Resources Canada's Green Infrastructure Fund and includes Sunverge Energy Inc., Flo, and Savage Data Systems as partners.

[2] APP was made possible through the support of the OEB through its Regulated Price Plan (RPP) Roadmap Pilots initiative. Partners included BEworks, Util-Assist, Bidgely, Energate (Tantalus), ecobee, Nest, and Eaton.

The Next 5 Years

Over the next five years, the landscape of innovation is set to undergo a profound transformation, propelled by unprecedented advancements in digitalization and transformative technologies. Artificial intelligence and process automation will continue to spearhead innovation agendas, revolutionizing industries across the board.

"The changing energy landscape demands an innovative shift. By embracing a holistic approach that intertwines technology, society, and the environment, we can break down silos and unlock immense potential for sustainable and impactful innovation through collaborative efforts."

Julia Zhu, EVP and Chief Digital & Innovation Officer, Alectra

From harnessing the power of emerging technologies to reimagining traditional processes, we are discovering the possibilities

Thinking Beyond the Siloes:

It is through bold experimentation and a willingness to challenge the norm that the next wave of innovation will unfold, ushering in a new era of transformative change. This new paradigm of innovation entails innovating with intent across multiple dimensions and quadrants, breaking away from siloed thinking to foster interconnectedness and synergy.

By considering a broader spectrum of factors, from technological breakthroughs to societal trends and environmental impacts, we can uncover untapped opportunities and drive transformative change on a grand scale.

The next game-changing model of innovation lies in our ability to integrate diverse perspectives, leverage cross-disciplinary expertise, and collaborate across sectors to address complex challenges and unlock new possibilities. It is through this collective effort and expansive mindset that we will chart a course towards a future defined not by incremental progress, but by exponential growth and profound societal impact.

We are adopting a comprehensive innovation approach to navigate the complexities of the next five years with confidence, resilience, and forward-thinking vision. Our innovation strategy embraces a multipronged view of innovation consisting of these approaches:

- Optimize: Streamline processes, operations, and resources for peak efficiency, cost reduction, and enhanced performance.
- Reinvent: Challenge the status quo, disrupting traditional approaches, and exploring new possibilities to drive innovation across all areas of the business.
- Create: Generate fresh ideas, products, and services that address evolving needs and capitalize on emerging opportunities.
- Improve: Continuously elevate customer experiences, refining products and services through feedback with an aim to deliver exceptional value and satisfaction.

We are looking at an interconnected innovation framework as a pathway to help us to not only optimize the present but also to ensure that the Alectra GRE&T Centre stays ahead of the curve.

Identifying latent needs, envisioning novel solutions, and creating transformative value propositions that resonate with both customers and the organization's objectives.

Alectra's vision is to be your trusted energy partner empowering a sustainable and brighter future

Alectra's mission is to provide innovative and reliable energy solutions which deliver lasting value for all

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

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Please contact us for more information about Alectra and
our efforts to create sustainable value in the energy sector.

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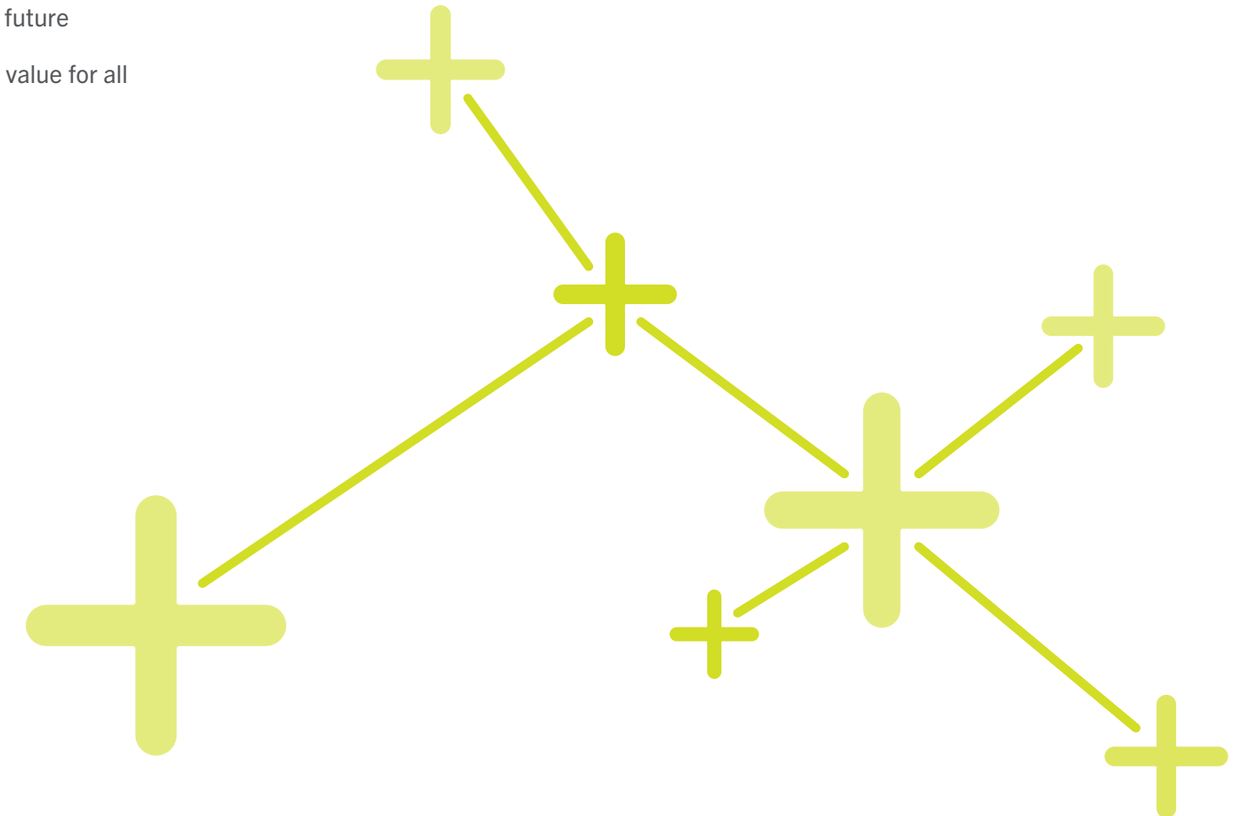

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