

GridExchange[®]: Alectra's Transactive Energy Platform

Project Completion Report

Updated August 2023



Section 1

Background

- Market Barriers
- Energy Landscape Challenges
- Project Goals
- Project Benefits

Enabling **exchange of clean energy**
for **monetary benefits and rewards**

1.1 Market Barriers

GridExchange aims to eliminate several market barriers. Distributed Energy Resources (DERs), including solar, energy storage, electric vehicles, and home energy management devices, can contribute to a more efficient, sustainable energy future.

However, currently, the tools and processes in place in the industry to securely manage contracts, transactions, and settlements are not positioned to be applied to many small DERs and it would be prohibitively expensive to do so.

A mechanism for practically, cost effectively, and securely managing the contracts, transactions, and settlement activities of many DER participants in near-real time is needed in order to enable DERs to contribute to grid services, energy markets, and provide value to consumers.



1.1 Market Barriers

Market Barriers to End Customers

Currently access to wholesale market services is restricted to large generating facilities or aggregators. With the exception of Demand Response, the requirements to participate in these market services preclude small scale, residential customers from participating. Alectra's recent work with the Power.House program has provided valuable insight into the technical potential that aggregates residential DERs can deliver grid services.

The challenge involves procuring, contracting, auditing and settling such transactions on a real-time basis and in a secured environment. The wholesale markets currently require participants to abide by rigid, bi-directional contracting mechanisms, expensive telemetry and onerous compliance practices. For distribution level market services that rely on hundreds of individual DERs, such contracting must be streamlined and flexible.

Pricing must also be dynamic and based on near real time market conditions. Ideally, the settlement of such services should also be near real time and rely minimally on intermediary agencies. Should all of these challenges be addressed, it would open up access to residential customers to participate in larger scale grid balancing services.



1.1 Market Barriers (continued)

Market Barriers to Utilities

Local Distribution companies are in the midst of a generational shift that sees them migrating from simply being owners of poles and wires to becoming Distribution System Operators (DSOs). The primary difference is that under the DSO market LDCs would look for various non-wires alternatives (NWAs) to potentially address the same network needs as traditional infrastructure investments.

The challenge for utilities is that incorporating the required systems to manage the procurement, customer engagement, contracting and settlement of these services into the existing utility information systems would be extremely challenging.

Having a parallel platform that could provide all of the above features would allow LDCs to flexibly procure services to meet both their short-term and long term needs, while simultaneously providing unprecedented access to behavioral insights that could be used to incentivize customers to adopt GHG reduction strategies.



1.1 Market Barriers (continued)

Low Carbon Technologies

Renewable technology such as solar and storage can be viewed as cost prohibitive, and suppliers currently face increasing pressure to decrease cost.

If, however, the value stack that these resources can participate in was to be increased, and accurate market pricing signals could be generated to manage their dispatch and increase their utilization, the economic return associated with the technologies should improve significantly.

1.1 Market Barriers (continued)

Government Agencies

This would pave the way for more accurate “pay for performance” incentives that promote true carbon reduction behavior that can be measured and verified.

Deploying capital toward GHG mitigation strategies is currently a difficult task for government funding programs. A major reason for this is that is very difficult to correlate a financial incentive to the actual GHG reduction behaviors that a customer chooses to partake in.

For example, a capital incentive for solar panels does not ensure that the energy generated by those panels displaces a centralized fossil-based resource. In order to track this, solar generation would have to be tracked and measured against the GHG intensity of the grid, and the resulting displaced CO2 accurately measured.

1.2 Energy Landscape Challenges



Challenge 1

With the increased deployment of DERs now and in the foreseeable future, how might utilities help manage the future **load growth** from DERs while still building a more resilient and most importantly flexible grid of the future?



Challenge 2

How might **technology** be leveraged to address growing global concerns of climate change, commitments to net-zero emission targets, and decarbonization while driving deployment of DERs?

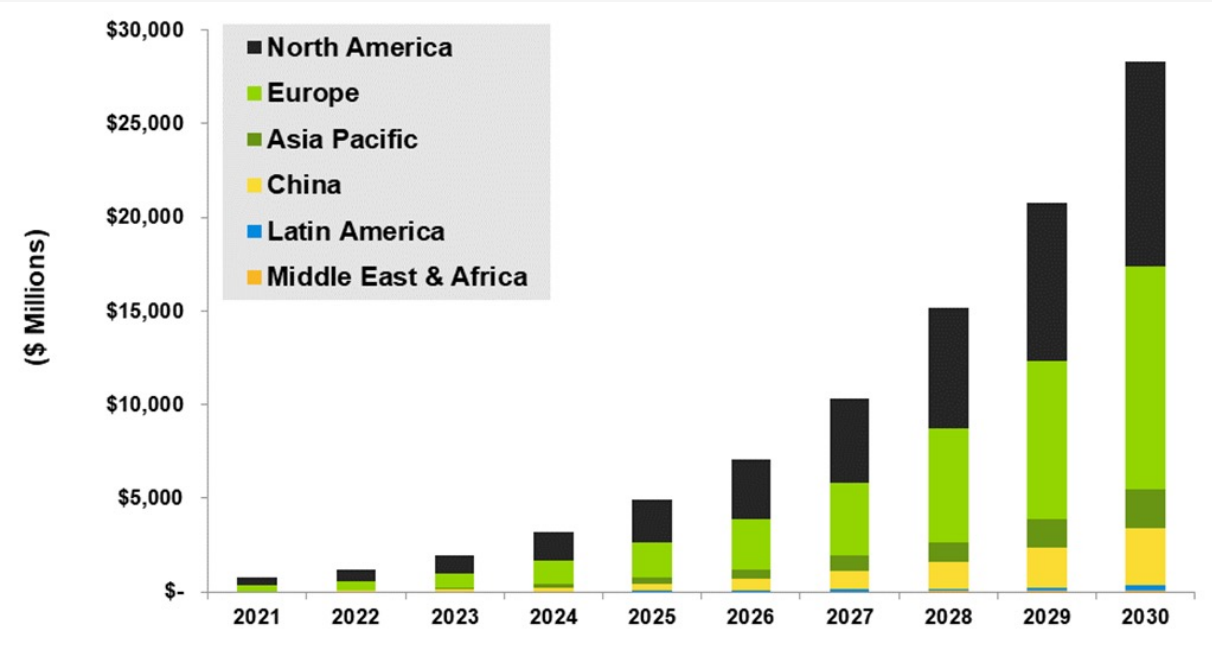


Challenge 3

How can customer unlock the value of their DERs by **accessing grid services** programs and access to revenue stream to help support DER investment and business case?

1.2 Energy Landscape Challenges (continued)

As DER penetration brings on new challenges, it offers a huge, never-seen-before opportunity to transactive energy (TE) market



GLOBAL MARKETS

\$28.4 Billion

From \$745.5 million in 2021 to \$28.3 billion in 2030. CAGR ~ 50%.

NORTH AMERICAN

\$10.9 Billion

From \$399.4 million in 2021 to \$10.9 billion in 2030 at a CAGR of 44%

CANADA

\$836 Million

Expected value in 2030

Annual Value of Total Power Traded on Transactive Energy Platforms by Region, World Markets: 2021-2030

Source: Guidehouse Insights

1.3 Project Goals



Demonstrate the **value of DERs** in providing energy services on the electrical grid with an **end-to-end transaction software platform**, based on enterprise **blockchain technology** that provides near real-time **transparency, tracking and management** of DERs, as well as the creation of a marketplace for exchanging rewards earned from participation for other goods and services.

Such a platform will enable DERs to contribute to **grid services, energy markets and reduce GHGs**, while also appropriately **compensating customers** for the value their DERs bring to the grid and society.

1.3 Project Goals



Solution 1

GridExchange helps utilities **unlock the value DERs** bring to the grid. This helps increase energy resilience and enables utilities to transition to becoming a DSO.



Solution 2

GridExchange **leverages Blockchain** to create, trace, and exchange clean energy credits. Blockchain ensures secure transactions of energy between the utility and the customers.



Solution 3

GridExchange helps transition **consumers** of energy to **prosumers** by allowing them to 'earn' from their DERs by participating in energy market grid services.

1.4 Project Benefits



CUSTOMERS

- Earn more money and rewards from existing DERs in their homes
- Empowered with greater energy choices, control and autonomy



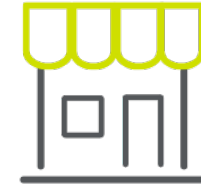
GRID OPERATORS

- Unlock the value DERs bring to the grid
- Increased visibility over DERs
- Integrated system planning with non-wires alternatives to defer infrastructure costs



COMMUNITIES

- Increased energy reliability and resilience from decentralized systems
- Lowered energy costs due to reduction in electrical infrastructure investments



BUSINESSES

- Attract customers to their businesses
- Purchase GxReward tokens for a variety of sustainability purposes

1.4 Benefits (Continued)



REGULATORY

- Support the development of standards, regulations or policies for DER participation in energy markets



ENVIRONMENT

- Reduce GHG emissions and help communities to transition to a low-carbon economy



TECHNOLOGY

- Develop a scalable platform using blockchain technology to facilitate DER participation in energy markets



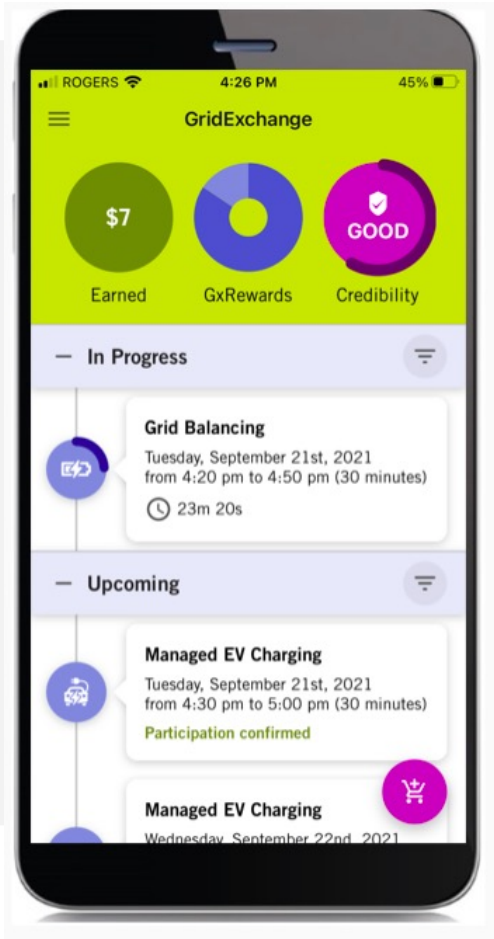
Section 2

Project Overview

- Overview of Platform
- Partners

Enabling **exchange** of **clean energy** for **monetary benefits** and **rewards**

2.1 Overview of Platform



GridExchange is a cloud-based platform that leverages blockchain to enable exchange of energy between utilities and their customers. The platform allows utilities the ability to engage customer-owned distributed energy resources (DERs) to respond to power grid needs and to reduce greenhouse gas (GHG) emissions.

This enables customers to become prosumers of energy and gain monetary benefits and other rewards for their participation in various energy exchange events.

GridExchange is supported on both mobile and web platforms that enable a **wholesale ↔ distribution ↔ end-user marketplace** to transact grid services through features like end-user DER registration, procurement, contracting, execution, validation, settlement and exchange.

2.2 Partners



Sunverge Energy - Distributed energy resource software/hardware provider
Sunverge makes renewable power reliable, economical and accessible to all. Their intelligent energy storage systems maximize the value of rooftop solar for homeowners and businesses, and their cloud-based platform enables powerful and flexible aggregation and management of distributed energy resources.



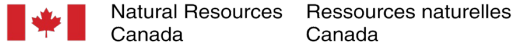
Savage Data - Operational data store provider for advanced metering data
Savage Data Systems services many local distribution companies (LDC) across Ontario via their Operational Data Storage (ODS) services. Their average LDC customer services 80,000 consumers, and their largest client has a customer base of over a million residential customers. Over half of all smart meters in Ontario are processed daily by Savage Data Systems

2.2 Partners (Continued)



Flo - Electric vehicle supply equipment provider

FLO is a leader in electric vehicle charging, offering a selection of reliable EV charging stations and a coast-to-coast network with 98% uptime. With a seamless network of easy-to-use EV charging stations and a complete portfolio of dependable solutions, FLO is dedicated to keeping users moving.



Canada

NRCAN - Government funding partner

The project received a contribution of \$2,620,000 from Natural Resource Canada's Smart Grid Program – Demonstration stream



Section 3

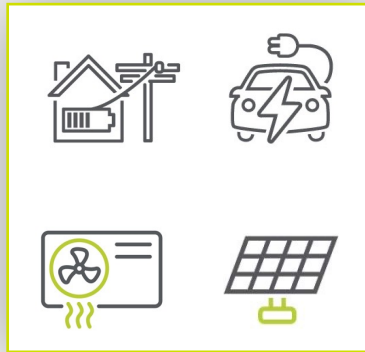
Project Design

- Concept
- How it works
- Primary definitions
- Core capabilities

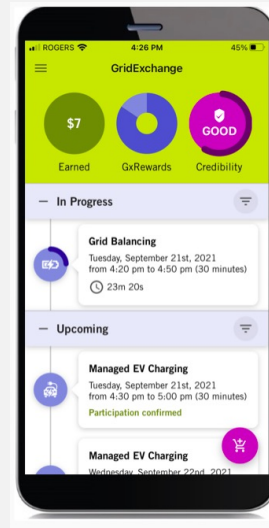
Enabling **exchange** of **clean energy** for **monetary benefits** and **rewards**

3.1 Concept

GridExchange allows energy consumers to leverage their DERs and engage in a two-way energy flow with their utility. It matches available customer energy resources with power grid needs through real-time, secure energy data exchanges, smart contracting, and settlement of financial compensation and rewards, all based on blockchain technology.



Sellers
(DERs end-users)



GridExchange



Buyers
(Utility, Government, Businesses)

3.2 How it Works

The utility anticipating high electricity demand sends a notification to participating customers via the GridExchange app, requesting their participation in the energy services.



MANAGED EV CHARGING

The energy service requests can include **'Manage EV Charging'** to slow down charging rate



GHG REDUCTION

The energy service requests participants to **'Reduce GHG Emissions'** by providing solar energy to the grid

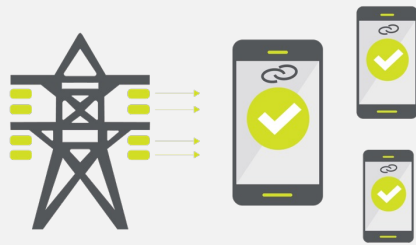


GRID BALANCE

The energy service requests participants to **'Balance the Grid'** by discharging back up battery storage

3.2 How it Works (Continued)

Participants can choose whether they want to opt-in to events, and in exchange they receive financial compensation directly into their bank account along with 'GxRewards'.



Request: The utility anticipating high electricity demand schedules a request asking customers to contribute clean energy to the grid.



Contribute: GridExchange participants respond confirming availability, shortlisted participants are notified and contribute to reducing the peak demand.



Compensate: Fast and secure processes verify customer participation and unlock payment¹ and GxRewards points.²

Note

¹ The price per kW compensated per event is set by the Contract Counter Party (CC) or Market Operator (MO) during the quotes creation stage. When creating the event, the price may depend on current ToU rates or wholesale market clearing prices. The price set for the events scheduled during the pilot ranged from \$0.15 to \$2.00 per kWh. On average the compensation amount for an event was between \$0.75 and \$10 per hour.

² A fixed GxRewards to dollar conversion factor was set for all three market services. All GxRewards were valued equally. The conversion factor between GxRewards and dollar was 10 Gx Rewards = \$1. Once participants accumulated enough Gx Rewards for a market service, they are able to redeem these GxRewards towards the offers posted by Merchants.

3.3 Participant Definitions

Primary participants are categories of users who directly participated in the platform and submitted transactions to the blockchain. For the purpose of the pilot, we defined the categories as:

1. **Residential User** – A residential customer with DERs who has a capacity to consume energy from the grid, consume energy from the DERs or feed DER-generated surplus energy back to the grid. The residential customer has the ability to control the energy characteristics (i.e. level of generation or consumption) and/or timing of the DER
2. **Contract Counterparty** – A Local Distribution Company (e.g. a Utility) or an Energy Aggregator (a company that acts as an intermediary between electricity end-users, who provide DERs, and power system / electricity grid participants such as LDCs who wish to use these energy services).
3. **Market Operator** – The organization that runs the wholesale market for the electric grid. Examples of a Market Operator are an Independent Service Operator (ISO) such as IESO (Independent Electric System Operator) in Ontario, Canada

3.3 Participant Definitions (Continued)

- 4. Control Agent** – A technology provider who can monitor and control the DERs owned by residential users or Institutional/Commercial/Industrial (ICI) users. Control Agents deploy distributed energy management systems (DERMS) for controlling DERs.
- 5. Metering Agent** – A technology provider who obtains DER energy consumption and supply data from energy meters installed at customer premises. Such data can include energy supplied back to the grid, and energy generated by DERs and consumed by the customer household (i.e. not supplied back to the grid). Metering agents can provide meter data management systems (MDMs).
- 6. Platform Operator** – The organization that manages the GridExchange platform infrastructure and its operation and oversees its functioning, including management of the reward marketplace.

3.4 Core Capabilities

The GridExchange platform facilitates a wholesale ↔ distribution ↔ end user marketplace for energy products and includes the following capabilities:



For example:

Residential customers register their EV charger

Utility anticipates high demand and schedules a managed charging event

Customers opt-in into the event. Platform clears all the bids and customers are notified if selected to participate

Customer devices react to the event and contribute energy

Customer participation data is verified

Customers are quickly and securely paid money and awarded GxRewards points

Customers may redeem and exchange their GxRewards for goods at participating merchants



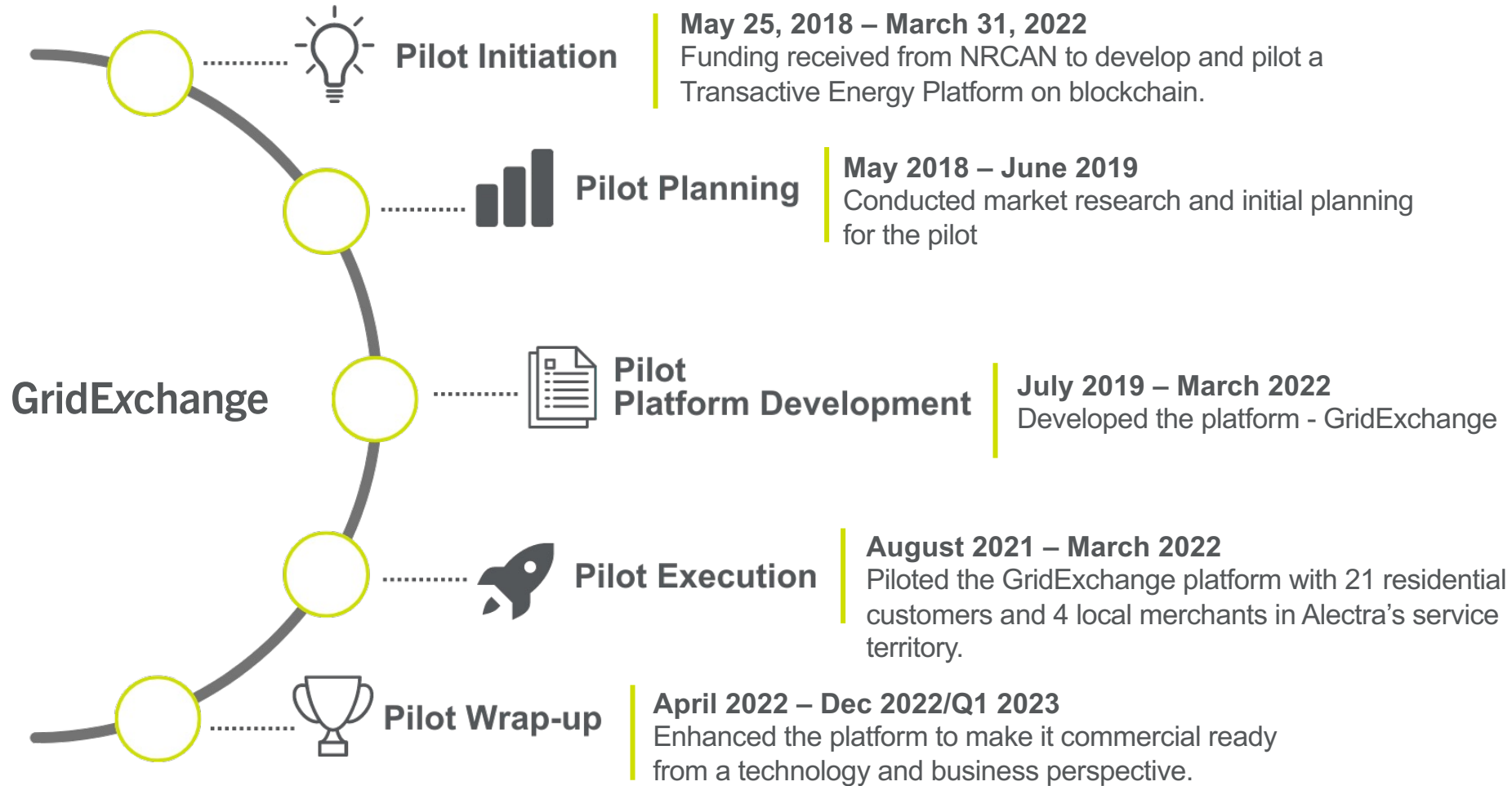
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Section 4

Pilot Details

- Timelines
- Participant Specifications

4.1 Timelines



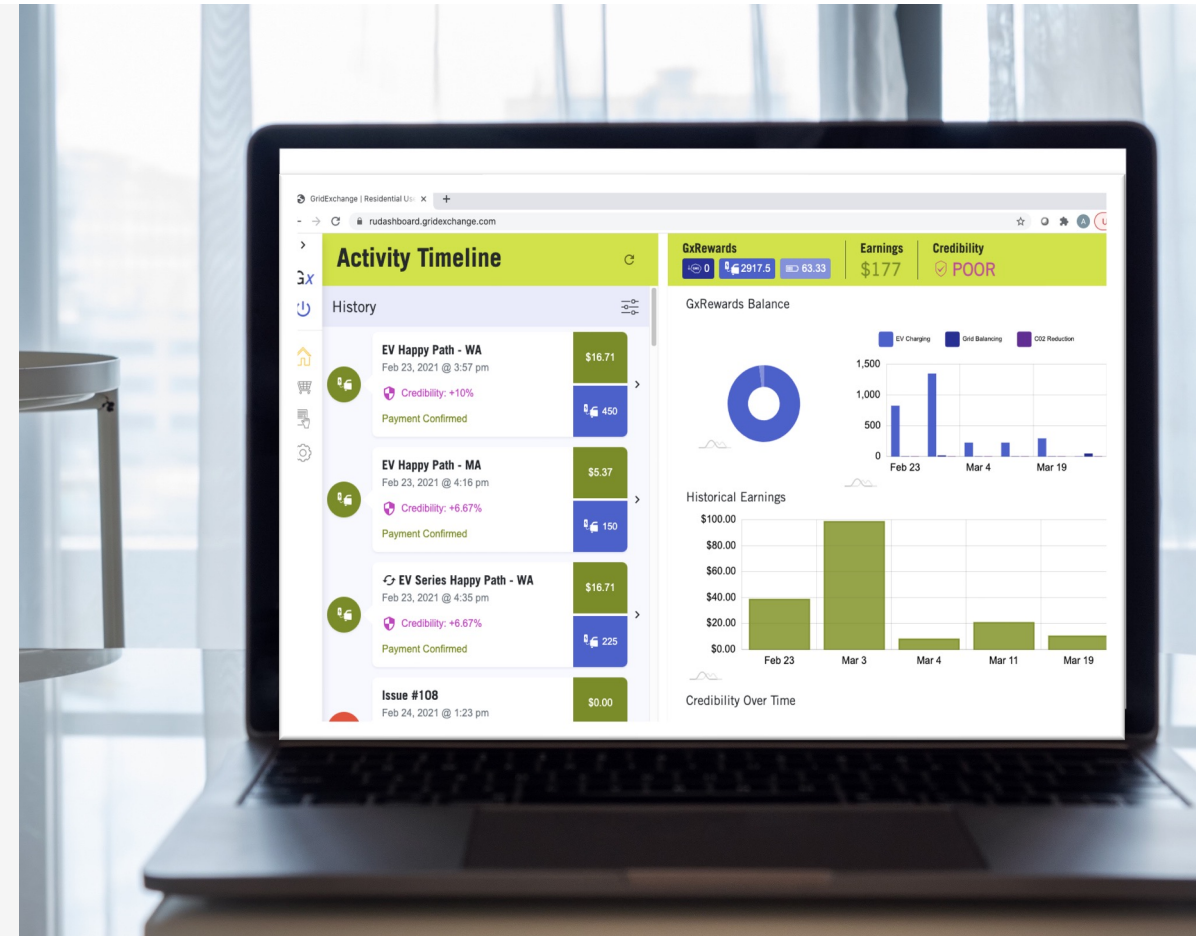
4.2 Participant Specifications

Participants

- Residential customers | Local businesses

DERs

- 3 – 5 kW Solar
- 4 – 6 kW Battery Storage
- BEVs and PHEVs (1.8 – 5.4kW charge reduction)



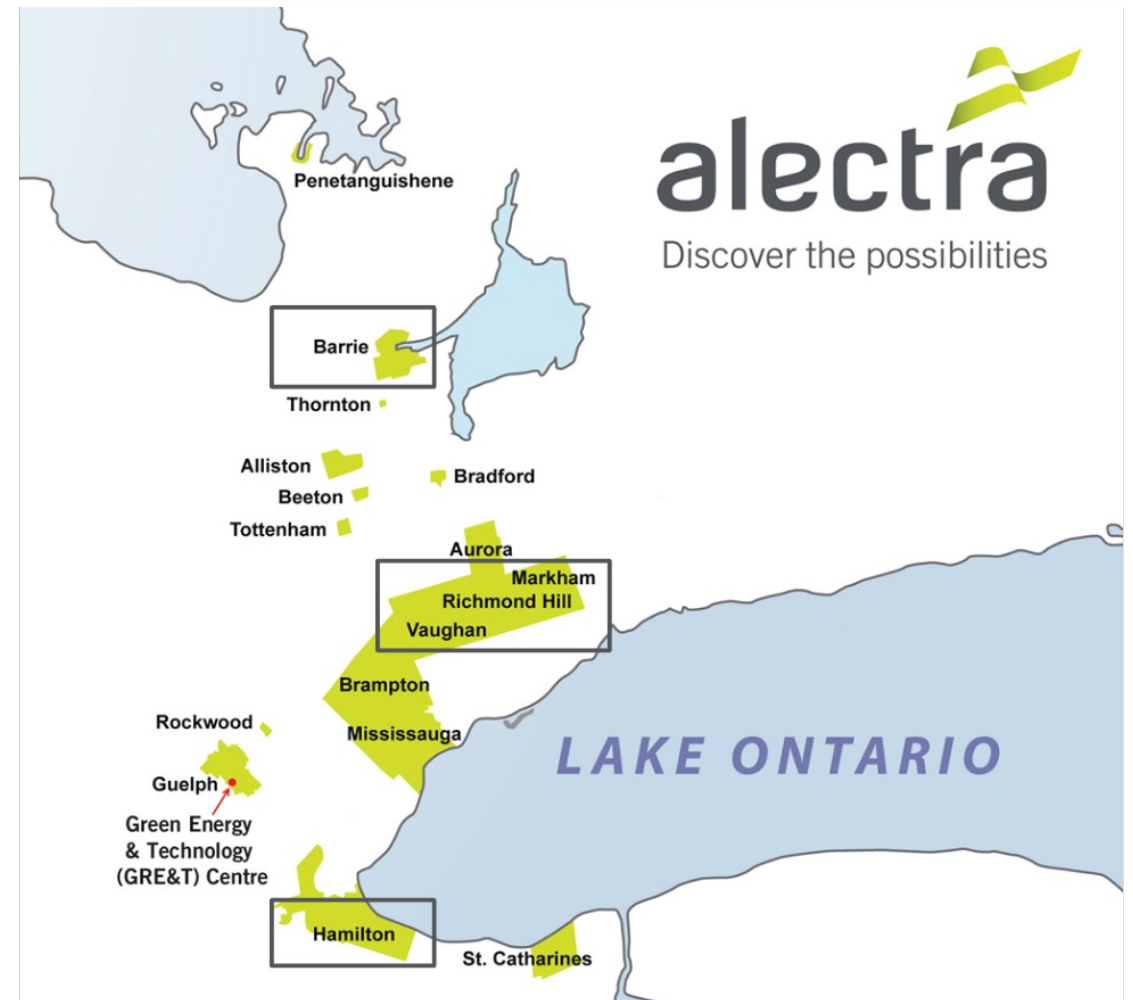
4.2 Participant Specifications (continued)

Residential customers from Vaughan, Markham, Richmond Hill, Barrie and Hamilton in Ontario participated in the live pilot.

Four local business were signed up to help participating customers redeem their GxRewards* for goods and services. They are:

- Chuck's Bar and Grill (Maple, Ontario)
- Grand Tour Autospa (Markham, Ontario)
- TruBliss Wellness & Spa (Woodbridge, Ontario)
- Pizzaville (Woodbridge, Thornhill, Barrie, Hamilton, and Vaughan, Ontario)

*GxRewards or reward-based payments/tokens are an additional incentive that is given to customers for participating in market grid services. They can be exchanged for goods and services from participating businesses.





Section 5

Leveraging Blockchain

- Benefits of blockchain
- Blockchain vs alternatives

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5.1 Benefits of Blockchain

The use of Blockchain technology provides near real-time transparency, tracking, and management of customer DERs and creates a marketplace for exchanging rewards earned from participation for other goods and services. Features that make Blockchain robust are:

- 1. Increased security and privacy:** With private, permissioned blockchains, only authorized parties are allowed to join the network and access the data captured within the chain. Every block written to the chain by one of these authorized parties is signed with their unique digital certificate, and each party maintains their own copy of the chain, making forgery or tampering immediately obvious.
- 2. Trust:** Because each participating organization has a copy of the blockchain data as well as a copy of the smart contracts that can interact with that data, there need not be a single organization that all the others trust to keep the data accurate and tamper-free. Organizations can trust that the blockchain technology is enforcing the agreed-upon rules of the network.
- 3. Transparency:** Each transaction executed by an organization on the network results in blocks being placed on each organization's copy of the chain. The smart contracts that define the rules for how the transactions are executed are visible to all organizations, and each block can be uniquely associated back to the organization that created it so that there can be no dispute as to the agreements made.

Increased Security
and Privacy

Trust

Innovation

Smart Contracts

Immutability

Transparency

GridExchange


alectra
GRE&T Centre

5.1 Benefits of Blockchain (continued)

- 4. Smart contracts:** Blockchain allows the use of smart contracts, which are self-executing digital contracts that can automate many processes and eliminate the need for manual intervention. Smart contracts codify the terms and conditions associated with a transaction directly into the software logic and identify which participants within the network are allowed to execute each transaction. Smart contracts provide transparency and trust because all parties can see exactly how each transaction will be performed. As such, they improve efficiency by eliminating intermediaries resulting in faster transactions and reduced costs.
- 5. Immutability:** Transactions, once written on blockchain, cannot be modified or deleted without invalidating the entire chain. Such an attempt to tamper with the chain is immediately observable.
- 6. Innovation:** Blockchain is still a relatively new and innovative technology, which means that it offers significant potential for new use cases and applications. Leveraging blockchain can create new revenue streams and business models that were not previously possible.

Increased Security
and Privacy

Trust

Innovation

Smart Contracts

Immutability

Transparency

5.2 Blockchain vs Alternatives

- The alternative to using blockchain technology would be to build GridExchange as a centralized application where the ledger of transactions is not distributed to all participants but instead is managed centrally by one organization.
- While a centralized approach would make the application easier to manage and scale, it requires that all parties be willing to trust the organization that is managing the centralized application (and the associated transaction data). Specifically, with no smart contracts that are shared across the business network of participants, the rules of engagement for the network will be managed by only the party that maintains the platform. This lack of visibility into the operation of the network could lead to a lack of trust among different participants over how transactions are being executed and therefore could make it difficult to onboard participants to the platform.
- Removing blockchain takes away the key features that enable a multi party ecosystem like enhanced transparency, security, immutability and smart-contract-based automation of energy transactions.
- When working with Market Operators (such as the Independent Electricity System Operator in Ontario), distributed trust and transparency is critical as such parties are required to be unbiased in their interactions with other market participants. Because of this, as well as the fact that the project was intended to pilot the user of blockchain for transactive energy, no other foundational technology alternative was considered for the platform.
- Overall, using blockchain for executing and recording energy transactions provides security, transparency, efficiency, and innovation, while helping to ensure that the platform is future-proof. These factors made blockchain a suitable choice for Alectra's GridExchange platform compared to other alternatives.



Section 6

Project Financials

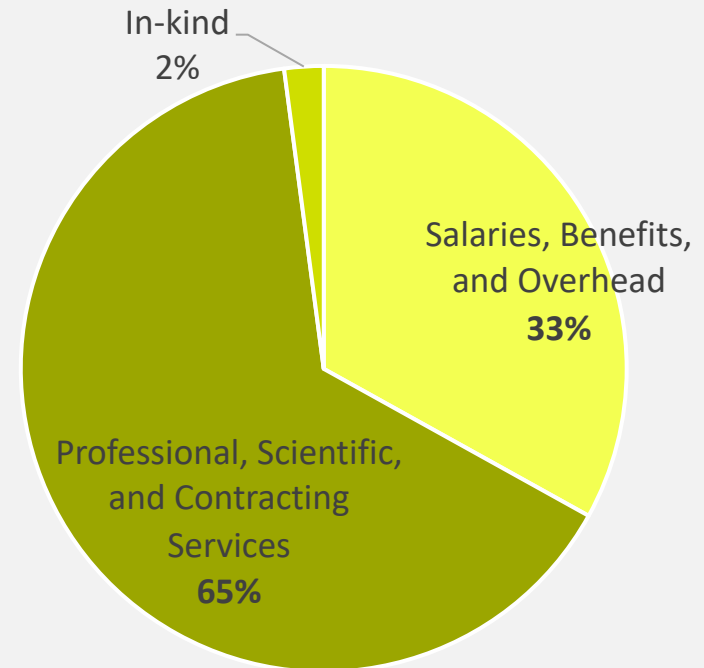
- Project costs

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6.1 Total Project Costs

EXPENDITURES	
Salaries, Benefits, and Overhead	\$ 1.7M
Professional, Scientific, and Contracting Services	\$ 3.4M
In-kind	\$ 0.1M
Total	\$ 5.2M

Numbers are rounds to nearest million





Section 7

Project Results

- Pilot impact
- GHG reductions derived
- Key achievements

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7.1 Pilot Impact

- The pilot successfully demonstrated the value of customer energy resources for the electrical grid.
- The customers saw first-hand the monetary benefits of transitioning from a customer to a prosumer of energy.
- Local businesses got energized when customers redeemed their 'GxRewards'.
- The entire community benefitted by getting close to ~5 MWh of energy from a previously untapped resource.
- The software successfully delivered the pilot program. There were no major platform issues identified for both the mobile and the Web application during the Pilot. Smart contracts on the Blockchain worked as expected and the Customers were very happy with the product.

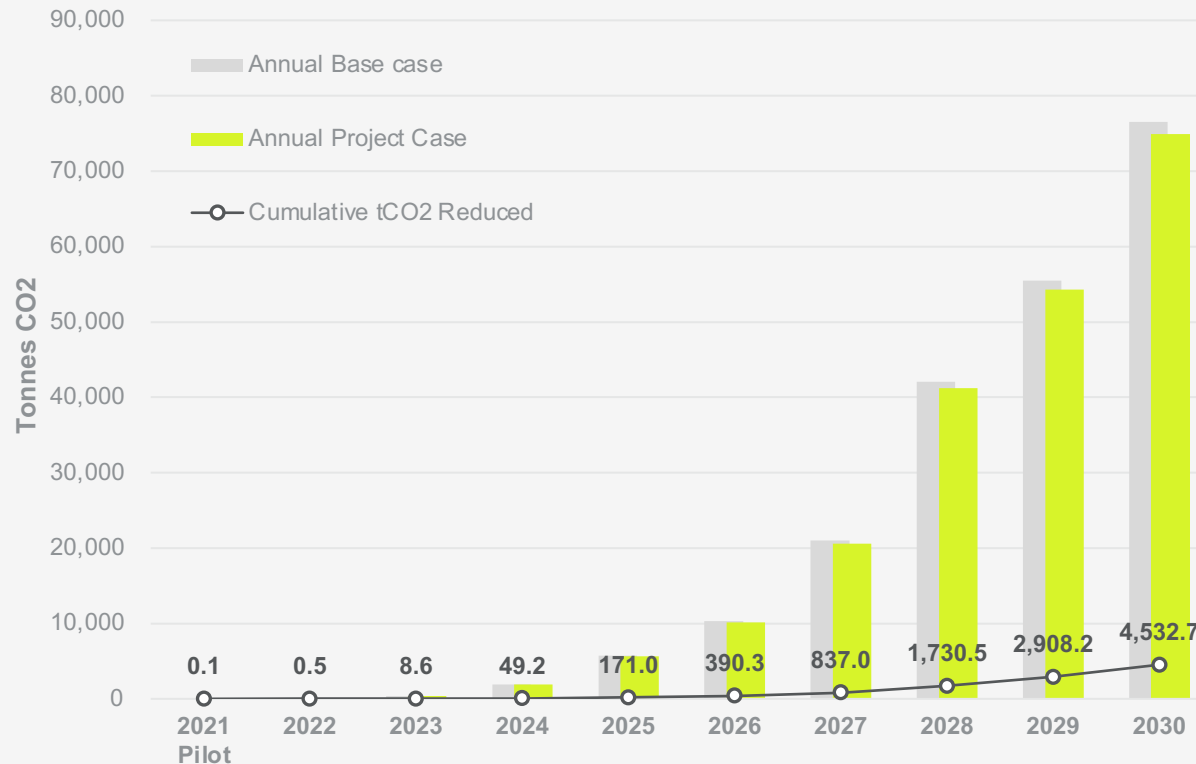


Note

The kW capacity per event depends on the event type, the number of participants and duration of the event. On average the total kW range per event is 16 kW 42 kW. The average capacity per event was 30kW. For clarity, each participant can make a contribution of 3 to 5 kW using solar, 4 to 6 kW using batter storage, and 1.8 to 5.4 kW using EV Charge reduction.

7.2 GHG Reductions Derived

Annual Base/Project Case and Cumulative tCO₂ Reduced



- The project is estimated to derive approximately 0.1 Tonnes of CO₂ reduction in 2021.*
- By 2030, the project and opportunities for scale up are estimated to derive 4,500 Tonnes of CO₂ reduction.*

* See GHG Estimate Report for calculations and assumptions. The growth in emissions reduction is due to increase customer count.

7.3 Key Achievement – Technology and Integration

- Blockchain allowed for the real-time exchange of energy and other market services between buyers and sellers while providing data tracking and provenance. Smart contracts were successfully configured to enable execution of the energy transaction lifecycle.
- GridExchange was integrated with third party DER vendors for device control and meter data management vendors for verification. It was also built using standards enabling easy integration with other vendors.



7.3 Key Achievement – Energy Resources

- DERs can help to reduce GHG emissions, increase grid resiliency, and provide bill savings to participants. Customers saw first-hand the monetary benefits of transitioning from being a consumer to a prosumer of energy. Local businesses saw benefits as customers redeemed their 'GxRewards'.
- GridExchange helped manage DER proliferation and contribute to a responsible and reliable delivery of energy services. This is key to meeting future sustainability goals.
- By demonstrating the ability to manage and settle grid service transactions between a distribution utility and residential DERs, this project paved the way for more DERs to participate in grid services and ensured that consumers who have DERs are appropriately compensated for the value those DERs can provide to the grid and to society.



7.3 Key Achievement - Participant Acquisition

- Leveraging an existing residential customer pilot participant group helped overcome recruitment challenges with COVID-19 and new technology adoption barriers.
- Partnering with DER vendors for residential customer recruitment was key to finding EV customers in specific areas within our service territory.
- Large internal staff effort was required to only acquire 4 merchants and yet customers wanted even more reward options.



7.3 Key Achievement - Participant Acquisition (continued)

- GridExchange closed the gap of engagement between the utility and customers. The majority of participants used the mobile app vs. the web app.
- Customer engagement was increased by gamifying the energy market using concepts such as GxRewards and a participant's 'credibility score'.
- The application was simple and not overwhelming. The consensus was that it was a very smooth experience
- Customers felt instant gratification for receiving payment immediately after participation. Customers enjoyed the credibility score feature. The credibility score proved to be a highly effective tool for encouraging delivery upon committed services.





Section 8

Lessons Learned

Enabling **exchange** of **clean energy** for **monetary benefits** and **rewards**

8.1 Lessons Learned

- **Planning is key to the implementation** of such projects that involve several stakeholders. While planning with vendors or other stakeholders, we always worked backwards from delivery timelines and ensured in the planning sessions that there was contingency factored into the timelines to ensure there was no slippage in the final delivery of the project.
- **Strong leadership** drive to keep the momentum going and reduce project fatigue
- **Having test hardware assets** is very important for a complex project like GridExchange, requiring hardware/software communication. Many assumptions were made about device behaviour (which is very common in the development cycle involving hardware devices) while developing the platform, but many of those assumptions proved incorrect while testing with actual devices. Integration testing identified many issues and we were able to fix all of them before the platform was piloted with actual customers.
- **Funding from NRCan was crucial** to make this project come to fruition and be successful. We could not have done this project without this funding

8.1 Lessons Learned

- Alectra found the workload of the project to be higher than expected because of the complexity in finalizing legal agreements with partners, **setting up the appropriate governance structure** for the project, and the complexity in designing and architecting the GridExchange platform, which had to be redone due to changing the project owner and selecting a new software development vendor
- Partners changed during the project, and this led to decreased partner in-kind contributions and a gap in knowledge. Alectra was agile to this situation and learned we needed to allocate more **internal resources to the project** to take on the technical and business support. For example, Alectra had to hire specialized staff with expertise in blockchain software development, end-to-end solution architecture, cloud computing, and data engineering/analytic capabilities/governance/ security/privacy to work on and manage this project, which increased the salary spending. Such expertise/backgrounds were not previously present in-house but were necessary to complete the project. Alectra has since filled all the internal resourcing gaps.

8.1 Lessons Learned

- **Comprehensive legal agreements** were created with our partners to ensure there was no conflict as to the ownership of the platform IP post-pilot
- In order to maintain complex API connections with different DER vendors, the project team was required to **work collaboratively and closely with our vendors and partners**. Some of the key benefits from having consistent vendor management are:
 - Making updates to the API code in a timely manner
 - Discovering that our control agent vendor required additional hardware to be installed at EV customer sites.
 - Determining findings on scalability – e.g. cloud-to-cloud communication is better for scalability as it does not require additional hardware to be installed in a customer’s home
 - Consistent vendor management was also required as the **technology was quite nascent** and partners/vendors were also **evolving** as the pilot evolved.



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Section 9

Participant Testimonials

- Engagement, Empowerment, Transparency
- Market-ready product
- Credibility score drives behaviour

9.1 Engagement, Empowerment, Transparency

“

Closes the Utility 'engagement gap'

We are always chatting about it. To us it's like a game, it's like how much did you save? And then we share screen shots.

- **Mobile first:** Mobile App was preferred by the participants.
- **Gamification:** Participants were motivated by points earned and other gamifications tools like the 'credibility score'
- **Empowerment of Choice:** Even though the participants switched to auto pilot mode during the pilot, they appreciated having the ability to 'stop' and switch to options that gave them greater control.
- **Transparency:** The participants had full visibility into their activities which allowed them to correlate the payments with their participation in the events.

9.2 Market-Ready Product

“

GridExchange exceeded my expectations after I used it. I thought it was going to be more “test like”, but it was a very nicely finished product.

- **Simple, not overwhelming.** During the course of the pilot, participants overcame their reservations about the extent of involvement and time required from them. The consensus was that participation in the pilot was a very smooth experience.
- “A very simple process, not overwhelming.”
- **Instant gratification of payment.** When asked their views on the instant payment process the consensus was: “That was fantastic.” When probed if monthly bill credit would be preferred, the participants leaned towards the existing off-bill instant gratification.

9.3 Credibility Score Drives Behavior



A successful alternative to traditional demand-response 'penalties'

The credibility score made consumers conscious of 'auto-pilot' events. There were many discussions to make sure they could follow through with events to protect their score.

The Credibility Score proved to be a highly effective tool for encouraging delivery upon committed services, as well as increasing frequency of participation.

All customers noticed the credibility score and spoke passionately about maintaining it.

The customers expressed frustration for any potential lowering of their score due to events that were seen as being out of their control (depleted battery, lack of ability to charge-up due to winter weather, etc.)

Note:

The credibility rating for a customer goes up as they successfully participated in more market events and provide them more opportunities to participate in future market services as GridExchange market clearing algorithms are designed to pick up customers with highest credibility ratings.



Section 10

Other Activities & Next Steps

- Knowledge dissemination activities
- Next steps

Enabling **exchange** of **clean energy** for **monetary benefits** and **rewards**



10.1 Knowledge Dissemination Activities

- Greentech Media's "Blockchain in Energy Forum 2019", September 2019, New York.
- SmartGrid Canada Symposium, October 2019, Toronto, ON
- Electro-Federation Canada Regional Member Event, October 2019, Vaughan, ON
- Energy Blockchain Consortium, October 2019, Atlanta, GA
- Decentralized Energy Forum, November 2019, Calgary, AB
- Utility Blockchain Interest Group Webcast, November 2019
- GridWise Architecture Council, March 2020
- SEPA Transactive Energy Working Group, June 2020

10.2 Knowledge Dissemination Activities (continued)

- NRCAN Symposium, October 2021
- Electricity Transformation Canada Conference, November 2021
- DER and Transactive Energy Internal Presentation, April 2022
- Darcy Transactive Energy Forum, May 2022
- EDIST Conference, June 2022
- SGIN Forum, September 2022
- Distributech, February 2023, San Diego

LinkedIn posts:

- Thanking partners, October 2021
- Pilot completion, January 2022
- GridExchange webpage update, April 2022

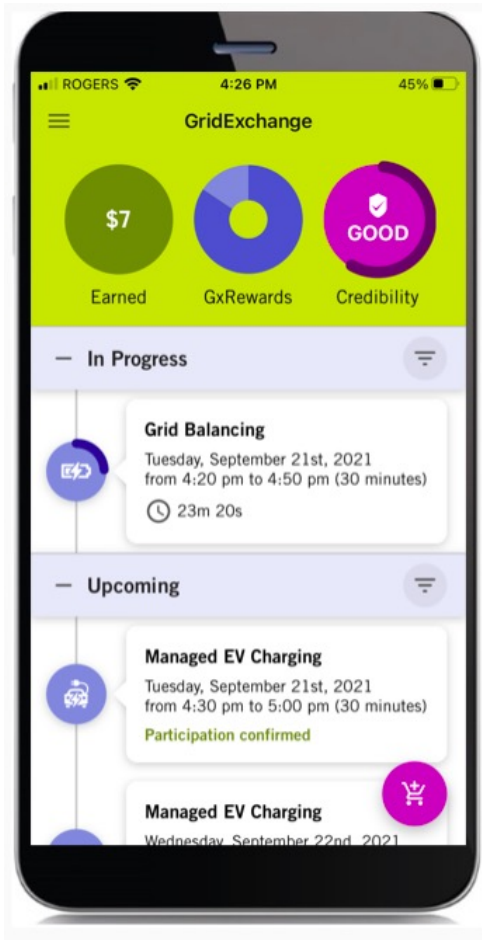


10.3 Next Steps

Recommendations have been identified to enhance the architecture so that the platform can be managed and scaled more easily and cost-effectively.

The next steps for the technology development will be to optimize the architecture in order to reduce operation costs and complexity with an aim to increase efficiency in performance and aid scalability.

Alectra is investigating opportunities to scale up GridExchange.



Thank You!

Visit

<https://www.alectra.com/gridexchange>

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