

Electric School Buses

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Introduction

School buses are only used a small fraction of hours a day. Thus, if they are electric they can be charged at night at low rates when power plants are not busy and sell back electric energy to the power grid during hours at higher rates when power plants are not busy (vehicle-to-grid [V2G] or load shifting), earning an [estimated \\$230,000/bus over a 14-year lifespan](#).

[School buses in U.S. & Virginia 2015-16](#): 474,194 & 16,020

School Buses and the Environment

[Diesel engines emit many chemicals](#) that are harmful to humans and the environment:

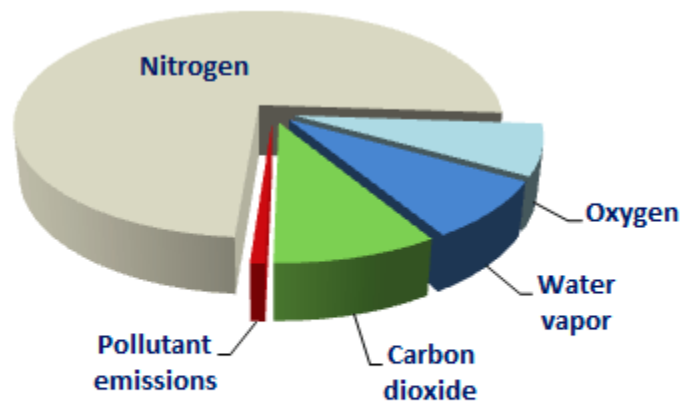


Figure 1. Relative concentration of pollutant emissions in diesel exhaust gas
Representative for diesel engines before the introduction of advanced aftertreatment

[Students getting on and off school buses breathe the full exhausts of the buses](#) and continue to breathe lesser exhaust as they ride in the bus. Childrens' developing lungs are especially susceptible to damage by diesel exhausts.

Economics

An [electric school bus compared to a diesel school bus](#) saves about \$2,000/year in fuel costs and about \$4,400/year in maintenance costs.

[Economics of an electric school bus with two-way charging](#) (vehicle-to-grid [V2G] with time-of-day electric rates):

	Diesel	EV	Key Assumptions
Initial Vehicle Price	\$110,000	\$230,000	Type C bus; includes cost of charging infrastructure for EV bus
Annual Expense for			
Fuel	\$5,000	\$3,024	12K miles/year; diesel at \$2.50/gal; electricity at \$0.18/kWh
Propulsion System Maintenance	\$5,743	\$1,306	Oil change, brake replenishment major drivers of cost
Accrual for Battery Replacement	--	\$3,061	\$500/kWh to start; 2% annual rate of cost decrease
Annual V2G Revenues	--	\$6,100	Based on actual electric market parameters
Years to Breakeven	13		

Electric bus compared to diesel savings is about **\$3350/year**. Adding V2G income yields about **\$10,450/year**.

If all 474,000 school buses in the U.S. were electric with V2G, the savings would be about **\$4.9-billion/year**.

If all 16,000 school buses in Virginia were electric with V2G, the savings would be about **\$167-million/year**.

References

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