



Fleet Electrification Decision Making



TIM MILBURN



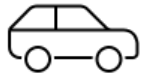
October 9, 2025





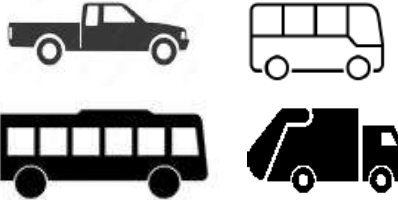
Evolution of EVs: Available Choices

2010 to 2020



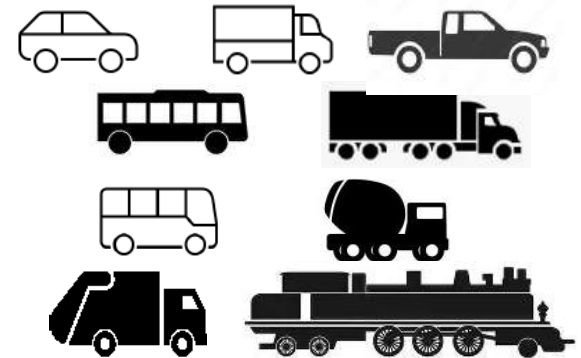
Passenger EVs

□ 2020 - 2025



Pickups, SUVs, Vans
School / Transit Buses
Refuse Trucks

□ 2025 - 2030



More LDEVs, MDEVs,
HDEVs, Buses, Rail,
Ports





New Considerations with EVs

- **Investments**

- LDVs are at or are approaching cost parity w/o incentives.
- Larger EVs still more expensive even w/ incentives
- Commonly will need investment in charging infrastructure
- Availability and timing of incentives

- **Total Lifecycle Cost (depends on mileage/usage)**

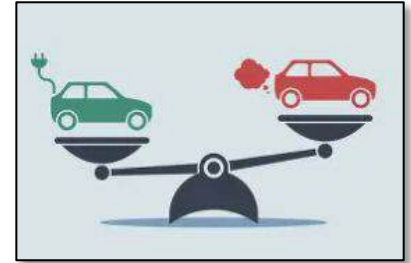
- LD EVs generally better TLC than ICEV counterparts
- W/o incentives, larger ICEVs generally better TLC than EV counterparts
- With incentives, larger EVs may be better TLC than ICEV counterparts, w/ sufficient operating miles

- **Fuel cost**

- Significantly less (EV advantage ~ 4:1 per VMT)

- **Maintenance**

- EVs generally need less servicing (3:1)
- EVs: No carbon filters, denox, spark plugs, tune-ups or oil changes
- EVs w/ regenerative braking = minimal brake wear – EV brakes last 3 to 5 times ICEVs
- EV tire life marginally less due to higher weight – where applicable



LDV = Light Duty Vehicle
TLC = Total Lifecycle Cost
VMT = Vehicle Mile traveled
ICEV = Internal Combustion Engine Vehicle
EV = Electric Vehicle

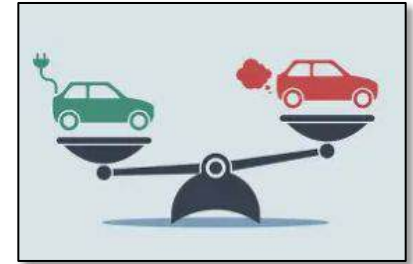




New Considerations with EVs

- **Operational**

- **Performance** – EVs can offer full range of torque, power, acceleration
- **Capacity / payload** – EVs batteries mean payload weight may be limited, but not volume limited.
- **Towing Capacity** – Comparable
- **Max Range** – Each EV has finite range- depends on battery size / type, Battery Thermal Management Systems (BTMS), duty cycle, ambient temperature and use case
- **Logistics** – Length of recharge vs. operational needs. Availability and use of public refueling.

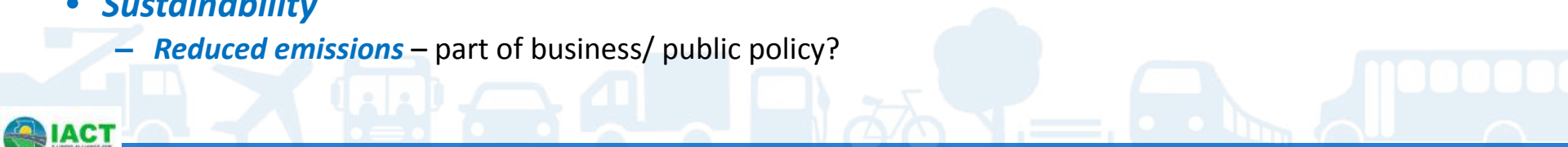


- **EV Recharging**

- **Acceptance Rate** – each EV can accept variable max AC or DC Power, which affects refill time
- **Fuel Efficiency** – Each amount of energy to travel each mile varies by vehicle, like ICEV (MPG)

- **Sustainability**

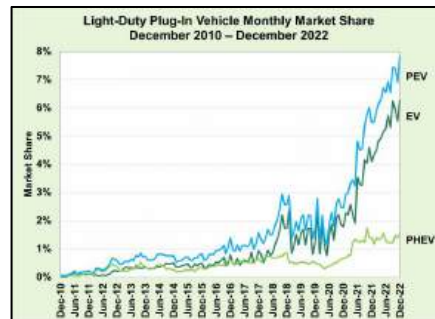
- **Reduced emissions** – part of business/ public policy?



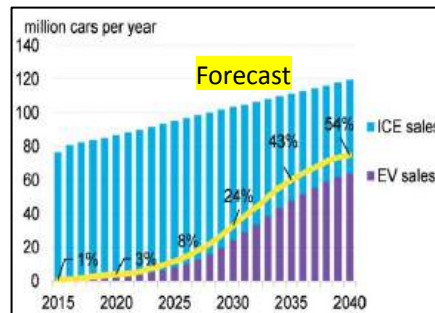


Demand Profile: EV Trends

- Rapid growth in PEV sales
- Seeing cost parity with passenger ICEVs & EV
- Most OEMs have/are developing EVs
- Larger EVs coming on-line
- Performance improvements
 - ↑ Battery energy capacity (kWh)
 - ↑ Faster charging
 - ↑ Battery thermal management
 - ↑ Safer battery technologies
- EV, EVCI, EVSE and energy incentives
- National EV Infrastructure program (NEVI) back on as of Aug 11, 2025



Source: Energy.gov/Argonne National Lab

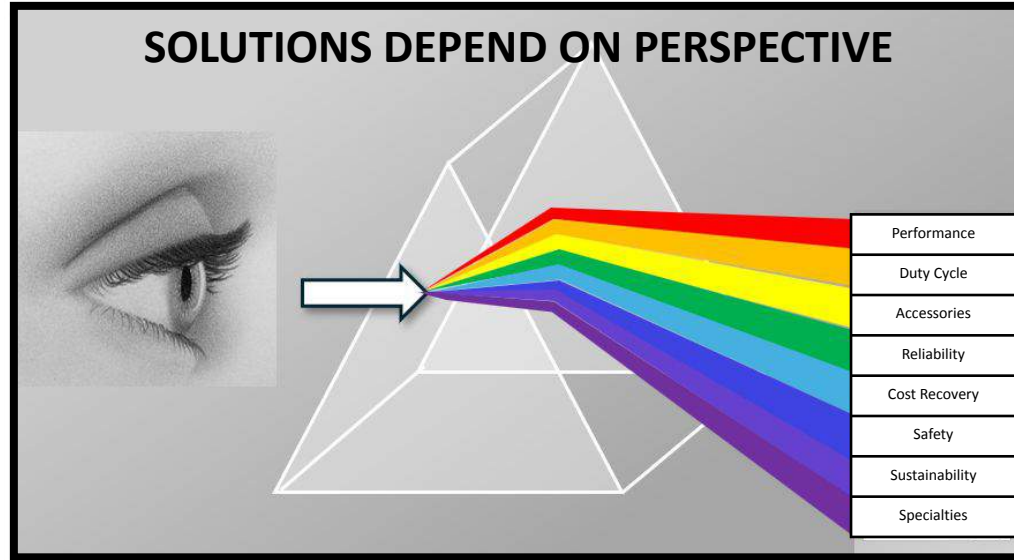


Source: Bloomberg New Energy Finance





Making Decisions





Vehicle Use Case Parameters

- **Performance**
 - Acceleration
 - Horsepower
 - Torque
 - Payload: volume and weight
 - Towing capacity
 - Maneuverability
 - Rightsizing
- **Reliability**
 - Parts / labor warranties
 - Response times
 - Parts availability
- **Accessories and attachments**
 - PTO, winches, lifts, buckets, snowplows, dump trucks, communications equipment, etc.
- **Policy and sustainability requirements**
- **Training**
- **Safety**





Vehicle Use Case Parameters

- **Duty Cycles**

- Daily routine
 - Mileage
 - Longest run
 - Seasonal variation
 - Load cycles
 - Hours of operation
 - Total power consumption
- Range
- Recharging logistics
 - Refuel speed
 - Refueling ubiquity
 - Acceptance rates and fuel efficiency

- **Specialty applications**

- Power backup systems
- Police Pursuit Vehicles
- Specialty Police Vehicles
- Street sweepers
- Ambulances, Fire equipment,



Technical Changes

“Looking under the hood”

- Fuel
- Energy efficiency (25% vs 75%)
- No ignition system, pollution controls
- No spark plugs, pistons, no oil, filters, pump
- Powertrain – EV motor drives wheels
- High voltage cables
- Less noise (no combustion)
- HVAC
 - Cooling: EV has no radiator, belt and pulley, but instead uses electric motor/compressor
 - Heating: ICEV- heat from engine. EV use electric heater and blower or heat pumps
- Regenerative braking





Investment Parity

Vehicle

- Production Cost Parity – cost to produce vehicle
- Sales price parity w/o incentives
- Sales price parity **with** incentives

Refueling / Recharging investments

- Fuel/ Charging system
- Infrastructure





Total Cost of Ownership (TCO)

Vehicle

- Vehicle purchase price
- Taxes, other fees
- Insurance
- Fuel cost
- Maintenance
- Depreciation

Refueling Investments

- Fueling station
- Fueling/ charging station infrastructure
- Insurance
- Maintenance



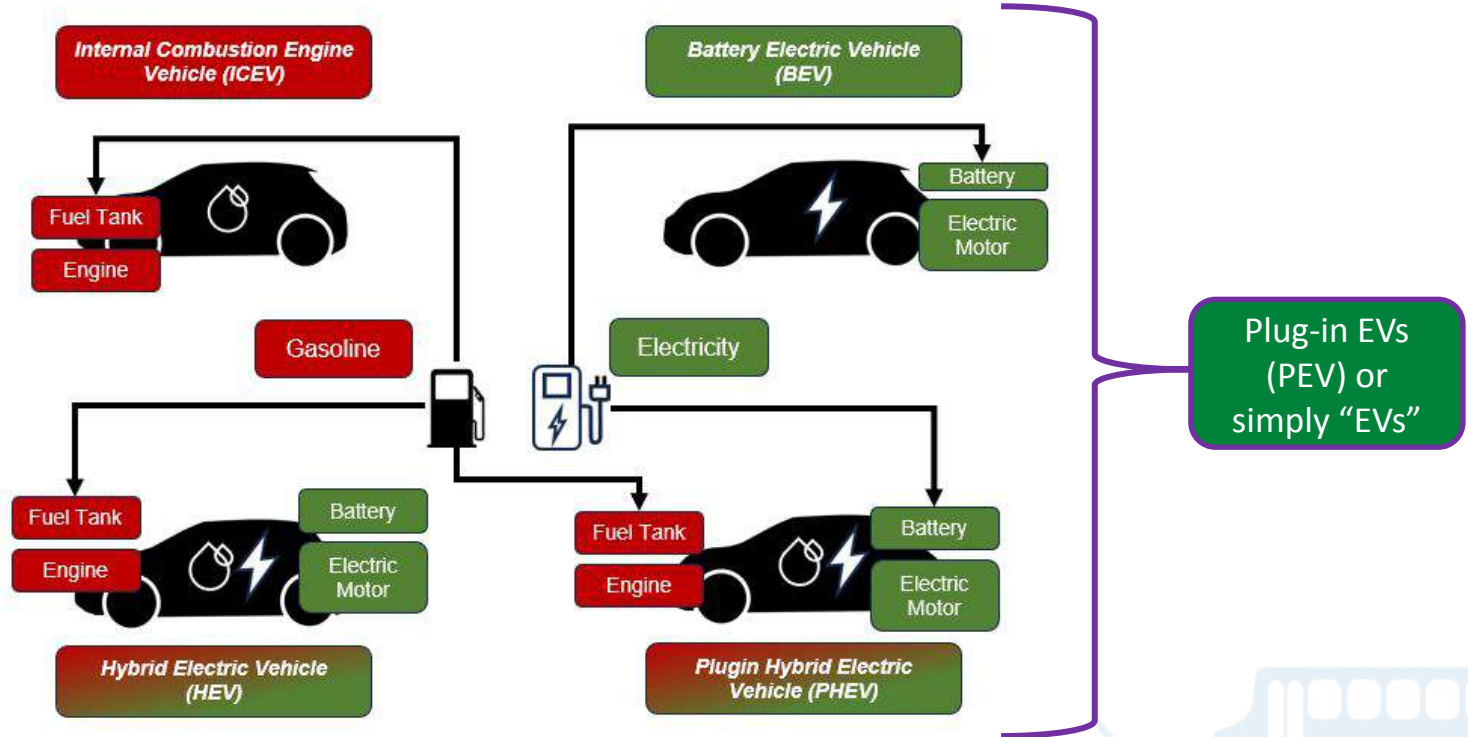


Classifying Vehicles





ICEV vs. BEV, PHEV and HEV





Vehicle classifications

Class 1 - 6,000 lbs & Less



Class 2 - 6,001 to 10,000 lbs



Light Duty Vehicles (LDVs)

Class 7 - 26,001 to 33,000 lbs



Class 8 - 33,001 lbs & Over



Medium Duty Vehicles (MDVs)

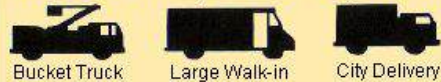
Class 3 - 10,001 to 14,000 lbs



Class 4 - 14,001 to 16,000 lbs



Class 5 - 16,001 to 19,500 lbs



Class 6 - 19,501 to 26,000 lbs



Heavy Duty Vehicles (HDVs)



Bus Weights and Capacities*

Bus Type	Curb Weight (lbs)	GVWR (lbs)	Class	Passenger Capacity	Common Use
Minibus/ Shuttles	7,000 – 14,000 lbs (3,175 – 6,350 kg)	10,000 – 19,500 lbs (4,535 – 8,845 kg)	3 to 5	8–30	Airport shuttles, hotels, senior care
Electric Shuttle Bus	8,000 –12,000 lbs (3,600 – 5,442 kg)	12,000 to 20,500 lbs (5,450 to 9300 kg)	3 to 6		
School Bus (Type C)	10,000 – 36,000 lbs (4,535 – 16,330 kg)	Up to 36,000+ lbs (16,330+ kg)	7 and 8	40–90	Student transportation
Electric School Bus (Type C)	10,000 – 36,000 lbs (4,535 – 16,330 kg)	Up to 36,000+ lbs (16,330+ kg)	7 and 8		
Transit Bus	25,000 – 33,000 lbs (11,340 – 14,970 kg)	35,000 – 44,000 lbs (15,875 – 19,960 kg)	7 and 8	30–80	Urban public transit
Electric Transit Bus	27,000 – 40,000 lbs (12,250 – 18,150 kg)	Up to 50,000 lbs (22,680 kg)	7 and 8		
Coach Bus	35,000 – 45,000 lbs (15,875 – 20,412 kg)	Up to 50,000 lbs (22,680 kg)	7 and 8	45–60	Long-distance travel, tours
Articulated Bus	44,000 – 60,000 lbs (19,960 – 27,215 kg)	Up to 80,000 lbs (36,300 kg)	7 and 8	100–120	High-capacity urban transit
Double-Decker Bus	30,000 – 50,000 lbs (13,600 – 22,680 kg)	Up to 60,000 lbs (27,215 kg)	7 and 8	70–130	Sightseeing, intercity transit

*Curb weights = empty bus. GVWR = w/ passengers



Types of buses

- School buses – Type A to D
- Transit – urban use
- Coach/ Motor Coach – long distance
- Articulated bus and bi-articulated bus
- Mini-buses, shuttles and neighborhood bus - limited regular stops.
- Double decker (70 people) bus, closed or open top
- Step entrance and low floor bus – easy entry in urban areas
- Trolley bus and guided bus – on rails
- Police bus – transport police
- Off road bus - use beyond normal road. Used by military.
- Hybrid bus – two fuels
- Pantograph – overhead electric
- Wireless – under road induction charging
- Electric bus



School Bus Classification

- A1: < 10,000 lb., / A2 >10,000, ≥ 10 people
 - Typical 10,0 to 14,500 lb
 - Engine in front. Cutaway front-section vehicle with a left driver's door
- B: > 10,000 lb., ≥ 10 people
 - Engine in front Bus body constructed and installed upon a front-section vehicle chassis, or stripped chassis
- C: > 10,000 lb., ≥ 10 people
 - Engine in front. Body is installed upon a flat-back cowl chassis
 - Typical 15,000 to 25,000 lb, 40 to 90 passengers
- D: > 10,000 lb., ≥ 10 people
 - Typical 25,000 to 36,000 lb, 40 to 90 passengers
 - Engine mounted in the front, mid-ship, or rear
- School Vans - converted vans for school use





Getting Started

FLEET ASSESSMENTS





Fleet Assessment Process

- Assess Fleet Vehicles
 - CapEx, OpEx
 - Use case
- Identify replacement candidates to electrify
 - Retirement plan
 - Procurement plan – multi-year
 - Incentives and timing
- Assess Charging needs
 - Site assessments
 - Home vs. remote charging options
 - Investments
 - Future proofing
- Calculate emissions outcomes (e.g, [AFLEET](#))
- Complete ROI
 - Confirm choices and attain funding





Available EVs



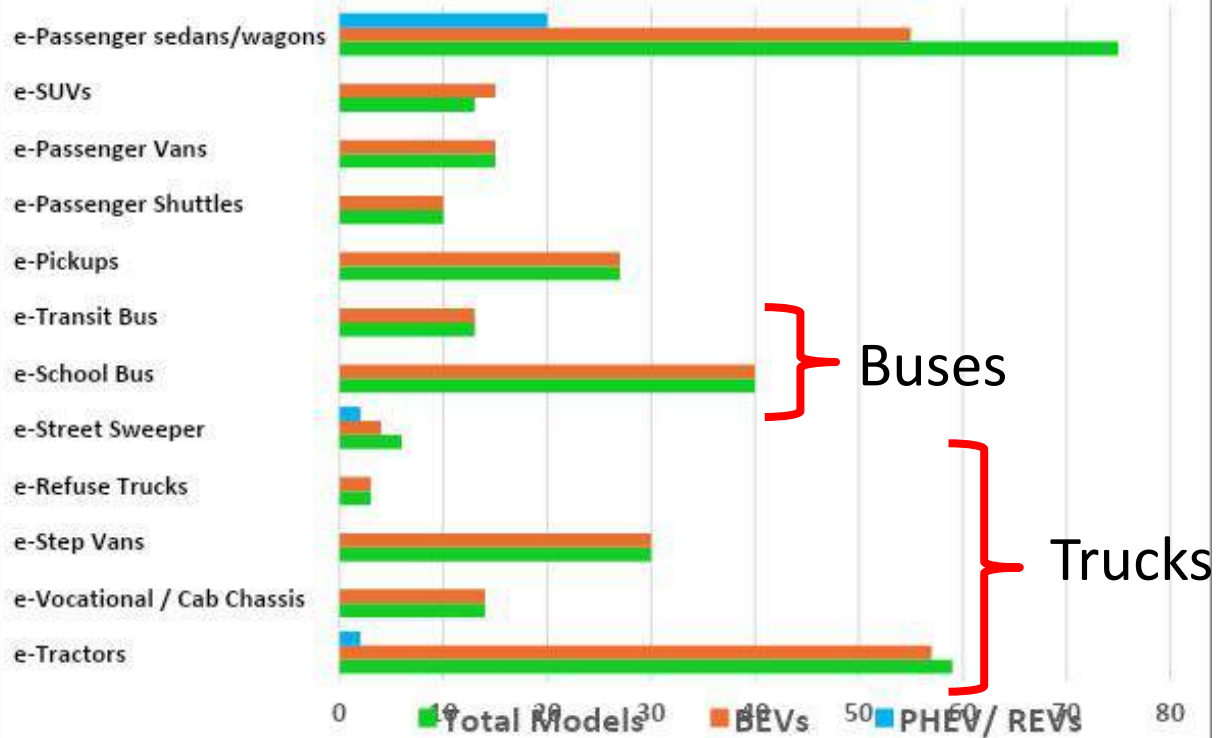


Alternative Fuels Data Center

<u>2025 AFDC Data</u>		2025 Model Quantities			
Category	OEMs*	Total Models	BEVs	PHEV/ REVs	Vehicle Classes
e-Trucks Total	29	59	57	2	3 to 8
Tractors	9	14	14	0	7 & 8
Vocational / Cab Chassis	18	30	30	0	5 to 6
Step Vans	2	3	3	0	4 to 5
Refuse	5	6	6	0	7 to 8
Street Sweeper	3	6	4	2	4 to 8
e-Buses Total	14	40	40	0	2 to 6
School	7	13	13	0	3 to 6
Transit	10	27	27	0	6 to 8
e-Pickups	4	10	10	0	1 to 3
e-Passenger Shuttles	7	15	15	0	1 to 3
e-Passenger Vans	10	13	15	0	1 to 3
e-SUVs	25	75	55	20	1 to 3
e-Passenger sedans/wagons	16	46	41	5	1
* Totals where markets are sub-divided may add up to greater number than total OEMs in market segment, as some OEMs service more than one sub-market		258	233	27	
PHEV = Plug-In Hybrid Electric Vehicle					



US Summary Data for Number of Available EV Models





Evolution of EVs: 2025

	Passenger EVs	LD EVs	e Buses	MD EVs	HD EVs
Supply Chain	Established	Developing	Developing	Early	Early
Production Volume	Significant for some OEMs	Developing	Developing	Low	Low
Innovation	Applied	Applied	Developing	Developing	Developing
Production costs	Near or at production cost parity	Higher than ICEV (10 -50%)	Decreasing, but still much higher than ICEV (~75 to 100%)		
Sales Prices w/ Rebate	Near or better than parity	~ 30% premium, commonly offset with rebates	~ 20% premium	~20 % premium	~30 % premium
TCO	Better than ICEV	Comparable to ICEV w/ incentives	Comparable to ICEV w/ incentives	ICEV still better TCO	



Finding EVs





Finding New Electric Vehicles

- US DOE Alternative Fuel Data Center (AFDC)
 - Advanced Vehicle Search: [LINK](#)
 - EV Model Availability – good info about currently available EVs [LINK](#)
 - Model Year 2025 Complete List: [LINK](#)
 - Compare Side-by-Side – Fuel Economy.gov [LINK](#)





Alternative Fuels Data Center

About | Contacts

search site



Fuels & Vehicles

Conserve Fuel

Station Locator

Laws & Incentives

Maps & Data

Case Studies

Publications

Tools

AFDC > Tools > Vehicle Search



Alternative Fuel and Advanced Vehicle Search

Find and compare alternative fuel vehicles, engines, and hybrid/conversion systems. Some of the light-duty vehicles may count toward vehicle-acquisition requirements for [federal fleets](#) or [state and alternative fuel provider fleets](#) regulated by the Energy Policy Act. For downloads of past model years, see the [publications search](#).

Printable List of Light-Duty Vehicles

Data Download for All Vehicles

Vehicles by Type



[Sedan/Wagon](#)



[Pickup](#)



[SUV](#)



[Van](#)



[Step Van](#)



[Vocational/Cab
Chassis](#)



[Street Sweeper](#)



[Refuse](#)



[Tractor](#)



[Passenger
Van/Shuttle Bus](#)



[Transit Bus](#)



[School Bus](#)

Vehicles by Manufacturer

Light-Duty

All



Search

Medium- and Heavy-Duty

All



Search

Engines and Hybrid/Conversion Systems

For medium- and heavy-duty vehicles:

- [Engine & Power Sources](#)
- [Conversion & Hybrid Systems](#)

List of 2025 Light-Duty Vehicles by Fuel/Technology



Alternative Fuel and Advanced Vehicle Search

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[Printable List of Light-Duty Vehicles](#)

[Data Download for All Vehicles](#)

Search Results - 1 - 8 of 31 vehicles

[New Search](#) | [Download](#)

Filter by: **Model Year:** 2025 **Fuel/Technology:** Electric, Plug-in Hybrid Electric | **Class/Type:** Vocational/Cab Chassis |

View:

Refine Your Search

Model Year

- ☒ 2025
- ☐ 2024
- ☐ 2023

Fuel/Technology

- ☐ All Fuels
- ☐ Biodiesel (B20)
- ☐ Ethanol (E85)
- ☐ Hydrogen Fuel Cell
- ☐ LNG - Liquefied Natural Gas
- ☐ CNG - Compressed Natural Gas
- ☐ CNG - Bi-fuel
- ☐ Propane
- ☐ Propane - Bi-fuel
- ☒ Electric
- ☒ Plug-in Hybrid Electric
- ☐ Hybrid Electric
- ☐ CNG/Hybrid Electric
- ☐ Diesel/Hybrid Electric
- ☐ E85/Hybrid Electric

Class/Type

- ☐ All Classes/Types
- ☐ Sedan/Wagon
- ☐ Pickup
- ☐ SUV
- ☐ Van
- ☐ Step Van

Battle Motors Raider



Electric

Electric-Only Range: 225 miles

Transmission: 2-Speed Powershift Automatic

Power Source(s):

BorgWarner Cascadia Motion IM435

Note: According to Manufacturer: Available in Class 7 or 8, up to 72,000 GVWR; up to 570 HP; 240-400 kWh battery pack; 80% recharge in 180 minutes

Battle Motors Striker



Electric

Electric-Only Range: 130 - 150 miles

Battery Capacity: 420 kWh

Transmission: Direct Drive or 2-Speed Powershift Automatic

Power Source(s):

BorgWarner Cascadia Motion IM435

Note: According to Manufacturer: 54,000 GVWR; 442-570 HP; 80% recharge in 110 minutes

Bollinger Motors B4 - Class 4



Electric

Electric-Only Range: 185 miles

Battery Capacity: 158 kWh

Transmission: Automatic

Power Source(s):

Bollinger Motors 235 kW electric motor

Note: According to Manufacturer: 15,500 lb GVWR (Class 4); 241 HP, 675 lb-ft torque; Level 2 charging up to 19.2 kW (9 hr), DCFC charging up to 110 kW (2 hr)

Envirotech Cab Over Chassis Class 4



Electric

Electric-Only Range: 140 miles

Battery Capacity: 92.5 kWh

Transmission: Automatic

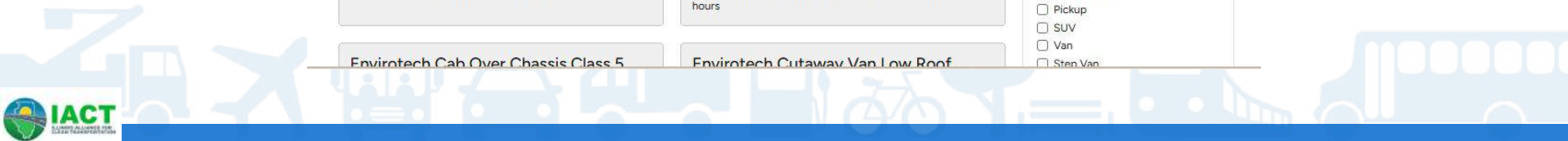
Power Source(s):

Envirotech 120 kW

Note: According to Manufacturer: 10,001-14,110 lbs GVWR; 161HP, 775 ft-lb torque; Lithium Iron Phosphate battery; Level 2 charging (11 kW) 8 hours, DC Fast charging (50 kW) 2 hours

Envirotech Cab Over Chassis Class 5

Envirotech Cutaway Van Low Roof





Alternative Fuel and Advanced Vehicle Search

Find and compare alternative fuel vehicles, engines, and hybrid/conversion systems. Some of the light-duty vehicles may count toward vehicle-acquisition requirements for [federal fleets](#) or [state and alternative fuel provider fleets](#) regulated by the Energy Policy Act. For downloads of past model years, see the [publications search](#).

[Printable List of Light-Duty Vehicles](#)[Data Download for All Vehicles](#)

Search Results - 1 - 31 of 31 vehicles

[New Search](#) | [Download](#)

Filter by: **Model Year:** 2025 **Fuel/Technology:** Electric, Plug-in Hybrid Electric | **Class/Type:** Vocational/Cab Chassis |
Manufacturer: All

View:

Refine Your Search

Model Year

- ☒ 2025
☐ 2024
☐ 2023

Fuel/Technology

Vehicle	Fuel Type	Fuel Economy	Compare (up to 4)
+ Battle Motors Raider	Electric	no data	☐
+ Battle Motors Striker	Electric	no data	☐
+ Bollinger Motors B4 - Class 4	Electric	no data	☐
+ Battle Motors Raider	Electric	no data	☐
- Battle Motors Striker	Electric	no data	☐

Battle Motors Striker



Electric

Electric-Only Range: 130 - 150 miles
Battery Capacity: 420 kWh
Transmission: Direct Drive or 2-Speed Powershift /Automatic
Power Source(s):
BorgWarner Cascadia Motion IM435
Note: According to Manufacturer: 54,000 GVWR; 442-570 HP; 80% recharge in 110 minutes



Alternative Fuel and Advanced Vehicle Search

Find and compare alternative fuel vehicles, engines, and hybrid/conversion systems. Some of the light-duty vehicles may count toward vehicle-acquisition requirements for [federal fleets](#) or [state and alternative fuel provider fleets](#) regulated by the Energy Policy Act. For downloads of past model years, see the [publications search](#).

[Printable List of Light-Duty Vehicles](#)

[Data Download for All Vehicles](#)

Comparison Results - 4 results selected for comparison

[New Search](#) | [Back to Results](#)



Envirotech Cutaway Van Low Roof

Electric

Electric-Only Range: 140 miles

Battery Capacity: 106 kWh

Transmission: Automatic

Power Source(s):

Envirotech 120 kW

Note: According to Manufacturer: payload capacity up to 3,615 lbs; 161 HP; Lithium Iron Phosphate battery; Level 2 charging (11 kW) 8 hours, DC Fast charging (50 kW) 2 hours



Mack LR Electric

Electric

Electric-Only Range: 100 miles

Transmission: Mack Powershift 2-speed

Power Source(s):

Mack AC motor (x2), 400 kW (536 hp) total peak power.

Note: According to manufacturer: 66,000 GVWR; 4 NMC lithium-ion batteries, 600V, up to 150-kW DC Fast charge for about 2 hr charge time



International eMV

Electric

Transmission: Automatic

Power Source(s):

International Direct Drive Electric Motor (1,700 ft-lb)

Note: According to manufacturer: 25,999 and 33,000 lb GVWR; 210 kWh battery; 608 V operating system; 125 kW/hour DC fast charging capable; 135 miles range



Bollinger Motors B4 - Class 4

Electric

Electric-Only Range: 185 miles

Battery Capacity: 158 kWh

Transmission: Automatic

Power Source(s):

Bollinger Motors 235 kW electric motor

Note: According to Manufacturer: 15,500 lb GVWR (Class 4); 241 HP, 675 lb-ft torque; Level 2 charging up to 19.2 kW (9 hr), DCFC charging up to 110 kW (2 hr)



Available EVs

BY SIZE





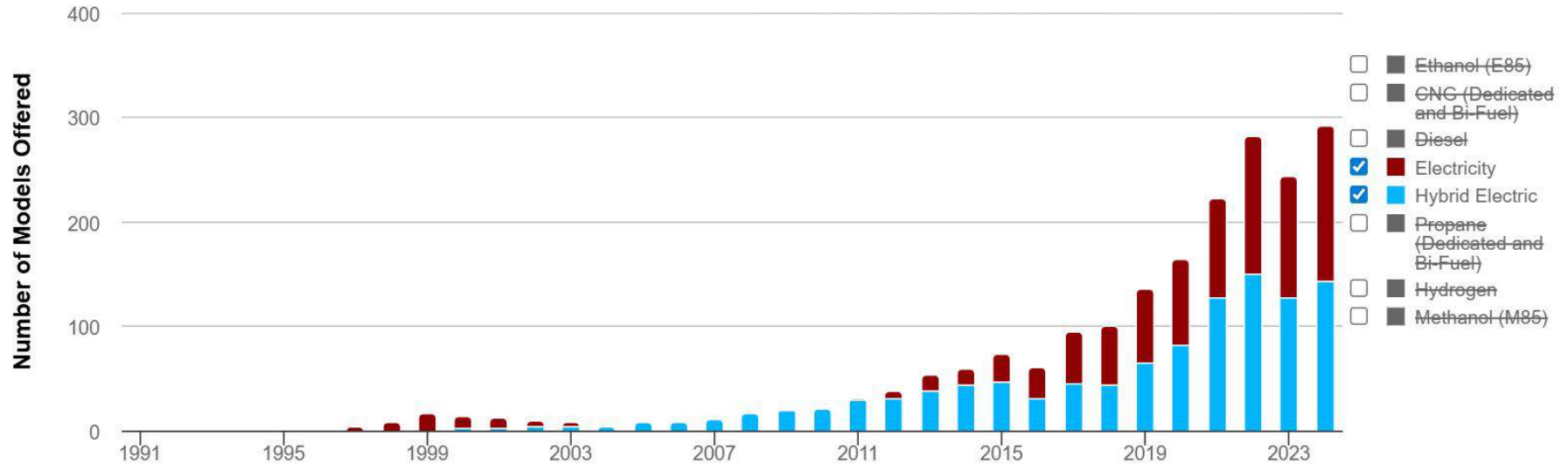
Class 1: Fleet Light Duty EVs < 6000 lbs.

- Commonly used for administration functions.
- Growth in Class 1 EVs – SUVs, Vans
- Reaching cost parity for some BEVs –with and w/o incentives.
- 80%+ are BEVs





Light-Duty AFV, HEV, and Diesel Model Offerings, by Technology/Fuel



Last updated: May 2024
Printed on: October 5, 2025

Highchar





Chevy Success

- In the first three months of the year, Chevy sold 10,329 electric Equinox, 6,187 Blazer, and 2,383 Silverado models. According to *S&P Global Mobility* (via [Automotive News](#)), Chevy surpassed Ford in March to become the second-best-selling EV brand, with registrations climbing 274% to nearly 8,500.





Pickups: Up to Class 2 (10,000 lbs)



Rivian
RT1
Pickup



Ford F150
Lighting
BEV



Dodge Ram 1500 REV



Chevy Silverado BEV



Tesla
Cybertruck
BEV



GMC Hummer BEV



GMC AT4 Sierra and Denali



Toyota Tacoma BEV



Bollinger B2 BEV



E-Pickup Trucks

- Ford F-150 Lightning – Pickup - [LINK](#)
- Rivian R1T – Pickup - [LINK](#)
- Bollinger B2 – Pickup - [LINK](#)
- Chevy Silverado - [LINK](#)
- Workhorse C1000 – [LINK](#)
- Tesla Cybertruck – [LINK](#)
- Tesla Pickup Truck (2026) – [LINK](#)
- Dodge Ram 1500 – [LINK](#)
- GMC Hummer Pickup – [LINK](#)
- GMC Sierra AT4 Pickup – [LINK](#)
- GMC Denali Pickup – [LINK](#)



• 75 SUVs (55/20)



**Cadillac
Escalade
IQ- BEV**

SUVs



**Rivian RT2
BEV**



**Ford F150
Lightning
BEV**



Dodge Ram 1500 BEV



GMC Hummer BEV



**Chevy Silverado
BEV**



**Tesla
Cybertruck
BEV**



**GMC Sierra
BEV**



Bollinger B2 BEV



SUVs

- Chevy Silverado - [LINK](#)
- Cadillac Escalade IQ - [LINK](#)
- Rivian R2T – SUV - [LINK](#)
- Bollinger B2– SUV - [LINK](#)
- [Workhorse C1000 – Pickup - LINK](#)
- [Tesla Cybertruck - LINK](#)
- GMC E- Hummer – [LINK](#)
- GMC Sierra AT4 – [LINK](#)
- GMC Denali – [LINK](#)





Vans (2025)

**Rivian
Delivery
500/700**



**Chrysler
Pacifica
PHEV**



**Chevy
Brightdrop
400/ 600**



**Ford
eTransit**



**Volkswagen
ID. Buzz
4Motion**



**Cenntro
Logistar 400**



**Mullen
One**



**GreenPower
EV Star Cargo+**



**Envirotech
Logistics
Van Class 4**



**Mercedes-Benz
eSprinter**



E-Vans

- Chrysler Pacifica **PHEV** : [LINK](#)
- Ford E-Transit : [LINK](#)
- Rivian Delivery 500/700 : [LINK](#)
- Chevy Brightdrop 400/600 : [LINK](#)
- Cenntro Logistar : [LINK](#)
- Mullen One : [LINK](#)
- VW ID.Buzz 4 Motion [LINK](#)
- Green Power EV Star Cargo : [LINK](#)
- Envirotech Logistic Van, **Class 4** : [LINK](#)
- Mercedes Benz eSprinter : [LINK](#)
- GEST Shuttle [LINK](#)
- Brightdrop EV400 and EV600 [LINK](#)





Medium Duty e-Trucks Class 3 to Class 6 (10,000 to 26,000 GVWR)

Battle
Motors
(Chicago)



Mack MD Electric



Kenworth
K270

BYD



Motiv Argo
Electric

Tata Prima
Electric



Workhorse Electric



Bollinger
B4



Medium Duty Trucks

- Mack MD Electric - [LINK](#)
- Kenworth Electric K270E (Class 6) [LINK](#)
- Battle Motors [LINK](#)
- Bollinger B4 Chassis Cab – [LINK](#)
- Workhorse Electric (Cab Chassis, Step Van and Work Truck) - [LINK](#)
- Motive Electric Argo – [LINK](#)
- Tata Prima E55SS EV – [LINK](#)
- BYD Class 6 Trucks (Class 6) Refuse Truck, Box Truck [LINK](#)





Heavy Duty e-Trucks

(> 26,001 GVWR)



**Freightliner
eCascadia**



Tesla Semi



Volvo VNR



**Peterbilt
579EV**



**Battle Motors
Dump Truck BEV**



Kenworth



Ford Semi EV



**International
eMV**



Nikola BEV



Heavy Duty Trucks

- International eMV Class 7 – [LINK](#)
- Kenworth Electric K370E (Class 7) [LINK](#)
- Daimler Freightliner eM2 (Class 7) [LINK](#)
- Tesla Semi (Class 8) [LINK](#)
- Daimler Freightliner eCascadia (Class 8) [LINK](#)
- BYD Day Cab (Class 8), Terminal Tractors (Class 8), Class 8 Refuse Truck [LINK](#)
- Volvo VNR (Class 8) [LINK](#)
- E-Trio (India Markets) (Class 8) [LINK](#)
- Nikola Badger (Class 8) – Semi [LINK](#)





First Responders: Police

- **Police Pursuit EVs :**

- Performance: acceleration and speed
- Reinforced front bumper
- Heavy duty (durability) components: tires, braking, suspension, and cooling systems, ABS/Brembo brakes
- Available:
 - Chevy Blazer EV, Silverado EV

- **Specialty Police EVs :**

- Armored body
- Special communication equipment
- Mobile crime functions: command functions, intelligence gathering, crisis negotiation, emergency response capabilities. tactical gear
- Ergonomics / comfort – easy access to controls and instruments.





Special Duty Trucks

- Elgin Electric Sweepers EV Broom Bear -

[LINK](#)

- Elgin Electric Sweepers Hybrid Pelican -

[LINK](#)

- Rosenbauer Fire Engine

- Pierce Fire Engine – [LINK](#)



- MAX EV Snowplow – [LINK](#)

- ENVO EV Snowplow – [LINK](#)





Horizon BEV Family

FEATURE OF HORIZON MOTOR EV VEHICLE

CAB AND CHASSIS TRUCK



TOWING TRUCK



Dry Base Box Truck



GARBAGE TRUCK



SWEEPER TRUCK



Delivery Van

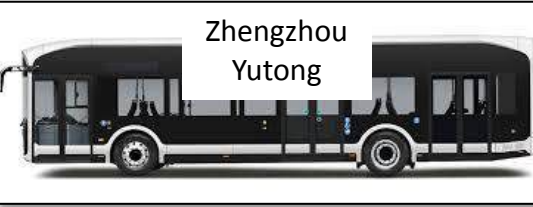




- 28 Transit Buses (28/0)
- 15 School Buses (15/0)

eBuses

Zhengzhou
Yutong



BYD



Volvo



Thomas



Tata



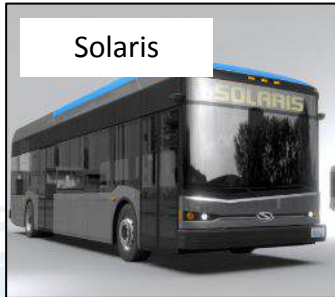
Blue
Bird



Temsa



Solaris



New
Flyer





Buses

- [Thomas](#)
- [Blue Bird](#)
- [New Flyer](#)
- [Volvo](#)
- [BYD](#)
- [Tata Buses \(India\)](#)
- [Wikipedia List of E-buses](#)





EVs vs. ICEVs costs





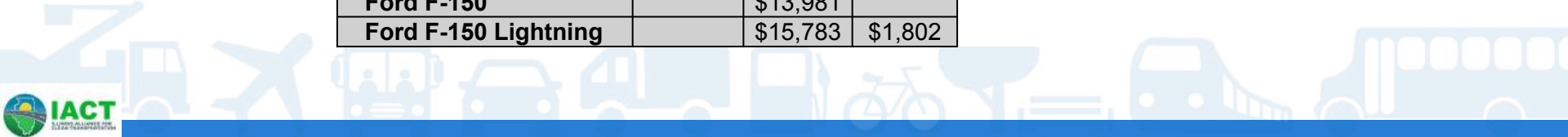
Cost Compare: EVs vs. ICEVs (2022 data no incentives)

PRICE		Price	Delta	
Hyundai Kona		\$22,595		
Hyundai Kona Electric		\$35,295	\$12,700	
Ford F-150		\$40,960		
Ford F-150 Lightning		\$54,769	\$13,809	
MAINTENANCE	Cost per mile	Cost @ \$15,000 mi	Delta per mile	Delta @ \$15,000 mi
Hyundai Kona	\$0.0984	\$4,428		
Hyundai Kona Electric	\$0.0794	\$3,573	(\$0.0190)	(\$855)
Ford F-150	\$0.0933	\$4,199		
Ford F-150 Lightning	\$0.0794	\$3,573	(\$0.0139)	(\$626)
FUEL	Usage per 100 mile	Cost @ \$15,000 mi	Delta	
Hyundai Kona	3.1 gal	\$5,162		ICEV vs BEV
Hyundai Kona Electric	27 kWh	\$2,548	(\$2,614)	Hyundai
Ford F-150	5.0 gal	\$8,325		Ford F-150
Ford F-150 Lightning	48 kWh	\$4,529	(\$3,796)	
DEPRECIATION		Amount	Delta	
Hyundai Kona		\$9,795		
Hyundai Kona Electric		\$15,305	\$5,510	
Ford F-150		\$13,981		
Ford F-150 Lightning		\$15,783	\$1,802	

	Differentials				Years to Breakeven
	Price	Maintenance Delta	Fuel	Maintenance + Fuel	
ICEV vs BEV					
Hyundai Kona	\$12,700	(\$855)	(\$2,614)	(\$3,469)	3.66
Ford F-150	\$13,809	(\$626)	(\$3,796)	(\$4,422)	3.12



Depreciation =
additional benefit





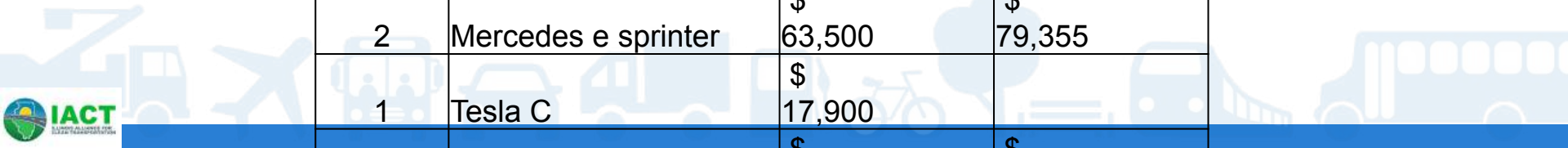
Comparing BEVs with ICEVs

Class		No incentive						With Incentive				
		BEV		ICEV		Delta, %		EV Rebate	BEV reduced price		Delta, %	
		Low	High	Low	High	Low	High		Low	High	Low	High
1	Chevy Blazer	\$48,000	\$53,000	\$35,000	\$46,000	37%	15%	\$5,000	\$43,000	\$48,000	23%	4%
1	Audi e-tron Q6 vs. Audi A6	\$65,000	\$77,000	\$59,400	\$75,000	9%	3%	\$5,000	\$60,000	\$72,000	1%	-4%
1	ID.4 vs. VW Jetta	\$54,000	\$57,000	\$24,000	\$29,000	125%	97%	\$5,000	\$49,000	\$52,000	104%	79%
1	ID 4 vs VW Tiguan	\$54,000	\$57,000	\$31,000	\$34,000	74%	68%	\$5,000	\$49,000	\$52,000	58%	53%
1	Ford Transit Cargo vs e-transit	\$54,000	\$57,000	\$49,000	\$63,000	10%	-10%	\$5,000	\$49,000	\$52,000	0%	-17%
1	Jeep Grand Cherokee PHEV vs ICEV	\$60,500		\$35,000	\$65,000	73%		\$5,000	\$55,500		59%	
1	ID.4 vs. VW Jetta	\$54,000	\$57,000	\$24,000	\$29,000	125%	97%	\$5,000	\$49,000	\$52,000	104%	79%
1	ID 4 vs VW Tiguan	\$54,000	\$57,000	\$31,000	\$34,000	74%	68%	\$5,001	\$48,999	\$51,999	58%	53%
2	Chevy Silverado	\$57,000	\$98,000	\$42,000	\$66,500	36%	47%	\$5,000	\$52,000	\$93,000	24%	40%
2	GMX Sierra	\$90,000	\$98,000	\$43,000	\$84,000	109%	17%	\$5,002	\$84,998	\$92,998	98%	11%
2	Ford F150	\$66,000	\$75,000	\$37,000	\$48,000	78%	56%	\$5,003	\$60,997	\$69,997	65%	46%
6	Peterbilt Class 6 (220)	\$240,000	\$290,000	\$140,000	\$170,000	71%	71%	\$5,011	\$234,989	\$284,989	68%	68%
8	Class 8 vs Tesla Semi	\$180,000		\$120,000	\$150,000	50%		\$75,000	\$105,000		-13%	
8	Class 8 vs Freightliner eCascadia	\$139,000		\$130,000	\$180,000	7%		\$75,000	\$64,000		-51%	
	Blue Bird Bus up to 78	\$	\$	\$	\$			\$	\$	\$		



Other prices

		BEV	
		Low	High
2	Rivian R1T	\$ 71,700	\$ 101,700
2	Rivian R2T	\$ 45,000	\$ 55,000
2	Brightdrop 400	\$ 46,000	
2	Brightdrop 600	\$ 48,000	
2	Hummer EV Pickup	\$ 96,700	\$ 105,000
2	Mercedes e sprinter	\$ 63,500	\$ 79,355
1	Tesla C	\$ 17,900	
		\$	\$





New Entrants: Passenger EVs

Alpine EVs (Expected: 2030)



Ferrari EV (Expected: Fall 2026)



Afeela 1 (Expected: 2026)



Chrysler EV Crossover (Expected: 2025)



BMW iX5 (Expected: 2027)



Jeep, Polestar, Rivian, Scout

Alfa Romeo Giulia EV (Expected: 2027)



Genesis GV90 (Expected: 2026)



Audi TT EV (Expected: 2027)



Buick Electra E5 (Expected: 2026)



Acura RSX (Expected: Second Half of 2026)



Chevy Equinox PHEV



Bentley EV SUV (Expected: 2027)



Ford Electric Van (Expected: 2028)





New Tesla Passenger EVs

- Model C (or Q or 2)
 - 2025 release??
 - 212 miles / 53 kW
 - May allow MW charger in future
 - 10% to 70% SOC in 10 minutes
 - \$17,999
 - Li Phosphate or Aluminum Ion Batteries
 - May integrate wireless charging





Coming E-Pickup trucks



VW Scout Terra BEV
350 mi
Rel. TBA



Tesla Pickup BEV
• USA



- Atlis XT BEV:
- USA
- \$45000
- 270 mi
- Rel: TBA



Maxus eTerron9 BEV:

- European
- \$71000
- 270 mi
- Rel: TBA



- Ford T3 BEV
- USA
- Less than F150 BEV
- 400 mi



- Canoe Pickup BEV:
- USA
- \$36,000
- 250 mi
- Rel: TBA



- Isuzu D-Max BEV
 - Japanese
 - 70 kWh
 - Rel: TBA



- Alpha Wolf BEV:
- USA
- \$36000
- 250 mi
- Rel: TBA



- USA
- Up to 450 mi
- Rel: TBA
- Integral Solar PV



- Toyota Tacoma BEV:
- Japanese
- \$32,000 to \$54000
- 330 mi
- Not coming to US





Coming Medium Duty

Mack BEV

- 230 mi



Hino : M5e and L6e BEV
138 kWh and 220 kWh



Ford:
F250 BEV
F350 BEV



GMC:
2500 BEV
3500 BEV



Coming Semis



Mercedes eActos BEV

- Germany
- \$71000
- 500 mi
- Rel: TBA



Solo Semi

- USA
- \$71000
- 500 mi
- Rel: TBA



Nikola: Tre BEV

- USA
- 330 mi

Daimler Autonomous BEV

- 500 mi
- Rel: TBA



Toyota BEV

- Japan
- 500 mi
- Rel: TBA



Toyota BEV

- Japan
- 500 mi
- Rel: TBA



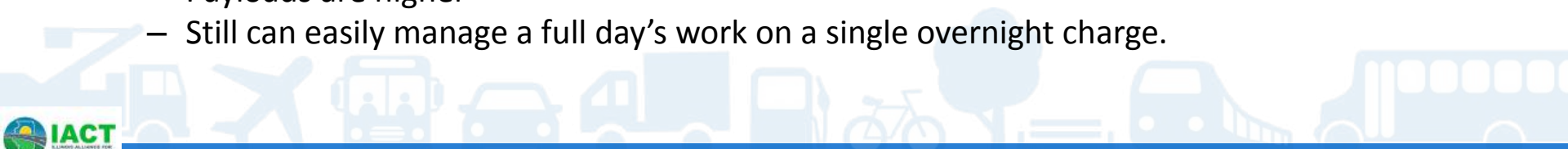


Electric Truck Progress Report



EV Evaluations for Trucking (*Source: NACFE interview in Heavy Duty Trucking*)

- Class 4-5 (GVWR 14,001 to 19,500)
 - Huge uptake in last-mile and local delivery applications
 - Minimum range requirements
 - Lack of concern over excess chassis weight..
 - Typical < 100 miles a day and
 - Return to base at the end of the shift for overnight charging.
- Class 5-6 package delivery cars (e.g., UPS) (GVWR 16,001 to 26,000)
 - Use larger battery packs
 - Capabilities for AC or DC fast charging.
 - Routes are often longer
 - Payloads are higher
 - Still can easily manage a full day's work on a single overnight charge.





Electric Truck Progress Report



- Class 6-7 (GVWR 19,501 to 33,000)
 - Fit for, serving the pickup-and-delivery segments, regional delivery, food service, etc.
 - Ranges up to 200-250 miles
 - can have more complex charging needs.





Electric Truck Progress Report



- Class 8 ([GVWR > 36,000](#))
 - Trucks quickly run up against the weight, range and payload problem.
 - Successfully deployed in many short- and middle-distance applications (e.g., food and beverage delivery)
 - Haul heavy but diminishing loads over short distances, with a
 - Significant portion of the work shift spent sitting still while unloading.
 - Long-haul irregular-route model is still years off for battery-electric.
 - Routes < 150 miles.
 - Moving from one charge per shift to thinking about opportunity charging somewhere in the middle.
 - Extra weight 4,000-5,000 pounds heavier than a typical diesel tractor.





Emission Outcomes

Evaluations look at the pollution and GHG *differentials* between ICEV and EV counterparts at three levels:

- **Tailpipe**
- **Well-to-Wheels** (WTW) – considers source of electric power
- **Total Life Cycle** = Cradle to Grave (US DOE [GREET](#) Modeler) – considers WTW plus extraction, transportation, disposal
- Fleet perspective – typically tailpipe comparisons

CONSTRUCTION			FUEL	PRODUCTION	TRANSPORT	USE		BY PRODUCT	END OF LIFE
Plant Construction	Transportation Fuel	Fuel Extraction 	Oil Nat Gas	Fuel Refining/ Production 	Fuel Transport/ Distribution 	Vehicle Fueling 	Driving Vehicle	Products of Combustion 	Disposal, Recycle, Reuse
Plant Construction	Electrical Power Fuel	Fuel Extraction 	Coal Oil Nat Gas Nuclear Renewables	Power generation 	Power Transmission/ Distribution 	EV Charging 	Driving Vehicle	Zero Tail Pipe Emission 	Disposal, Recycle, Reuse



Sourcing EVs

NEW AND USED EVs





Finding New Electric Vehicles

- **AFDC Resources**

- EV Model Availability – good info about currently available EVs [LINK](#)
- Advanced Vehicle Search: [LINK](#)
- Model Year 2025 Complete List: [LINK](#)



- **Shop New and Used EVs** by make, model, location

- Plugstar: [LINK](#)
- Car & Driver: [LINK](#)
- Electric Vehicle Database Website – global EV listings -[LINK](#)



- **Reports and Reviews**

- American Made New EVs (cars.com) [LINK](#)
- Consumer Reports, “Hot New Electric Cars” - [LINK](#)
- EV Technical Specs and Comparisons - [LINK](#)
- EV Sales by State - ICCT - [LINK](#)





Finding Used EVs

- Shop New and Used EVs by make, model, zip code
 - Plugstar - [LINK](#)
 - Car & Driver - [LINK](#)
- Carmax - [LINK](#)
- Autotrader - [LINK](#)
- Edmunds Find Used EVs - [LINK](#)
- Car Gurus - [LINK](#)
- MYEV- Your EV Marketplace - [LINK](#)
- Carvana - [LINK](#)





Procurement

- COVID put a wrinkle in supply chains – especially computer chips from Asia
- Europe and Asia still advancing
- New US policies are newly adding uncertainty- trade balances, tariffs, building domestic capacity
- Now: Delivery times – 1 to 3 months typical
 - Very vehicle dependent
 - Tesla 1-2 months, some inventory, Cybertruck longer
- Planning is key





Procurement

- US EV markets are still growing
 - Ample passenger EVs – models and quantities
 - Some startup issues with pickups and SUVs
 - Hard to purchase in volume, independent of quantity
 - Availability picking up – brand dependent
 - Currently new uncertainties causing delays in decisions
 - Pricing, availability, supply chain
 - Federal Incentives, policy uncertainty
 - Larger trucks – expensive and still low production numbers
 - Large corporations required to create anchor accounts - get production levels up so volume costs go down, iron out new production line issues, deploy innovation







Other EV Resources

USEFUL INFORMATION





EV Resources

- AFDC EV Model Availability – good info about currently available EVs - [LINK](#)
- EV Technical Specs and Comparisons - [LINK](#)
- Acceptance Rates for EVs - [LINK](#)
- Miles per kilowatt hour List for AC Charging - [LINK](#)
- North American Council for Freight Efficiency (NACFE) – focused reports on truck electrification - [LINK](#)





Incentive / Policies Resources

- AFDC Search Federal and State laws and Incentives [LINK](#)
- Database of State Incentives for Renewables and Efficiency (DSIRE - NC) [LINK](#)
- EV Policies by State - ICCT - [LINK](#)





EV Procurement / Supply Chain Issues

- COVID put a wrinkle in supply chains – especially computer chips from Asia
- New policies are newly adding uncertainty- trade balances, tariffs, building domestic capacity
- However, US EV markets are still growing
 - Ample passenger EVs – models and quantities
 - Some startup issues with pickups and SUVs
 - Hard to purchase in volume, independent of quantity
 - Availability picking up – brand dependent
 - Issues leveling off
 - Currently new uncertainties causing delays in decisions
 - Pricing, availability, supply chain
 - Federal Incentives removed
 - Larger trucks – expensive and still low production numbers
 - Large corporations required to create anchor accounts- get production levels up so volume costs go down, iron out new production line issues, deploy innovation
 - More demand in West and Northeast – policy driven





Thank You

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