# Bus Fleet Vehicle-to-Grid (V2G) Storage

NIST Workshop: PCS Architectures for PEV Fleets as Grid Storage

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# School Bus Fleet Background

- The school bus market is supplied by an oligopoly consisting of three OEMs: Blue Bird, International, and Thomas
- The size of the fleet is 450K vehicles
- Manufacturing capacity is 35K to 40K vehicles per year; currently mid 20K due to local government fiscal issues
- The vehicle replacement cycle is 12 years
- Average daily usage for a school bus is approximately 60 miles
- DoD has a school bus fleet of 8K vehicles

# Why are School Buses Good PEV V2G Candidates?

- Predictable usage pattern resulting in availability to the grid of >75%
- Buses are stored in one of three locations: a depot, a school, or a driver's home
- Average range (with 30 to 50 percent margin) can be achieved with a battery of between 100 KWh and 130 KWh
- 25 PEV V2G buses = 1MW
- 77 percent of school districts have at least 25 buses
- Grid operators and utilities have identified PEV V2G capable school buses as an ideal grid storage device for supplying frequency regulation services

# PEV V2G School Buses: Other Considerations

- Good candidates for battery leasing programs and vehicle leases that monetize frequency regulation services
- Zero emission vehicles for non-attainment areas
- “Natural aggregation” – i.e., depot and school vehicle storage – makes school buses attractive pilot candidates for utilities
- Incentives already exist in California to buy-down the purchase price of a PEV V2G school bus to the price of a conventionally powered diesel bus
- Can serve as a mobile power source for natural disaster events
- Depots and school vehicle storage areas lend themselves to the use of solar power to generate electricity for the buses

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