



Innovation Sandbox 2.0 Report

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Ontario
Energy
Board

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1 INTRODUCTION

The Innovation Sandbox Renewal Consultation (Consultation) was launched in June 2021 to seek input from stakeholders on the design and features of a renewed OEB Innovation Sandbox (Sandbox). That resulted in several new Sandbox features that reflect stakeholder priorities, one of which was an enhanced annual report that includes the following components:

- Case studies of actual Sandbox projects
- A discussion around the most common themes or barriers to arise in the Sandbox throughout the year
- Descriptions of the type of Sandbox support provided throughout the year.

The inaugural Innovation Sandbox 2.0 report (Report) focuses on the two and a half years (July 2020 to December 2022) since the OEB decided to consult on the design of an enhanced Innovation Sandbox. Its release will be complemented with a webinar – another recommendation from the Consultation – in the spring of 2023. The webinar will also provide information on other initiatives the OEB has supported to promote innovation in the sector, many of which are detailed in the [Innovation Handbook](#) released in March 2023.

2 INNOVATION SANDBOX 2.0

Background: The OEB Innovation Sandbox

The Sandbox provides two types of support to innovators: an “Information Service” and “Project-specific Support.”

The Information Service is intended to be an easy and accessible way for innovators to reach out to OEB staff with questions about the regulatory framework as it relates to innovative ideas, products, services or business models, or ideas about a specific pilot project.

Project-specific Support is available for innovators wishing to move forward with a specific innovative project and allows innovators to request specific forms of support from OEB staff, including customized guidance related to a

regulatory requirement and/or assistance in requesting temporary relief from a regulatory requirement.

Both of these services are provided to innovators by the Sandbox team which is composed of subject matter experts from across the OEB¹.

Innovation Sandbox 2019 – 2021

In its first two years of operation, the Sandbox provided information and support to more than 60 energy sector innovators. It received numerous enquiries on a wide range of topics, including distributed energy resources (DERs), storage, net metering arrangements and hydrogen. While there was some success supporting innovation in Ontario’s energy sector through these enquiries and projects, the OEB recognized that it could do more, and that a renewed Sandbox would benefit from stakeholder input.

Sandbox Renewal Consultation

The Consultation was launched in June 2021 to seek input from stakeholders on enhancements to the Sandbox. To ensure that a variety of stakeholders had the opportunity to provide input on the renewed Sandbox and any new features, the OEB provided multiple opportunities for input, including through one-on-one and small group meetings.

The OEB unveiled its report on [Innovation Sandbox 2.0](#) on January 31, 2022, which included new features to be implemented in a phased approach from July 2022 to February 2024. These features reflect the priorities of stakeholders and provide a foundation upon which the Sandbox can continuously evolve to meet the changing needs of the energy sector.

2.1 New Sandbox features

Transparency and Communication

¹ In addition to the Sandbox, the OEB also has its Industry Relations Enquiry (IRE) system that allows industry participants to seek advice and guidance from OEB staff regarding legal and regulatory obligations, compliance activities or current policy. Industry participants and innovators can be assured that requests made through the Sandbox or IRE system will be directed to the right group and receive the same level of OEB staff attention and expertise.

Stakeholders reaffirmed the importance of transparency and information-sharing during the stakeholder consultations. In response, the OEB committed to set up an “as-it-happens” dashboard, on a refreshed Sandbox website, along with an enhanced annual Sandbox Report. The new website including the dashboard was launched in July 2022, clarifying the Sandbox process, the support available and the ways to access that support.

Stakeholders also expressed interest in engaging in a broader dialogue about innovation in the context of the energy transition and the path to net zero. They indicated that this dialogue should involve a variety of participants including government, distributors, academics, municipalities and any other type of stakeholder that may be interested but may not have typically participated in the past. The OEB responded by launching the [Energy Transition](#) initiative in September 2022 as an open dialogue to map out what the OEB’s priorities should be in response to the energy transition, and how it can progress in a manner that is cost-effective and valuable to consumers.

Lastly, in further support of communication and information-sharing, the OEB committed to sharing lessons learned with the Ministry of Energy to identify opportunities to facilitate innovation through legislative change. OEB staff has held meetings with Ministry staff to share insights from enquiries that came through the Sandbox, some of which identify legislative barriers to implementation.

Sandbox Awareness and Confidentiality

When the Sandbox first launched, a completely confidential process was implemented in order to encourage innovators to bring their ideas to the OEB. After consulting with stakeholders on this approach, the feedback indicated that there was value to both the Sandbox and proponents if there was more transparency around the enquiries that came through the Sandbox and the types of projects that received support.

In line with the commitment to provide greater transparency and share more information about Sandbox proposals, the OEB committed to treating confidentiality differently going forward for innovators using the Information Service versus those seeking Project-specific support. While enquiries that came through as Information Service requests would remain confidential, certain details on projects that receive Project-specific Support would be shared on the Sandbox’s dashboard.

The dashboard on the Sandbox website tracks all enquiries that come into the Sandbox, categorized by theme. For guidance provided through the Sandbox that relates to a matter of broader interest, the OEB may issue a staff bulletin² or other document to share that guidance as widely as possible.

To increase Sandbox awareness and sector outreach, a webinar/industry training session accompanying this Report is planned for the spring of 2023 to provide further insight into Sandbox initiatives. This webinar will also offer an opportunity to revisit the need for a concierge service and discuss more broadly how the Sandbox can further evolve to support the sector.

3 OEB-IESO JOINT TARGETED CALL

In June 2021, the OEB [announced](#) it had joined forces with the Independent Electricity System Operator (IESO) on a first-of-its-kind collaboration to support innovative projects to help meet the province's growing energy needs. The OEB's Innovation Sandbox and the IESO's Grid Innovation Fund held a joint targeted call for innovative proposals that test the capabilities of DERs in providing services at both the local and provincial levels. This partnership leverages the expertise and financial support that both the Sandbox and Grid Innovation Fund can provide, while responding to requests from stakeholders for the OEB and IESO to work together on issues that cut across the mandates of both organizations.

Background

Ontario's increasing demand for electricity is seeing a growing number of residential, commercial and industrial customers installing DERs independent of distribution or bulk system needs, with at least 5,000 MW³ of DERs deployed across the province. As the energy system becomes more diverse and complex, DERs have the potential to increase grid reliability, affordability and competition, as well as enhance value for consumers. However, there is uncertainty regarding the tools needed to unlock the value that DERs can

² The views expressed in Bulletins are those of OEB staff and are not binding on a panel of Commissioners. Any questions regarding Bulletins should be directed to the OEB's Industry Relations email address at IndustryRelations@oeb.ca.

³ Application Guideline, <https://www.ieso.ca/en/Get-Involved/Funding-Programs/Grid-Innovation-Fund/Targeted-Call-for-Proposals>.

provide at both the wholesale market and distribution levels, as well as the technical and operational requirements to fully integrate DERs across both levels.

Joint Targeted Call Objectives

Four objectives for the call were identified:

1. Demonstrate the potential for cost-effective services that DERs can provide to consumers, distribution systems and the IESO-controlled grid to unlock ratepayer cost savings.
2. Test and demonstrate effectiveness of technologies, programs or other innovative strategies to further the IESO's, OEB's and market's understanding of the dependability of DERs and improve reliability to the integrated electricity system.
3. Test the effectiveness of DERs to defer or eliminate the need for traditional electricity infrastructure (e.g., poles and wires) while maintaining or improving reliability.
4. Support the development of innovative arrangements that test new activities or business models where regulatory requirements may prevent or impede those arrangements from proceeding.

The intake window for submissions took place between November 1, 2021, and November 30, 2021. Eighteen submissions were received, with seven chosen for funding and five receiving support through the Sandbox. The majority of projects that requested Sandbox support requested guidance on the application of section 71 of the *Ontario Energy Board Act, 1998* (OEB Act), which generally prohibits an electricity distributor from carrying out a business activity other than distributing electricity, except through an affiliate, subject to certain exceptions. As exceptions to the rule set out in section 71(1):

- Section 71(2) allows distributors to undertake activities that would assist the Government of Ontario in achieving its goals in electricity conservation.
- Section 71(3) allows distributors to own and operate certain types of generation and energy storage facilities.

- Section 71(4) empowers the OEB to authorize a distributor to engage in other business activities if the special circumstances of a particular case so require.

Some of the projects that received Sandbox guidance are described below.

Joint Targeted Call Projects

Toronto Hydro Electric Systems Ltd. (Toronto Hydro)

This project will aggregate local, behind-the-meter (BTM) demand response (DR) resources (that are currently participating in Toronto Hydro's Local DR program) to simulate simultaneous participation in the IESO's Capacity Auction, and subsequently simulate managing this capacity in the real-time energy markets. The project expects to provide insights into the potential benefits of creating a new market participation pathway that enables the same DERs to provide services to the bulk and distribution systems.

Toronto Hydro sought guidance through the Sandbox on whether these incremental activities, which build upon its Local DR program, were permissible under section 71(1) of the OEB Act. OEB staff agreed that they were. OEB staff expressed the view that it is appropriate to consider the pilot project holistically in the unique context of Toronto Hydro's Local DR program, which was intended primarily to manage short- to-medium-term capacity constraints while avoiding or deferring infrastructure upgrades to the distribution system. Treating the "net new" Pilot Project activities as distribution activities for the purposes of section 71(1) is aligned with the OEB's Conservation and Demand Management Guidelines and in keeping with the OEB's statutory objective of facilitating innovation in the electricity sector on a cost-effective basis.

Enel X Canada Ltd. (Enel X Canada)

This project will demonstrate the ability to measure and verify performance from heterogeneous DER aggregations. Resources participating in the pilot include BTM battery storage and/or load curtailment located at sites across Ontario. Alternative measurement approaches will leverage best practices from other jurisdictions with benefits that include exploring how DER aggregations that are not fully utilized could provide additional value to the grid. The project will test the provision of wholesale grid services outside of the actual IESO-administered market environment.

Enel X Canada sought guidance from the Sandbox on whether a wholesale licence was required to simulate participation in the IESO-administered

markets. OEB staff provided its view that a licence was not required for simulated activities.

BluWave-ai in partnership with Hydro Ottawa Ltd. (Hydro Ottawa)

This project will aim to test two types of non-wires alternative solutions to mitigate capacity limitations associated with electric vehicle (EV) charging: 1) Remote load management by Hydro Ottawa of customers' BTM EV chargers, and 2) Front-of-the-meter (FTM) batteries. An Artificial Intelligence software platform will be used to test both methods as a complete solution. The project expects to reduce peak demand and may defer the need for infrastructure builds.

The main activities Hydro Ottawa will engage in relate to curtailing BTM EV chargers, installing a FTM battery, and using these resources to simulate participation in IESO-administered markets. Hydro Ottawa sought guidance through the Sandbox on whether these activities were permissible under section 71(1) of the OEB Act. OEB staff provided its view that these activities were permissible under section 71(1) of the OEB Act, as their main purpose is to meet distribution system needs (i.e., to test two non-wires alternatives to mitigate constraints caused by increased EV charging within Hydro Ottawa's distribution system). Further, wholesale market participation is a simulation and does not involve participation in the IESO-administered market. The activities align with the kinds of activities that the OEB's Conservation and Demand Management Guidelines contemplate may be funded through distribution rates.

Essex Powerlines Corp. (Essex Powerlines)

In this project, Essex Powerlines will act as a Distribution System Operator for a distribution-level market for activation of DER flexibility in near real-time. DER owners in Essex Powerlines' service area will be able to participate in a local flexibility market to sell excess or stored power to support grid resiliency. The project will demonstrate the use of DERs participating in the local market and explore how those same resources can also provide bulk level services. Expected benefits of the project include demonstrating the ability of a utility to act as a DSO, testing whether DERs can provide services to both distribution and bulk systems, and testing distribution level/IESO co-ordination.

OEB staff provided its view that the proposed activities were permissible under section 71(1) as their main purpose is to meet distribution system needs using customer-owned DER assets as non-wires alternatives to create flexibility within its distribution system and mitigate local constraints on the

grid, thereby helping avoid the need to build new infrastructure. The activities also align with the kinds of activities that the OEB's Conservation and Demand Management Guidelines contemplate may be funded through distribution rates.

Upcoming Joint Targeted Call Milestones

These projects are working on completing their first milestones. For some of them, that may include activities such as market rule design, program design, participant recruitment and asset installation. For some of the projects, testing of installed assets is scheduled to begin in spring 2023 and be completed by spring 2025. The OEB and the IESO have committed to publishing an interim report in fall 2023 on these projects to share status updates and lessons learned.

4 COMMON SANDBOX ENQUIRIES

The Sandbox has received enquiries over the years that cover numerous topics relevant to the sector. Some of the most common enquiries are described below.

Net Metering: Community Net Metering and Virtual Net Metering

Through the Sandbox, staff received enquiries on virtual net metering, net metering Power Purchase Agreement/financing arrangements and whether it would be possible to conduct additional Community Net Metering projects throughout the province. The OEB, through the Sandbox, provided guidance on each enquiry and expression of interest, including identifying where a proposal did not appear to be consistent with the applicable regulatory requirements.

Additional enquiries were received through IREs and other forums related to stakeholders exploring different types of arrangements between a distribution customer and a third party in the net metering context, with questions on whether a customer of an electricity distributor can participate in net metering if the customer operates but does not own the generation facility.

In response, OEB staff issued a [Bulletin](#) in October 2021 that provides OEB staff's view that an electricity distribution customer can qualify for net

metering where the customer operates but does not own the renewable energy generation facility. Put another way, as long as the distribution customer is the operator of the generation facility, the customer can qualify for net metering.

Distributed Energy Resources

DERs, such as rooftop solar panels, battery storage units and demand response devices, are being connected to the grid across the province for a variety of purposes (e.g., reducing peak demand, improving reliability). Some examples of the types of enquiries that come through the Sandbox on DERs include aggregating DERs behind the meter and transactive energy models. These models involve peer-to-peer electricity buying and selling at the distribution level that could be part of local energy markets, which may coordinate generation, supply, storage, transport and consumption of energy from DERs.

In early 2020, an enquiry came through the Sandbox related to a distributor using BTM storage assets to improve reliability. On August 6, 2020, OEB staff released a [Bulletin](#) on BTM energy storage that set out staff's view that ownership and operation of BTM energy storage can be a distribution activity within the meaning of section 71(1) of the OEB Act. This applies to instances where the purpose driving the distributor's decision to engage in the activity is to bring reliability for some of its customers to a level comparable with what is provided by the distributor to other customers in the same rate class. This Bulletin was issued to provide broader awareness of staff views that had been provided to a rate-regulated electricity distributor in response to the Sandbox enquiry.

Electric Vehicles

The enquiries that staff has received through the Sandbox related to EVs have been around harnessing battery storage systems, vehicle-to-grid capabilities, and different incentives to encourage EV owners to charge their vehicles during periods of lower demand on the distribution system. For more information on the OEB's work on Electric Vehicle Integration (EVI), please visit the EVI [Engage with Us page](#) and the DER Connections Review [Engage with Us page](#).

5 CASE STUDIES

The following projects have received Project-specific Support through the Sandbox and were selected as case studies for this Report as they reflect topics that are of interest to the sector. The information included in these case studies was prepared based on information provided to the Sandbox team by project leads from Hydro One Networks Inc. (Hydro One) and Alectra Utilities Corp. (Alectra) and has not been validated by OEB staff.

5.1 Hydro One's Ownership and Operation of BTM Energy Storage Assets

Project Background

In December 2019, Hydro One submitted an enquiry through the Sandbox on implementing a non-wires alternative solution to remediate persistent supply reliability problems experienced by certain non-seasonal residential customers. These customers were served by feeders that traverse heavily forested areas, are difficult to access, and contain multiple branches that serve a small number of outlying or “grid-edge” customers.

Hydro One said the customers supplied from these feeders represent some of their most vulnerable in that they often experience long interruptions when an outage occurs. The level of service reliability for many of these customers ranked among the worst of any customers connected to Hydro One's distribution system, with many of them experiencing more than 150 outage hours per year based on data from 2017-2019.

To improve the supply reliability for these customers, Hydro One proposed connecting a whole-home battery energy storage system (BESS) behind the meter of each of these customers. The whole-home BESS, which consists of two Tesla Powerwalls rated for 10 kW/27kWh, is capable of supplying a typical residential customer's load with safe and reliable power for 6–12 hours. Due to the unique geographical and topological challenges of serving these customers, Hydro One determined that installing a whole-home BESS on the customer side of the meter was the only cost-effective solution that will guarantee a meaningful improvement in reliability. Hydro One estimated that a whole-home BESS would significantly reduce the total number of annual outage hours experienced by the target group of customers by 50% or more.

Under its proposal, Hydro One owns the BESS installed for each customer and has entered into a service agreement with MPOWER Energy Solutions,

which is responsible for providing, installing, supporting and maintaining each BESS installation. If the data confirms the effectiveness of the solution for the pilot group, the goal is to expand the deployment of the BESS solution as part of a residential reliability improvement (RRI) program.

In considering the broader applicability of this type of project to improve service reliability for customers, OEB staff issued a Bulletin on August 6, 2020, that provided guidance to the sector, noted in section 4.

Update on the Hydro One Project

In October 2022, Hydro One reported to the Sandbox team that it had entered into residential BESS participation agreements with 110 residential customers. A number of these agreements were still subject to further site assessments to determine feasibility, but Hydro One completed 39 customer BESS installations as part of the RRI pilot project. Of the remaining 71, there were 26 additional customer sites that have been approved for a BESS installation, but the sites were awaiting further clarity from the Electrical Safety Authority regarding newly established requirements that would affect how installations are performed.

Overall, Hydro One has identified some challenges and obstacles that include identifying customers with dwellings that have adequate space for an enclosed BESS installation, a lack of resources to complete all facets of the installation and ensuring compliance with enacted and recently proposed provincial electrical safety requirements for residential BESS installations. These factors have delayed the rollout of the project, limiting the number of installations that have been completed. Despite these challenges, Hydro One has reported that residential BESS is effective at improving supply reliability for the target customers. As of the end of August 2022, Hydro One reported that the 39 BESS installations had resulted in 79,620 customer minutes of interruption saved in 2022 (note: not all of the 39 installations were in service since the beginning of 2022).

5.2 AlectraDrive @Home EV Charging Pilot

Project Background

Alectra serves approximately one million homes and businesses across a largely suburban service territory. In January 2021, Alectra sought guidance through the Sandbox regarding a proposed small-scale EV charging pilot

known as AlectraDrive @Home. The project aims to assess the effectiveness of time-varying access fees as a means of incenting off-peak use of charging equipment. Alectra sought guidance on whether the activities it intended to carry out related to load management were permitted under section 71 of the OEB Act.

OEB staff provided written guidance to Alectra on April 20, 2021, that indicated that the project can be considered load management, conservation and/or efficient use of electricity and is permitted under section 71(2) of the OEB Act, which allows electricity distributors to provide services related to load management that assist in achieving the Ontario government's goals in electricity conservation. Project-specific Support through the Sandbox assisted Alectra in understanding how its activities in the AlectraDrive @Home project were consistent with the scope of activities that distributors are permitted to undertake.

Update on AlectraDrive @Home

The project was launched in 2020. The Alectra project team focused on participant acquisition and refining the pilot design and customer offering for residential EV charging. Alectra reported that the project was delayed in 2020 and 2021 primarily due to COVID-19 restrictions. In April 2021, the project team resumed marketing and recruitment efforts for customers in multi-unit residential buildings and single-family homes that had Electric Vehicle Supply Equipment installed to provide price response. The project team continued to engage active leads and began marketing to new leads. Alectra reports that multiple site assessments have been conducted that have resulted in four multi-unit residential buildings being enrolled, and 17 single-family homes recruited to participate in the project for a total of 28 EV charging stations. The project team continues to manage 200 participants in the telematics-based element of the project, testing an incentive-based approach to encouraging off-peak charging, which concluded in December 2022.

Results from the pilot are expected in 2023.

5.3 Alectra York Region Non-Wires Alternative (NWA) Pilot

Project Background

In Ontario's York Region, electricity demand is growing rapidly and expected to exceed system capability by 2030. Alectra's NWA project aims to explore how a local electricity market can meet new demand with customer-owned

DERs over two years (October 2020 – October 2022). Funded by the IESO and Natural Resources Canada, and delivered by Alectra, the IESO York Region NWA Demonstration Project is North America’s first local electricity market at the distribution level.

Alectra sought OEB staff’s views on whether the activities Alectra proposed to carry out in connection with the Demonstration Project fit within section 71 of the OEB Act. Staff provided its view that facilitating the use of demand response resources (one type of DER eligible to participate in the Demonstration Project) to meet system needs can be considered load management, conservation and/or “the efficient use of electricity” under section 71(2). As a result, it was staff’s view that Alectra’s participation in the demonstration project is permissible under section 71(2) of the OEB Act.

Update on Alectra’s NWA Pilot

In the project’s first year, Alectra reported that the Local Capacity Auction garnered high interest from market participants, with three times the sought capacity registering in the auction. The project reached a milestone in June 2021, when DERs were activated during a heat wave to help reduce local peak demand. According to Alectra, this was the first time in Canada that DERs secured through a Local Capacity Auction were used to help reduce local peak demand. During the six-month commitment period, the project saw nine activations that coincided with the hottest days of the year, which achieved an average of ~8 MW of peak demand reduction and 200 MWh delivered/reduced. The participants who own and/or operate the DERs earned a total of ~\$125,000 per MW during the commitment period, with the procured DERs delivering ~80% of the energy requirement.

In the project’s second year, a local reserve service with financial benefits for standby power or demand reduction was introduced, which can be called upon on short notice. Alectra reports it was able to procure the 15 MW target (from the 30 MW of registered capacity), of which 6.8 MW is reserve-capable. The Local Capacity Auction cleared at \$0.40/kW per day (\$50,000/MW per year for the 125 business days in the summer commitment period), which was a more competitive clearing price compared to the first year’s clearing price of \$0.64/kW per day (\$80,000/MW per year).

Alectra is wrapping up the project’s second-year commitment period. Once completed, Alectra is working jointly with the IESO to publish a project evaluation report, which will capture the key outcomes and lessons from the two-year pilot project.

6 WHAT'S COMING UP IN 2023

The Sandbox team will focus on several initiatives in 2023. These include:

- The **Innovation Sandbox Challenge**, a one-time funding opportunity of \$1.5 million to support innovative projects in the energy sector and provide Sandbox guidance, will start in the spring.
- The projects that are part of the OEB-IESO **joint targeted call** will have assets installed and testing set to begin. The IESO and the OEB expect to release an interim project status report in the fall.
- The **long-term Sandbox 2.0 commitments**, which include considering additional types of reporting, reassessing the idea of a concierge service, and exploring other funding opportunities, will be examined and implemented, as warranted.