**Quantifying the potential operational grid and environmental impacts for a V2G-enabled electric school bus fleet**

As states begin to replace diesel school buses with electric ones, utilities will want to control charging schedules to capture potential benefits on the grid and avoid all buses charging at the same time, adding a large electric load. Vehicle-to-grid (V2G) services can provide more grid stability and reduce carbon dioxide emissions than simple controlled charging systems. This project simulates the effect of managed charging of electric school buses on peak shaving in the state of North Carolina using V2G electric school buses as dispatchable storage and using the optimized loads to determine potential emissions reductions. The methodology is applied to a summer day, a winter week day, and a winter weekend day to represent cases with high electricity demand with and without required school bus activity. The results demonstrate that at full electric school bus replacement, 14,000 V2G buses can aggregate and shift 2.6 GWh per day in North Carolina. For the cases examined, the avoided carbon dioxide emissions range from 700 to 1,130 metric tons of CO2 per day from peak shaving assuming decreased dependence on natural gas peaker plants. An additional 1,500 metric tons of CO2 can be avoided daily by replacing diesel-powered buses compared to the 320,000 metric tons total daily CO2 emissions from all activities in North Carolina. Avoided emissions from bus replacement can only be considered on school days which is when the risk of buses being disconnected from the grid during peak periods is highest. However, the overall emissions reduction from operating electric buses instead of diesel buses more than compensates for the decreased ability to shave the peak load. The model can be used by researchers, the utility, and states as these entities evaluate the environmental and operational grid benefits of a V2G school bus program.