

Real-World Vehicle to Grid: Case Study on School Buses in New England

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Abstract : Floods, heat waves, drought, wildfires, tornadoes and other environmental disasters are a snapshot of looming national problems that can create increasing demands on the national grid. With nearly 500,000 school buses on the road and the environmental protection agency (EPA) providing nearly \$1B for electric school buses, there is a solution for this national issue. Bidirectional batteries in electric school buses enable a future proof solution to sustain the power grid during adverse environmental conditions and other periods of high demand. School buses have larger batteries than standard electric vehicles. When they are not transporting students, these buses can spend peak solar hours parked and plugged into bi-directional direct current fast chargers (DCFC). A partnership with Highland Electric, Proterra and Rhombus enabled over 7 MWh of energy servicing Massachusetts and Vermont grids. The buses were part of a vehicle to grid (V2G) program with National Grid and Green Mountain Power that can charge an average American home for one month with a single bus. V2G infrastructure enables school systems to future proof their charging strategies, strengthen their local grids and can create additional revenue streams with their EV fleets. A bidirectional ecosystem with Highland, Proterra and Rhombus can enable grid resiliency or the ability to withstand power outages caused by excessive demands, natural disasters or rogue nation's attacks with no loss of service. A fleet of school buses is a standalone resilient asset that can be accessed across a city to keep its citizens safe without having any toxic fumes. Nearly 95% of all school buses across USA are powered by diesel internal combustion engines. Diesel exhaust has been classified as a human carcinogen, and it can lead to and exacerbate respiratory conditions. Bidirectional school buses and chargers enable energy justice by providing backup power in case of emergencies or high demand for marginalized communities and aim to make energy more accessible, affordable, clean, and democratically managed.

Keywords : V2G, vehicle to grid, electric buses, eBuses, DC fast chargers, DCFC

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