

Where great minds collaborate to power a better tomorrow





Bringing energy innovations to life

“The GRE&T Centre is the think tank, the collaboration hub, and ground zero for innovation as we change from the old energy economy to the new energy ecosystem.”

Brian Bentz, President and CEO, Alectra Inc.

Discover

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

The GRE&T Centre’s work has now become more important than ever before as the COVID-19 pandemic disrupts the world. The electricity industry was already undergoing a historic transformation as distributed energy resources (DERs), digital intelligence, and electrified transportation reshaped the energy landscape. The scale and speed of that disruption has now accelerated. The pandemic has required businesses and customers to use more virtual and online options, highlighted issues in climate change, and created heightened interest in the power of automation and digitalization. This disruption has called for us to pivot faster than had been anticipated to support our customers.

We at the GRE&T Centre are working with industry partners and government to create solutions that benefit the public. We need to use innovation and creative thinking not just at Alectra, but in the whole energy ecosystem, to carve our path forward. The GRE&T Centre is the innovation hub where we can prepare, think, experiment, and act to help build the energy ecosystem of tomorrow.

GRE&T i4 Innovation Framework

The GRE&T Centre’s i4 Innovation Framework guides ideas along the path from ideation through incubation, investigation, and integration.



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

The GRE&T Centre’s strategic areas of focus include:



Smart Cities

- Powering homes, buildings and transportation with smart, clean technologies
- Focus on e-mobility



Grid Innovation

- Leveraging grid modernization technologies to enable a more sustainable grid
- Focus on DER integration, the Distribution System Operator (DSO) model, and a Transactive Energy Platform



Advanced Planning

- Identifying and designing solutions using emerging technologies to enable a digitalized utility of the future
- Focus on market intel, advanced data analytics, integrated end-to-end solution design and deployment, and decentralized data governance



Pina D'Agostino and Neetika Sathe at the GRE&T Centre Launch Event in June 2019.



We at the GRE&T Centre are first out of the gate, working with industry partners and government to benefit the public.

Q&A

Discovering the Possibilities

Dr. Giuseppina (Pina) D'Agostino, Chair of the Alectra GRE&T Centre Advisory Committee and Alectra Board Member, and Neetika Sathe, Vice-President of the GRE&T Centre, provide their perspectives on the changing energy landscape, the impacts of COVID-19, and the utility of the future.

Last year, as the GRE&T Centre delivered its inaugural Annual Report regarding 2019, you talked a lot about the GRE&T Centre being a catalyst for change and about being an enabler for collaboration across industries, cities, government, academia, etc. Has 2020 brought anything new or different to the table? Has the focus of the GRE&T Centre changed?

Pina: The second year of the GRE&T Centre has reinforced the importance of the GRE&T Centre not only as a catalyst for change and as an enabler for collaboration, but also as a coordinator. This role of the GRE&T Centre is more important now than ever before. We are seeing accelerated change in our industry, in other domains, and in our communities. This change requires us to anticipate and execute quickly. To do this, we need to be able to effectively coordinate and collaborate. We at the GRE&T Centre are first out of the gate, working with industry partners and government to benefit the public. We are building a strong reputation in the industry as a catalyst for change.

What would you consider the greatest achievement of the GRE&T Centre in 2020?

Pina: The GRE&T Centre has had so many achievements of note in 2020. It has been humbling to see the speed at which the Centre has been successful on so many fronts. On an individual level many of our leaders have been receiving honours and awards during the past year. It is a testament of the fabric of our Centre and of Alectra. It requires both individual strength, collective strength, fabulous leadership, and an effective governance structure to achieve so much. Our greatest strength is having all these successful parts working collectively.

Neetika: Even during the COVID-19 pandemic, while we have been focused on the basics of ensuring Alectra can provide safe and reliable power to customers, we have also been moving forward. With the combined strength of all our collaborators, the GRE&T Centre has been able to continue pushing the envelope and testing new technologies to bring new opportunities to Alectra and bring new energy solutions to customers.

What are the impacts of COVID-19 on the technology and the work that you do in the GRE&T Centre?

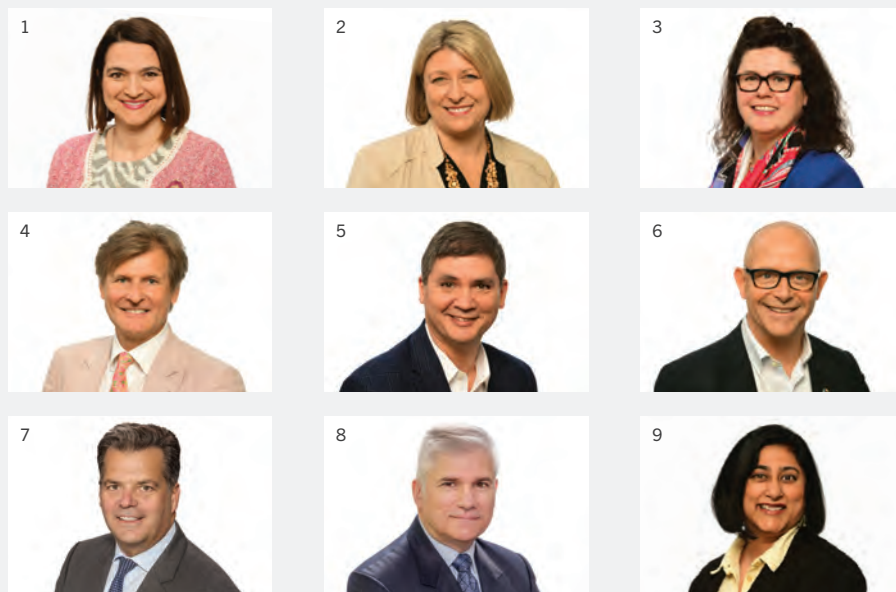
Pina: One thing we keep talking about is that the pandemic has accelerated the pace of change. We are all looking at the future of possibilities. Our customers expect more from us. We need to enable change, adapt, use the power of emerging technologies, and really embrace the new energy culture. We have to really go after the latest, smartest technology to make the lives of our customers healthier, easier, and more affordable. And we have to do this faster than ever anticipated.

Neetika: Before the pandemic, we were very hopeful and optimistic about the opportunities that digitalization would bring to our industry. Since the beginning of COVID-19, the use of digital options has accelerated because in a lot of cases, these are the only options available while we are required to maintain physical distancing. If anything, COVID-19 has further strengthened the importance of the GRE&T Centre's work. COVID-19 has allowed us, and even required us, to pivot much faster than anticipated into digitalization.

Alectra GRE&T Centre Advisory Committee

The Advisory Committee provides inspiration and guidance to Alectra regarding the GRE&T Centre's strategic direction, projects, and engagement activities. The Committee is continuously looking at the future of Alectra through an innovative lens, providing insights on global trends and issues, sharing out-of-the-box ideas, and bringing "edge" thinking to strategic deliberations.

The Committee includes Alectra leaders and experienced professionals recruited from diverse fields who share a wide range of perspectives and skills to ensure that the GRE&T Centre can deliver initiatives that are relevant, forward thinking, and applicable to the ever-changing energy industry.



1. **Dr. Giuseppina (Pina) D'Agostino**
Alectra Board Member and Chair of the Alectra GRE&T Centre Advisory Committee
2. **Chantel Broten**
Committee Member
3. **Lorelei Graham**
Committee Member
4. **Dr. Janusz Kozinski**
Committee Member
5. **Dr. Brian Mergelas**
Committee Member
6. **Nicholas Parker**
Committee Member
7. **Brian Bentz**
President and CEO of Alectra Inc. and Ex Officio Committee Member
8. **John Matovich**
Executive Vice-President, Alectra Energy Solutions and Services and Ex Officio Committee Member
9. **Neetika Sathe**
Vice-President, GRE&T Centre and Ex Officio Committee Member

With the increasing importance of digitalization, a digitized grid, and a digitized customer, what role does the GRE&T Centre play in enabling the "digitalized utility of the future"?

Neetika: The emerging technologies and the business models we are testing out at the GRE&T Centre keep a future state in mind where energy solutions for customers are online, enabled with an app, and include two-way communication with the customer. The customer can be a consumer as well as a generator. The remote monitoring and control required to do this is happening by way of digitization. COVID-19 has strengthened the need for these types of technologies and solutions that the GRE&T Centre was already working on before the pandemic. It further strengthens our belief that such solutions will help customers access cleaner and greener energy solutions.

Pina: The digitalized utility of the future also requires our attention on data. Data governance, data stewardship, data analysis, and IP are crucial to our initiatives and will be even more so with increasing and new

smart technologies. We at Alectra are at the forefront of thinking about data governance and IP issues which are crucial to enacting our digital future. We are aware of and are developing effective strategies for a greater innovative society.

The GRE&T Centre has been described as the think tank, the collaboration hub, and ground zero for innovation at Alectra. What does this description mean to you?

Pina: It encompasses preparation, thinking, experimenting, and acting. We identify problems and come up with the big solutions.

Neetika: At ground zero we are on ground that has not been walked on before. When we come across hurdles and roadblocks, we don't have precedents to look at to figure out how to respond and proceed. We need to use innovation and creative thinking to build a path forward. When we are exploring emerging technologies and new business models we are involving real customers, academic partners, industry partners and startup companies in this journey so we can test out solutions together at ground zero.

Which global trends are you following with the most interest?

Pina: The main trend I am interested in is the focus on the customer and customer empowerment. At Alectra we are of course working with energy, so the focus is on making energy sustainable, applying smart usage, and considering smart sourcing of that energy for the customer.

What are the greatest challenges facing the GRE&T Centre?

Pina: I think one of the greatest challenges (and I think everyone has this challenge) is trying to get everyone working together for a collective vision. We want Alectra to continue to work collaboratively to address the big challenges we face. We want to get people to act in unison and with vision.

Are there any final thoughts you would like to share?

Pina: You need the right people to be successful. The people power at Alectra is key. You need the people with passion, expertise, and heart behind everything.

2020 Highlights

In 2020, leading industry associations and prominent voices in business and sustainability recognized the GRE&T Centre for various achievements and key project milestones. The GRE&T Centre is very proud to report on the following accomplishments and contributions to Alectra and to the energy sector.



“The work that the GRE&T Centre does is an important part of Alectra’s efforts to help build a clean energy future and embrace new technologies to help our customers.”

Brian Bentz
President and CEO, Alectra Inc.

Innovation

2020 Awards

Smart Electric Power Alliance (SEPA) Public Power Utility of the Year

Alectra Utilities was the first Canadian Utility to be recognized as Public Power Utility of the Year as part of SEPA’s 2020 Power Players Awards. The award highlighted the GRE&T Centre’s significant achievements in initiatives like AlectraDrive, GridExchange, POWER.HOUSE™, and Power.House Hybrid.



2020 Achievements

AlectraDrive @Home

200 participants in the AlectraDrive @Home pilot are testing various incentives and are providing us with data to better understand EV driver charging behaviour and its impacts on our grid.



Canadian Electricity Association (CEA) Tom Mitchell Electric Vehicle Utility Leadership Award

Alectra received the CEA award for its various EV initiatives, including, AlectraDrive @Work, AlectraDrive @Home, GridExchange, Advantage Power Pricing, and the York University Electric Bus Simulation Study.



Corporate Knights Top 30 under 30

Corporate Knights selected Anastasia Boutziouvis, Specialist, Alectra GRE&T Centre, as one of their top 30 under 30 sustainability leaders in Canada. Anastasia was recognized for her work as the project lead on the Alectra GridExchange pilot, supporting clean grid edge technology for a low carbon economy, and her life-long pursuit of a sustainable future.



Engineering Project of the Year Award

In January 2020, the 2019 Engineering Project of the Year Award was awarded to Alectra Utilities by Professional Engineers Ontario (York Chapter) for the AlectraDrive @Work project.



Power.House Hybrid

10 homes were installed with Power.House Hybrid systems which will enable the transition to Net-Zero Energy Emission homes by utilizing a Virtual Power Plant.

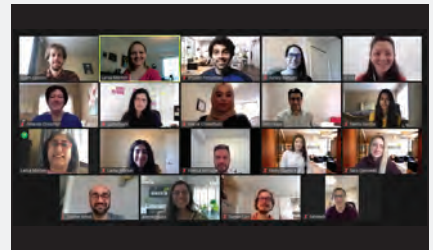


Local Electricity Market

In partnership with the Independent Electricity System Operator (IESO) and National Resources Canada (NRCan), Alectra brought to life Canada's first local electricity market, the IESO York Region Non-Wires Alternatives Demonstration Project. It launched with a successful and highly competitive capacity auction in late 2020 with 34.3 MW of capacity registered to participate at a highly competitive price of \$0.64/ kilowatt-day.

Event Participation

The GRE&T Centre participated at events and conferences hosted by industry associations across Canada. We shared our thoughts, in presentations and panel discussions, about the impacts of technology on work, electrification of transportation and the proliferation of EVs, energy storage, and the impacts of COVID-19 on the energy sector.



Enabling e-mobility

E-mobility is growing rapidly as countries around the world approach the tipping point of EV proliferation and major auto manufacturers increase their production (and their selection) of available EVs. By 2030, we expect there will be about 150 million EVs on the road worldwide. We are gearing up today so you can drive your way to a cleaner, better, and smarter tomorrow.



smart



Powering homes, buildings, and transportation with smart, clean technologies is a key strategic area of focus for Alectra. The GRE&T Centre's Smart Cities team is focusing on enabling e-mobility.



AlectraDrive @Home¹

A key goal of AlectraDrive @Home is to enable the transition to e-mobility by making EV use and ownership a great experience for the individual whether it is in a single family home or a multi-unit residential building. In 2020, the AlectraDrive @Home pilot successfully recruited over 200 participants to test various incentives aimed at encouraging drivers to charge their vehicles at off-peak times. Participants will have access to vehicle telematics, unlocking info about their EV, battery health, load, carbon footprint, and more. Data collected will provide us with information about EV driver charging behaviour and its impact on our grid, helping us to prepare the grid for more EVs and enable the increasing proliferation of EVs.

¹ The AlectraDrive @Home project 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 in this project include Enbala, FleetCarma®, FLO, Robertson Bright Inc., and Plug'N Drive.

² The AlectraDrive @Work pilot is 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). Partners include ChargePoint, Eguana Technologies, Enbala, FleetCarma, Flo Inc., Plug'N Drive, Robertson Bright Inc., Schneider Electric, and Util-Assist.

³ The Advantage Power Pricing program was made possible through the support of the Ontario Energy Board through its RPP Roadmap Pilots initiative. Partners included BEworks, Util-Assist, Bidgeley, Energate (Tantalus) ecobee, Nest and Eaton.



Over 200 drivers, in 10 cities, driving 18 different types of electric vehicles are participating in the AlectraDrive @Home pilot.

AlectraDrive @Work²

The goal of the AlectraDrive @Work pilot is to support drivers and building managers with convenient EV charging solutions. The pilot aims to demonstrate the value of a smart 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 drivers have an easy and accessible charging solution at their workplace. This program aims to encourage the adoption of e-mobility while helping businesses manage their energy costs and helping the utility manage its infrastructure.

Advantage Power Pricing³

In 2018–2019, Alectra tested different, new time-of-use price plans and their effect on customer behaviour, electricity use and costs. The different electricity price plans were designed to give customers more choice and help Ontario's power system run more efficiently. Alectra's pilot was part of an OEB-led initiative to inform possible changes for electricity prices under the current Regulated Price Plan.

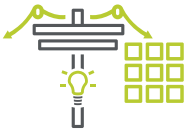
The Overnight pricing plan was designed to give customers with EVs a significantly lower overnight rate to encourage them to shift EV charging to off-peak periods and reduce their electricity costs. The results of the program continue to help us to build energy options that better serve the changing needs of customers.

Supporting a sustainable grid



Sustainable

Enabling grid innovation and unleashing the potential of grid modernization technologies, is a strategic area of focus for Alectra. The Grid Innovation team at the GRE&T Centre is supporting Alectra's transformation to the grid of the future.



IESO York Region Non-Wires Alternatives Demonstration Project

In partnership with the IESO and NRCan, Alectra has brought to life Canada's first local electricity market in southern York Region, Ontario. The project demonstrates the potential for non-wires alternatives to meet local, regional, and province-wide electricity needs.

Through this project, we are procuring distributed energy resources (DERs) as cost-effective, reliable, and environmentally sustainable energy solutions. We are testing them as alternative supply options to help meet accelerating electricity demand and to defer the need for traditional wires infrastructure. Participating businesses, institutions, and homes can leverage their DERs to earn revenue and to help power local communities while Alectra and the IESO test the coordination required to support the reliable and cost-effective dispatch of these resources. The first capacity auction was successfully completed in late 2020, with registered capacity (34.3MW) well exceeding the target capacity (10MW), at a highly competitive clearing price (\$0.64/kilowatt-day) from a diverse group of providers.



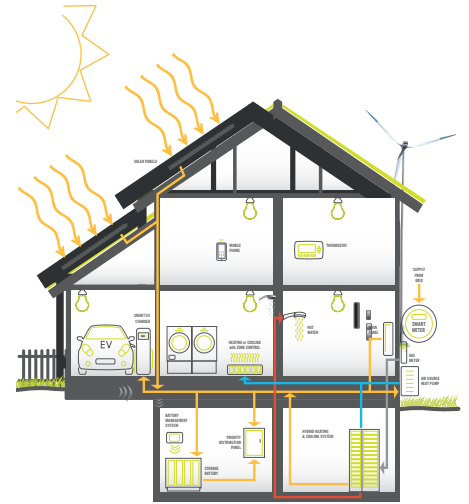
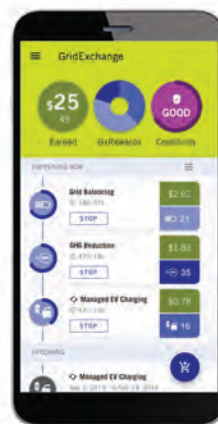
“This new local market gives us the opportunity to bring forward a new revenue stream and help manage growing local energy needs.”

Atal Walia,
Director of Operations at Tyco Poly Inc.

GridExchange⁶

GridExchange is a transactive, blockchain-backed energy platform that offers customers the ability to participate in an energy marketplace. They can exchange energy with Alectra in real time to gain more revenue or rewards from their energy assets. Customers are off-setting their energy bills, reducing GHG emissions through the use of clean energy sources, and getting compensated for doing so.

The platform, which will be tested and deployed with residential customers in 2021, demonstrates how the GRE&T Centre can bring different players together to try out new solutions at Alectra's ground zero for innovation.



Power.House Hybrid⁵

Ten homes have been installed with Power.House Hybrid systems which integrate a hybrid set of electrical and thermal equipment into a Virtual Power Plant platform, enabling the move towards Net-Zero Energy Emissions homes. This solution adjusts heat and electricity consumption within a home to minimize its carbon footprint. Testing began in 2020. Full end to end testing of controls and the hybrid system will conclude in 2021.

We are not only equipping participants with renewable energy resources to actualize their sustainability goals, but we are also working to prove the Power.House Hybrid technology and benefit the grid. We are getting the know-how and confirming the value-add of this project so that we at Alectra can be prepared to deliver relevant and simple energy solutions for customers.

4 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.

5 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.

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

Harnessing emerging technologies

Determining how utilities can more effectively embrace emerging technologies to enable a digitalized utility of the future is a strategic area of focus for Alectra.

An aerial night view of a city, likely Toronto, with a network of glowing blue lines and nodes overlaid on the buildings and streets, symbolizing connectivity and digital infrastructure. The city lights are visible in the background, and the sky is a deep blue.

connected



The Advanced Planning team at Alectra’s GRE&T Centre applies the power of technologies such as blockchain, artificial intelligence, Internet of Things and big data, to help Alectra deliver value, choice, and affordable advanced energy options for customers and local communities.

Our main focus areas include data analytics and strategies, emerging trends and technologies, and new business models.



Data as a Utility

Alectra has partnered with the City of Guelph and the County of Wellington to develop a Data Utility concept, where data is treated and valued similarly to public utilities such as water and electricity. Alectra has contributed its data expertise to this dynamic project which has an expansive vision and which will be supporting a technology-enabled circular food economy. The open system will enable the integration from public and private systems. It will provide secure and transparent access to new and existing data, integrated into a platform to enable value-added services.

Alectra advised and consulted to develop the governance and sustainability framework, created the distributed data governance frameworks, designed the end-to-end application architecture, defined the policies and controls for data management, and implemented the data workstreams. Ultimately the vision is for the platform to incorporate AI and machine learning to analyze large volumes of data.



Safety, Innovation and Sustainability

Supporting Alectra Strategy 2.0

Alectra recognizes that technology is giving customers greater autonomy and more choice in the way they source, use, and store electricity. The electricity sector is experiencing the convergence of technology-powered push and a customer-powered pull. Electricity markets are now shared with new players, new technologies, greater customer interaction, broader options, and eroding distinctions between industries.

Alectra is in the midst of a shifting landscape where enabling innovation and building new opportunities have become essential activities. Alectra’s response is the evolution to Strategy 2.0.

Strategy 2.0 focuses on three pillars: customer experience, grid modernization, and enterprise growth. These pillars build a foundation for Alectra to prepare for the future.

Since the GRE&T Centre’s launch in 2019, to help begin Alectra’s transition to Strategy 2.0, the Centre has been looking at the changing needs of customers and piloting new energy solutions so that we at Alectra can enable a new energy ecosystem of the future. Strategy 2.0 is our response to the changes in our sector and supports Alectra’s evolution to Canada’s leading distribution and integrated energy solutions provider.

Building our energy future

As we look towards the future we see many evolving trends.

How will Our World and Our Communities have changed in 2025?



Uncertainty and Disruption

- Disruption from the worldwide COVID-19 pandemic will persist for many years
- Accelerated change
- Some activities/trends slowed down during the pandemic but will likely pick up later



Cleaner and Greener Communities

- Sustainability and climate change will be mainstream
- More focus on cleaner air and health goals, and on the Paris Climate Agreement to limit global warming



Tipping Point of Electrification

- Financial and environmental incentives will enable the transition to EVs for fleet, transit and personal use
- All technologies will be in higher demand
- Accelerated adoption of fast charging networks




Changing Communities

- With rising viability of remote work and virtual events, people can contribute and connect from all around the globe without travel
- People may be more dispersed and shift to rural areas requiring a more decentralized grid and requiring better remote connectivity
- Other areas may have urban intensification and a rise of multi-unit residential buildings



Accelerated Digitalization

- Agility, adaptability, more connectivity and interoperability

A futuristic high-speed train with a white body and blue accents is shown in motion on a track. The train is positioned horizontally across the middle of the frame. In the background, several white wind turbines are visible against a clear blue sky. The foreground is filled with a lush field of green grass. The overall scene conveys a sense of clean, modern energy and transportation.

As we reflect on 2020 we recognize that the COVID-19 pandemic has further accelerated the pace of change. We have experienced dramatic changes at home, at work, and in our communities. The mindset of customers and their openness to adopt digitalized solutions is higher than ever before. Changing customer expectations call for radical, big-picture, holistic, and breakthrough thinking. COVID-19 has strengthened the importance of the GRE&T Centre's work in innovation and the need to enable change using the power of emerging technologies to make the lives of our customers healthier, easier, and more affordable.

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

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