








# KEY FINDINGS FROM ROUSH INDUSTRIES

Photo: [Scharfsinn86](#)

## MEDIUM- AND HEAVY-DUTY ZEV COST EVALUATION

EDF commissioned an analysis by Roush Industries to evaluate the cost of electrifying vehicles in several medium- and heavy-duty market segments, specifically those concentrated in urban areas, in the 2027–2030 timeframe. Many classes of medium- and heavy-duty vehicles, including delivery, box and stake trucks, shuttle vehicles, and transit and school buses, tend to be concentrated in urban areas where average trip distances are short and health and pollution impacts are of most concern, making these categories particularly important opportunities for early electrification deployment.

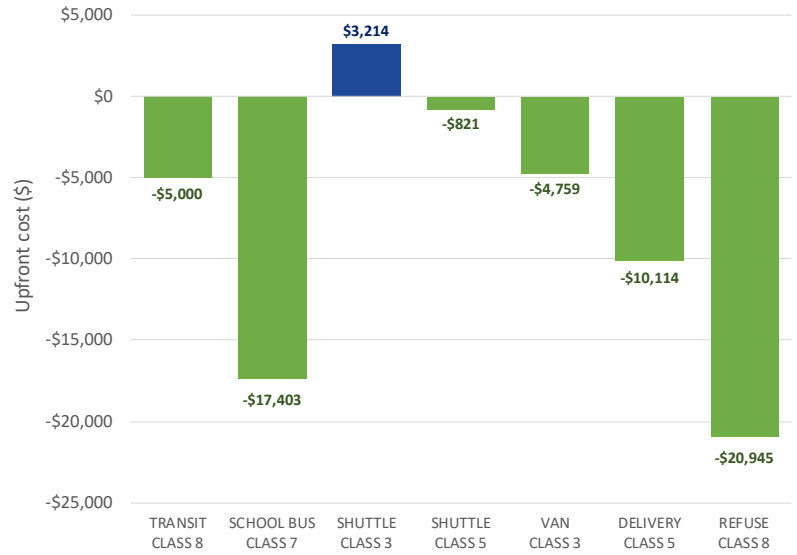
TABLE 1				
CLASS	SEGMENT	BATTERY SIZE	TOTAL COST OF OWNERSHIP PARITY	
		kWh		
	CLASS 8	TRANSIT BUS	400	1 YEAR
	CLASS 7	SCHOOL BUS	60	IMMEDIATE
	CLASS 3	SHUTTLE BUS	200	2 YEARS
	CLASS 3	DELIVERY VAN	100	2 YEARS
	CLASS 5	DELIVERY TRUCK	150	IMMEDIATE
	CLASS 7	DELIVERY TRUCK	100	3 YEARS
	CLASS 8	REFUSE HAULER	200	IMMEDIATE

The analysis evaluated the cost of electrifying these medium- and heavy-duty market segments and projects incremental vehicle costs of electric vehicles (EVs) over diesel vehicles at the time of purchase and the total cost of ownership (TCO) of EVs in the 2027–2030 timeframe. The analysis concludes that EVs are cost competitive with diesel vehicles in all vehicle segments examined, and in most cases at the time of purchase in 2027.

# UPFRONT VEHICLE COSTS

The upfront vehicle cost analysis demonstrated that for all transportation segments studied, the cost of electrification significantly decreases, and in nearly all cases, electric vehicles will deliver upfront savings when compared to diesel vehicles in 2027. As state and federal greenhouse gas (GHG) and low NOx regulations continue to become more protective, technology will be developed to improve fuel economy and reduce emissions in diesel vehicles, adding costs to their systems. In contrast, further technology development of EV components such as batteries, motors, and power electronics will lower the costs of these items, leading to their cost parity or advantage over diesel powertrains as early as 2027.

**FIGURE 1: UPFRONT COST FROM DIESEL TO EV POWERTRAINS (VEHICLE PURCHASED IN 2027)**

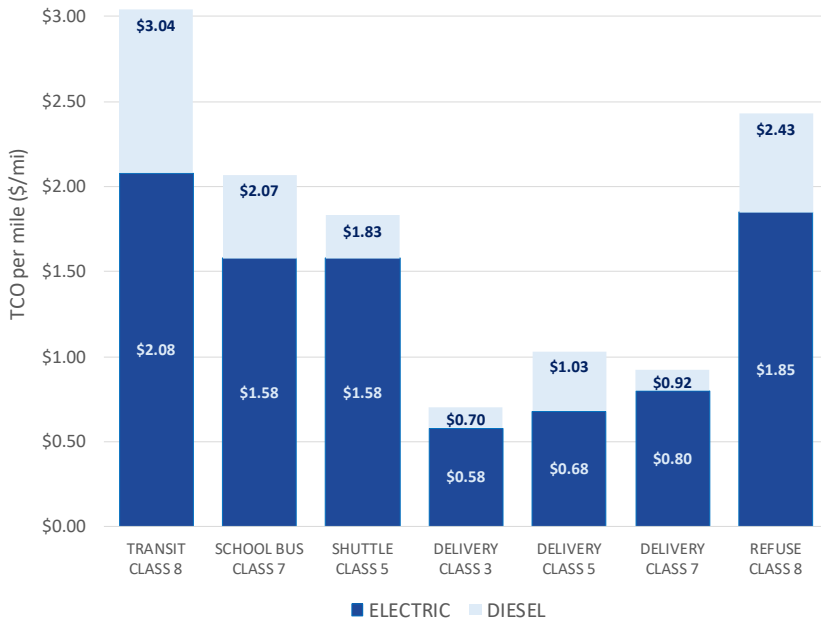


**Figure 1** shows that in almost every case, electric vehicles are projected to have lower upfront costs than their diesel counterparts as early as 2027. Incremental vehicle costs were determined by identifying the major components in a diesel-powered vehicle that would be eliminated in an EV (delete costs), as well as identifying components that must be added to a vehicle for electrification.

# TOTAL COST OF OWNERSHIP

Total cost of ownership (TCO), which is also important to fleet customers, represents all capital expenditures related to a vehicle that an owner will incur over the vehicle's life. TCO considers purchase price, maintenance, energy, and charging infrastructure costs over the life of the vehicle.

**FIGURE 2: TOTAL COST OF OWNERSHIP PER MILE (VEHICLE PURCHASED IN 2027)**



**Figure 2** shows Roush's findings on the cost per mile of all financial aspects of ownership of each vehicle segment examined, if purchased in 2027. In all segments, the cost of owning an EV purchased in 2027 will be less than a diesel counterpart over the life of the vehicle. Maintenance and energy costs are significantly lower for EVs than diesel vehicles, making EV ownership even more economically beneficial over time. Charging infrastructure costs are expected to decline in the future as a result of increasing availability, advancing technology, and optimized charging strategies, which could further reduce the TCO for EVs.

Roush's analysis concludes that all classes of medium- and heavy-duty vehicles examined – those that tend to be concentrated in urban areas where harmful health and pollution impacts are greatest – are logical and cost-effective targets for near-term electrification deployment in the 2027 timeframe.