



Smart Electric
Power Alliance

Case Study: Plymouth State University & New Hampshire Electric Co-op— Transactive Energy & V2B

The State of Bidirectional Charging in 2023

September 2023

In Partnership with

CLEAResult[®]



 **Fermata Energy**



Virtual Peaker 

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The Smart Electric Power Alliance (SEPA) is dedicated to helping electric power stakeholders address the most pressing issues they encounter as they pursue the transition to a clean and modern electric future and a carbon-free energy system by 2050. We are a trusted partner providing education, research, standards, and collaboration to help utilities, electric customers, and other industry players across three pathways: Electrification, Grid Integration, Regulatory and Business Innovation. Through educational activities, working groups, peer-to-peer engagements and advisory services, SEPA convenes interested parties to facilitate information exchange and knowledge transfer to offer the highest value for our members and partner organizations. For more information, visit www.sepapower.org.

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Customer Project: Plymouth State University & New Hampshire Electric Co-op

Transactive Energy & V2B

Description of Project

Plymouth State University (PSU) uses two Nissan LEAF electric vehicles (EVs) and a Fermata Energy bidirectional charger to conduct electricity arbitrage and reduce its ALLWell Center's peak demand. PSU's bidirectional charging system receives day-ahead electricity price signals from New Hampshire Electric Co-op (NHEC) through its Transactive Energy Rate (TER) program. The hourly price signals are then processed by Fermata Energy's AI-powered bidirectional charging platform, which analyzes and simplifies the information before advising PSU on the optimal times to discharge the EV batteries. PSU decides on whether to park the vehicle for discharge events or leave the vehicle available for its student ride service.¹

Key Partnerships

- Fermata Energy
- Bellawatt

System Set-up

- Grid-tied vehicle-to-building (V2B)
- The EV batteries deliver electricity to the ALLWell Center and any excess energy is shared with the grid.

Goals

- **To study a new transactive energy rate.** NHEC and PSU were able to study the performance of EVs under NHEC's new transactive energy rate.
- **To generate economic gain for customers.** PSU uses the two Nissan LEAFs to generate additional revenue through energy arbitrage and peak demand reduction.
- **To study grid stabilization.** The EV discharge can help stabilize the grid during peak hours and other events.

Economic Incentive Structure

- NHEC, in collaboration with Bellawatt and Fermata Energy, developed the new TER utility rate program. This program is a day-ahead electricity pricing program that allows PSU to purchase electricity from NHEC at low prices, store the energy in the EV batteries, and discharge the energy back to NHEC when the prices surge. The TER program incentivizes grid-tied V2X electricity arbitrage.
- By participating in the TER program, PSU earned over \$1,300 in credits in less than 6 months of deployment.²

Lessons Learned

Challenges

- PSU is located in New Hampshire and experiences extreme cold in the winter. While there were concerns that the batteries would not operate well in the frigid winters, the V2G system remained a reliable asset and provided support during NHEC's winter peaks.

Successes

- The day-ahead price signals enable PSU to make informed decisions about utilizing the energy stored in the Nissan LEAFs.
- Over a six-month period, the EVs provided 1 MWh of energy to PSU's AllWell Center, offsetting approximately 90 hours of power consumption. 1 MWh of energy is equivalent to the electricity consumption by approximately 330 homes in an hour.
- The success of this hourly electricity pricing program sets the stage for NHEC to compensate its members for power exported from other Distributed Energy Resources (DERs).

1 New Hampshire Public Radio (January 2022). [How an Ev charging pilot program at Plymouth State could help transform the grid.](#)

2 Bellawatt. (n.d.). [DER Transactive Energy Rate Strategy & Technology. Client: New Hampshire Electric Co-op \(NHEC\).](#)



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