

Appendix B: Literature review of costs

A wide range of studies were used to make the predictions shown in Table 13 of the main comments. In Table B1, we present the specific predictions from each study for year of parity of total cost of ownership (TCO) between zero-emission and conventional vehicles. For studies that presented TCO calculations, rather than year of TCO parity, the year of TCO parity was determined by linearly interpolating from the two closest datapoints.

Table B1: Estimates of year of parity of total cost of ownership between battery-electric and conventional vehicles across several market segments.

	Segment	BEAN ^a	NREL 2021 ^b	NREL 2022 ^c	ANL ^d	EDF/MJB ^e	ZEV Alliance ^f	CARB ^g	Roush ^h	Consensus
Fast	Transit buses primarily class 8	Before 2024							Before 2027	Before 2025
	Refuse trucks primarily class 8	Before 2025				Before 2025		Before 2025	Before 2027	Before 2025
	Short-haul rigid trucks class 4-7 (e.g., delivery, utility)	2022-2026	2020-Class 4 Delivery	2026 - 2031	2023-Class 4 Delivery	Before 2025-Delivery Vans and Trucks, Service Vans	2027-Class 7 Cargo	Before 2025-Class 5 Van	Before 2027	2022 - Class 4, 2027 - Class 7
Medium	Short-haul rigid trucks class 8 (e.g., delivery, utility)	2028		2031 - 2034		Before 2025				2028
	Short-haul tractors primarily class 8 (e.g., drayage, beverage)	2028-2033	2023		2027	Before 2025	2027	Before 2025		2025-2033
	School buses primarily class 6-7	Before 2026							Before 2027	2026
	Other buses (e.g. shuttle buses, regional transit)	2032-Class 8							Before 2027 - Class 5 shuttle	

	regional transit)									
Slow	Long-haul rigid trucks class 4-8			2027 - 2035		After 2030- Class 3-7 Box Trucks				After 2030
	Long-haul tractors primarily class 8	2040-2045	After 2050	2033 - 2035	2031	Before 2025	After 2030	Before 2025		None

- a) <https://vms.es.anl.gov/tools/bean/>
- b) <https://www.nrel.gov/docs/fy21osti/71796.pdf>
- c) <https://www.osti.gov/biblio/1854583>
- d) <https://publications.anl.gov/anlpubs/2021/05/167399.pdf>
- e) <https://www.edf.org/sites/default/files/documents/EDFMHDVEVFeasibilityReport22jul21.pdf>
- f) <http://www.zevalliance.org/zero-emission-freight-2020/>
- g) https://ww2.arb.ca.gov/sites/default/files/2021-08/210909costdoc_ADA.pdf
- h) <https://www.edf.org/media/new-study-finds-rapidly-declining-costs-zero-emitting-freight-trucks-and-buses>

Table B2 shows the ratio of upfront cost between ZEVs and ICEVs in 2027, the first year of this regulation. For studies with no data in 2027, values were linearly interpolated between the two closest years.

Table B2: Estimates of ratio of cost of a battery electric vehicle to cost of a conventional vehicle in model year 2027. Studies are the same as referenced in Table B1. For studies with no MY 2027 value for a given segment, values were linearly interpolated from the two closest studied years.

Segment		BEAN	NREL	ANL	ZEV Alliance	CARB (includes CA incentives)	Roush	Consensus
Fast	Transit buses primarily class 8	1.1					1	1-1.1
	Refuse trucks primarily class 8	1.1-1.15				1.25	0.9-0.95	1.1-1.15
	Short-haul rigid trucks class 4-7 (e.g., delivery, utility)	1.15-1.5	0.9-0.95 (Class 4 Delivery)	1.2	1.2	1.2 (Class 5 Van)	0.85-0.9	0.9-1.5
Medium	Short-haul rigid trucks class 8 (e.g., delivery, utility)	1.45-1.6						1.45-6
	Short-haul tractors primarily class 8 (e.g., drayage, beverage)	1.4-1.8	1.35	1.7	1.65	1.3		1.3-1.8
	School buses primarily class 6-7	1.25-1.3					1	1.25

	Other buses (e.g. shuttle buses, regional transit)	1.25-1.3 (Class 8 Regional Transit)					0.9 (Class 5 Shuttle)	
Slow	Long-haul rigid trucks class 4-8							
	Long-haul tractors primarily class 8	2.15-2.4	2.35	2.3	2.25	1.8		2-2.4