ENERGY INNOVATION CHALLENGE - PROJECT OVERVIEWS

Aqua-Cell Energy

Long-duration storage

Storing electricity allows communities to use it when it is most needed, rather than only when it is produced. Aqua-Cell Energy's Medicine Hat project is Canada's first field demonstration of a saltwater flow battery, which stores energy in tanks of liquid electrolyte and releases it over many hours. Housed in a shipping container, the system offers a different approach to managing periods of high demand and making better use of renewable electricity.

Now being commissioned, the battery completes the final demonstration commissioning in the Energy Innovation Challenge. It gives Aqua-Cell the opportunity to assess its technology outside the laboratory, under the engineering, installation and operating requirements of a real utility. The system is scheduled to remain in Medicine Hat for a year of operation and testing.

For Medicine Hat, the project tests whether storage can serve as what City engineer Raymond Chokelal calls a "non-wires upgrade": easing peak demand on the distribution system and potentially deferring conventional infrastructure upgrades. Operating experience will help the City assess the technology's performance and inform future decisions about where and how batteries could be used.

Why it's different	· Energy is stored in liquid, so longer storage means more tanks, not more batteries · Water-based and non-flammable · Uses no lithium
What it means for Medicine Hat	· Peak relief that could delay costly substation and line upgrades · Can pair with solar to supply power when it is needed
Key milestone	· Operating, with results informing a plan for the next 2 MW of storage

Eguana Technologies

9 batteries · 3 City buildings · 1 coordinated fleet

Electricity demand can put pressure on a distribution network when several buildings or large pieces of equipment need power at the same time. Demand response helps manage that pressure by changing when electricity is drawn from the grid. Batteries can support this by supplying some of a building's electricity needs during periods of high demand, reducing its draw on the network and helping manage conditions that could otherwise affect reliable service.

Managing these demand-response events was the original purpose of Eguana Technologies' Medicine Hat project. It combines nine batteries at three City buildings with software that allows operators to see and manage them as a coordinated fleet. This gives the utility a way to explore how batteries at individual buildings can work together to respond to changing conditions across its network. Battery deployment was completed on December 5, 2025.

By March 13, 2026, Eguana had completed a software release that mapped battery locations and activity alongside grid voltage and frequency, giving operators a clearer view of the fleet and conditions on the network. Meter data confirmed the batteries reduced each building's afternoon demand by about 13 kW. Testing also produced a practical finding for Canadian use: in temperatures below −20°C, improved enclosure design enabled an outdoor battery configuration to keep operating under conditions that would normally cause the battery to shut down for self-protection. That design is now Eguana's standard for cold climates.

On October 1, 2026, a 149 kW solar array came online at 364 Kipling Street, making it the City's first site where solar and batteries operate together with data available. This adds a further application to the original demand-response project: testing how batteries can absorb midday solar production for use later, and how charging from solar and the grid can be coordinated.

Why it's different	· Many small batteries run as one fleet from a single dashboard · Responds automatically to voltage and frequency changes · Lithium iron phosphate, the more heat-stable lithium chemistry
What it means for Medicine Hat	· Lower building peaks ease strain on City lines and can delay upgrades · A grid resource built from buildings the City already owns · Can store midday solar for use later in the day
Key result	· About 13 kW less demand per building from 2 to 5 p.m., confirmed by meter data

Bill savings and feeder-level benefits have not yet been measured.

Edgecom Energy

11 City buildings · Equipment-level energy data

Understanding where and when electricity is used is an important step toward managing it more efficiently. Edgecom Energy's Medicine Hat demonstration uses 178 wireless sensors on heating, cooling, and ventilation equipment in 11 City buildings, with analytics to give participating facilities a clearer view of their electricity use and identify opportunities to improve it.

The technology is designed to help building operators recognise patterns, spot unusual consumption and understand when demand is putting pressure on the grid. Because it measures individual units rather than whole buildings, it shows what each piece of equipment costs to run, and when. This can support better decisions about how equipment is operated and when electricity is used, with the potential to reduce waste, control costs and ease demand at busy times.

City departments are now using the data to review equipment schedules and cut after-hours operation. The experience also raised an important question for wider adoption: how the benefits compare with the ongoing cost of the service. The project's final energy and cost results will provide evidence for quantifying those benefits.

Why it's different	· Clip-on sensors installed without rewiring · Tracks individual equipment, not just whole buildings · Combines sensor data with utility bills and weather
What it means for Medicine Hat	· Finds equipment running after hours, with a dollar value attached · Pinpoints each building's peak and when it happens · Shows how much solar each building could use on site
Key result	· About 14 City staff using the portal; departments reviewing HVAC schedules

Savings identified so far are estimated opportunities, not measured results.

Arcobi (formerly Arcus Power)

Grid planning software · Tested on the City's network model

Where a battery is installed can be as important as how much electricity it stores. Arcobi built planning software that reads the City's grid model, first tests whether rerouting power through existing switches can relieve congestion, and only then recommends where batteries should go and how large they should be.

The work also exposed a practical barrier: the City's modelling software can export only its live grid, not the what-if scenarios planners want to test, and the City has no separate planning environment. That finding matters when utilities assess advanced technologies, because the usefulness of a new tool depends on the information available to it and how it works with systems already in place.

City planners shaped key features of the tool. Arcobi now has a product refined in a real utility and suited to larger utilities, and Medicine Hat could draw on it as a service for future decisions such as siting large batteries or solar.

Why it's different	· Tries no-cost fixes first by testing switching options · Plans ahead for the loss of any one line · Recommends battery size, site and approximate cost
What it means for Medicine Hat	· Gets more from existing equipment before spending on new · A ready switching plan if a feeder fails · Evidence for siting future batteries and solar
Key result†	· In a demonstration run, recommended storage cut a 28% overload to under 1%

† Modelled scenario, not a measured outcome on the City's grid.

TAKEnergy

21.4 MWh generated · 99.8% uptime

Natural gas utilities must reduce line pressure as the gas moves into lower-pressure distribution systems. TAKEnergy's TERVEX technology captures energy from that pressure reduction and uses it to generate electricity, without burning any of the gas. The Medicine Hat demonstration tested a 25 kW generator at a gas regulation site, exploring how existing infrastructure could also become a source of local power.

Over the trial, which ended April 20, 2026, when the station shut in for the summer, the system generated 21.4 megawatt-hours of electricity, with 99.8% uptime in its final two months. About half was used at the site and the rest went to the grid. Testing also identified line losses and voltage conditions that limited output: a transformer about 700 feet away held output to roughly 60% of capacity, a lesson for siting future local generation.

While no gas is burned to generate the power, there is a need to pre-heat the gas to compensate for additional cooling from the TERVEX system. Initial greenhouse gas analysis indicates a shortfall from the anticipated emissions benefit. These findings provide evidence for assessing future sites, equipment design and the full energy balance before further investment. The project moved TERVEX from TRL 6 to TRL 8, and TAKEnergy is now pursuing larger sites with other gas utilities.

Why it's different	· Generates useful electricity from energy that pressure regulator valves otherwise waste · Steady output whenever gas flows, unlike solar or wind · Five times larger than TAKEnergy's earlier pilot
What it means for Medicine Hat	· Makes the City's own gas network a source of local power · At full output, could have supplied all of the station's power · Lessons on transformer placement for future generators
Key result	· 21.4 MWh generated; 99.8% uptime in the final two months

Emissions wording to be confirmed once the greenhouse gas analysis is final.

INNOVATOR PERSPECTIVES

Aqua-Cell Energy

“The Energy Innovation Challenge has successfully transitioned our saltwater flow battery from the lab to its first field deployment. Support from our funders, investors and the City of Medicine Hat has been instrumental in advancing our testing and positioning us for larger-scale rollouts. We look forward to continuing to develop our saltwater flow battery technology to support sustainable energy production in Canada and beyond.”

- Keith Cleland, CEO, Aqua-Cell Energy

Eguana Technologies

"The Energy Innovation Challenge provided us with the opportunity to work directly with a distribution utility at a key point in Eguana’s product development. Beyond the value of the new features themselves, the direct and collaborative feedback was invaluable and has provided us with context and experience as we present our solution to other utilities across North America looking to get more out of the grid they've already got."

- Brent Harris, CTO, Eguana Technologies

Edgecom Energy

“The Energy Innovation Challenge allowed us to test and improve our dataTrack offering in a diverse set of municipal buildings. Within months, wireless metering at City of Medicine Hat facilities surfaced over 20 potential savings opportunities in after-hours consumption and monthly peak demand. This project reaffirms that you can’t manage what you're not monitoring and we're excited to continue improving our product based on the feedback provided by the City of Medicine Hat.”

- Tanner Behrend, Vice-President, Strategic Growth, Edgecom Energy

Arcobi

“The Energy Innovation Challenge allowed Arcobi to develop and test our planning software using a real utility network and direct feedback from City of Medicine Hat personnel. The project reinforced the importance of integrating new tools with existing utility systems and testing operational solutions before recommending new infrastructure. We will apply these lessons as we help utilities plan energy storage and other distributed energy resources.”

- Rhonda Jewett, Vice President of Growth and Operations, Arcobi

TAKEnergy

“TAKEnergy appreciates the opportunity to partner with the City of Medicine Hat and DEC to demonstrate TERVEX technology. At five times the capacity and 20% greater efficiency than our first pilot, we demonstrated scalability, reliability and grid integration. By recovering energy traditionally lost during natural gas pressure reduction, TERVEX is poised to unlock a valuable new source of low-emission electricity for utilities.”

- James Cleland, President, TAKEnergy