



Smart Electric
Power Alliance

Case Study: North Boulder Recreation Center— Commercial V2B

The State of Bidirectional Charging in 2023

September 2023

In Partnership with

CLEARresult®



 **Fermata Energy**



Virtual Peaker 

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Authors

Brittany Blair, Senior Analyst—Research & Industry Strategy, Smart Electric Power Alliance

Drake Moran, Analyst—Research & Industry Strategy, Smart Electric Power Alliance

Garrett Fitzgerald, Senior Director—Electrification, Smart Electric Power Alliance

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Customer Project: North Boulder Recreation Center

Commercial V2B

Description of Project

In 2020, the City of Boulder partnered with Fermata Energy to implement a vehicle-to-building (V2B) project at the North Boulder Recreation Center (NBRC).¹ The city selected the NBRC after conducting an analysis of its public buildings, which identified the buildings that had a peak electric load greater than 100 kW and had a fleet vehicle available for the project. The project used one of the city's Nissan LEAFs and Fermata's FE-15 bidirectional charger. The bidirectional V2B charging system allows vehicle batteries to transfer energy from the battery back to the NBRC. This can reduce the building's peak demand.

Key Partnerships

- Fermata Energy

Figure 1. NBRC's V2B System



Source: City of Boulder. (2022). Shared with permission.

System Set-up

- Parallel, Non-export - Under the interconnection agreement with Xcel Energy, the system only sends load to the building.
- The charger software continuously monitors NBRC's electrical load to determine whether to charge or discharge the battery.

Goals

- **To demonstrate bi-directional charging technology.**
- **To not interfere with the vehicle's normal usage.** Staff could use the LEAF whenever the vehicle was needed, even during peak times.
- **To have consistent demand reduction.** Aim of 15.2 kW peak demand reduction per month (based on charger size).

Economic Incentive Structure

- The NBRC discharges under one of Xcel's battery tariffs, where NBRC saves approximately \$17 per kW discharged in winter months and \$23 per kW discharged in summer months per kW.
- NBRC averages 13 kW of peak demand reduction per month and averages \$247 savings per month.

Lessons Learned

Challenges

- In its first year of operation, the project averaged reduced peak demand by 13 kW per month instead of the rated 15.2 kW. The system achieved less than the maximum potential energy savings because of a communication system error during a peak event in one month that prevented the system from discharging. For that month, there was no peak demand reduction. In the second year of operation, the project averaged 14 kW of demand reduction per month.
- Sometimes the vehicle was not properly plugged in or set to the correct charge / discharge mode, which

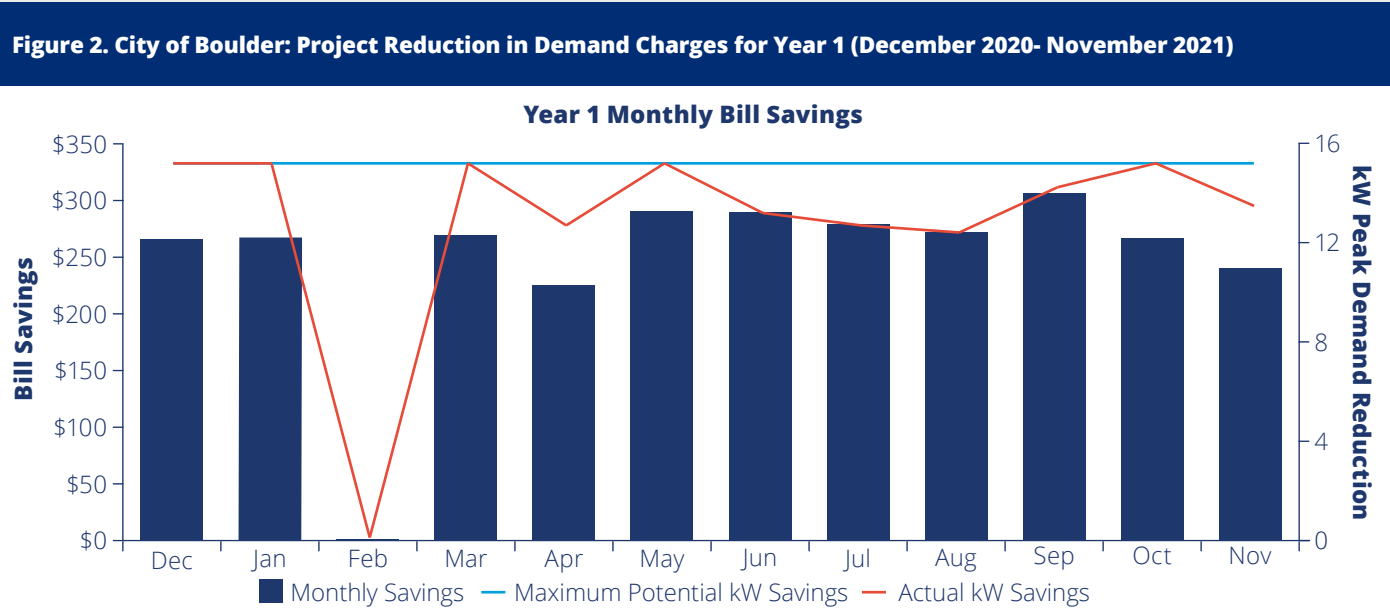
¹ City of Boulder. (March 2022). [North Boulder Recreation Center Electric Vehicle Charging Station Pilot](#).

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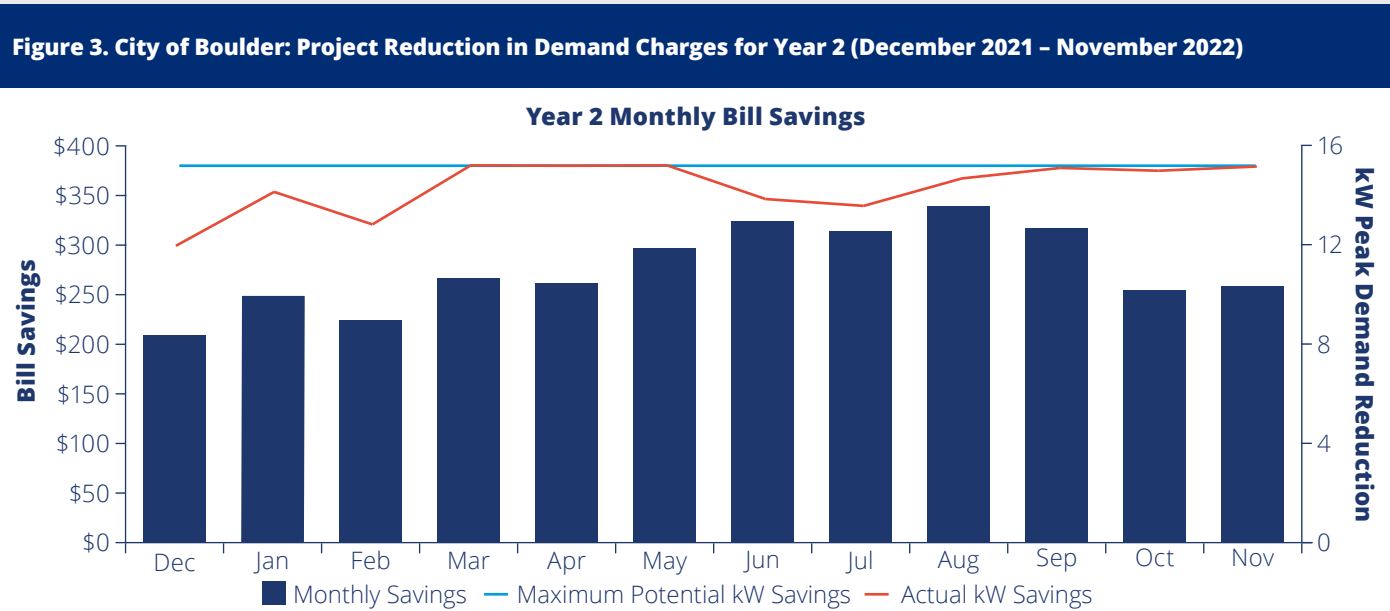
- required someone to manually correct it before the peak time. A benefit of Fermata's charging software is that it alerts staff that the vehicle hasn't been plugged in correctly so they can quickly fix the issue.
- The project occurred during COVID and there were fewer staff using the LEAF. The project manager expects that during normal operations there will be more demand on the fleet vehicle, which could influence the ability of the vehicle to reduce energy demand.

Successes

- While the cost savings of \$247/month is only 3.4% of the NBRC's total electricity bill, the savings help pay for the monthly lease on the LEAF.
- The system is easy to use. It took only one staff meeting to train staff on the vehicle and charger.



Source: City of Boulder. (2023). Recreated by SEPA with permission.



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**Smart Electric
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1800 M STREET, NW FRONT 1
#33159
WASHINGTON, DC 20036
202-857-0898

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