

CASE STUDY



Pittsburg Unified School District and project overview

PUSD introduction: EVs

Pacific Gas and Electric Company (PG&E) partnered with Olivine and Liberty PlugIns on a pilot project to provide Pittsburg Unified School District (PUSD) with a low-cost, configurable electric fleet (E-Fleet) management system that is capable of achieving specific goals defined by the fleet manager, including: providing bill management, reducing carbon emissions, maximizing charging from on-site renewable generation, and providing grid support services.

The E-Fleet management system met the project goal of minimizing fuel costs by shifting the buses' charging to the less expensive off-peak time-of-use (TOU) periods and implemented a round-robin technique to manage demand charges. Leveraging the on-site renewable generation through performing renewable self-consumption in parallel with participating in PG&E's Excess Supply Pilot (XSP) provided valuable insights on how electric school bus fleets can be commanded to charge when the grid has excess electricity supply.

Project goals

Reduce the total cost of ownership of electric buses for school districts by minimizing infrastructure and fuel costs.

Inform how medium and heavy-duty fleet vehicles can act as local energy resources when the grid has excess electricity supply.

Infrastructure at PUSD

The full infrastructure implemented at PUSD during the pilot included nine Level 2 chargers operated with a charger controller and deployment of four electric school buses from two different manufacturers. PUSD expects to grow their electric fleet as funds become available. Additionally, the school district installed 200 kW of on-site renewables, 160 kW of solar PV and 40 kW of wind turbines, in parallel with this pilot.

Project partners and funding

This project was funded by PG&E as part of California's Senate Bill 350 (Clean Energy and Pollution Reduction Act) Transportation Electrification *priority review* pilot projects. PG&E partnered with Olivine, PUSD, and Liberty PlugIns on this pilot project.

Renewables integration

PUSD pushed the envelope on transportation decarbonization beyond just electrification by integrating their E-Fleet with on-site renewables to reach their goals of reducing emissions and achieving energy self-reliance. The school district operates renewable self-consumption and receives bill credits on both the facility and EV meters for energy exported to the grid by the on-site renewables through participation in PG&E's Net Energy Metering Aggregation (NEM2A) Program. Future school bus electrification projects should consider integrating with renewables to further minimize greenhouse gas (GHG) emissions and save money on their utility bill.

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Charging methodologies

Bill management

PUSD's EV utility meter was on PG&E's A-6 rate for the duration of the pilot which abides by a TOU schedule, meaning energy prices vary based on whether the usage occurs during peak, part-peak or off-peak periods. The E-Fleet charge management system implemented at PUSD shifts charging from the high-cost peak TOU period in the middle of the day to the lower-cost off-peak TOU period at night to save the school district money on their electric bill.

The E-Fleet charge management system also implements a round-robin charging approach to minimize demand or subscription charges on the school district's utility bill. Round-robin charging is the act of charging buses in alternating intervals in order to limit the number of vehicles charging simultaneously as opposed to charging all of the buses at once and causing a spike in the demand.

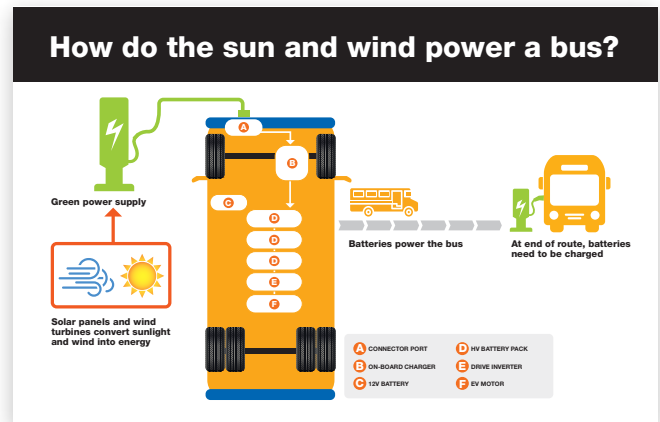
PG&E's Excess Supply Pilot participation

PUSD's E-Fleet provided grid stability and earned additional revenue by charging during periods of high renewable penetration as part of PG&E's XSP*.

Renewable self-consumption

Concurrent renewable-self consumption (RSC) was implemented in this pilot to leverage PUSD's on-site renewable generation. The buses were scheduled to charge when PUSD's on-site renewables were exporting to the electrical grid and the number of chargers activated corresponded to the rate of export.

Interested in taking advantage of PG&E's EV Fleet program?
Visit pge.com/evfleet.



Learning exhibit

The school district turned this project into an impressive learning opportunity for teachers, students and families, by developing a learning exhibit near the on-site renewables that includes educational kiosks about renewable energy, energy storage, and electrified transportation. Teachers and students will work together to integrate this learning exhibit into the curriculum.

Project learnings

Bill savings

PUSD saved money on their utility bill by shifting charging to less expensive TOU periods and earning bill credits from on-site renewable generation through participation in PG&E's NEM2A Program. PG&E performed a bill analysis to compare PUSD's EV utility meter rate to PG&E's new Business EV (BEV) rate to determine cost saving opportunities. The analysis found PUSD could save an average of 20 percent per mile by switching from their current A-6 rate to the BEV rate and optimizing their charging around the BEV TOU periods and subscription charges.

Greenhouse Gas emissions reductions

PUSD's electrification efforts are rooted in a desire to reduce pollution and GHG emissions. The school district executed innovative ways to reduce emissions such as performing renewable self-consumption and participating in PG&E's XSP throughout the project. PUSD will continue to reduce their emissions as they expand their E-Fleet.

*PG&E's XSP pilot may be closing on December 31, 2020, pending CPUC approval.