Heavy-Duty Zero Emission Vehicles Webinar Part 1

Clean Fuels and Energy Team |3.25.2025

Dallas-Fort Worth CLEAN CITIES

Image Source: https://www.gettyimages.com/

Agenda

15 Minutes

NCTCOG

- Battery Electric Vehicle (BEV) and Hydrogen Vehicle 101
- Investments in Zero-Emission Vehicles (ZEV)
- Funding Opportunities
- Key Resources

Speakers

15 Minutes

Peterbilt

- 220E EV
- 536/537 EV

15 Minutes

Open Discussion/ Q/A

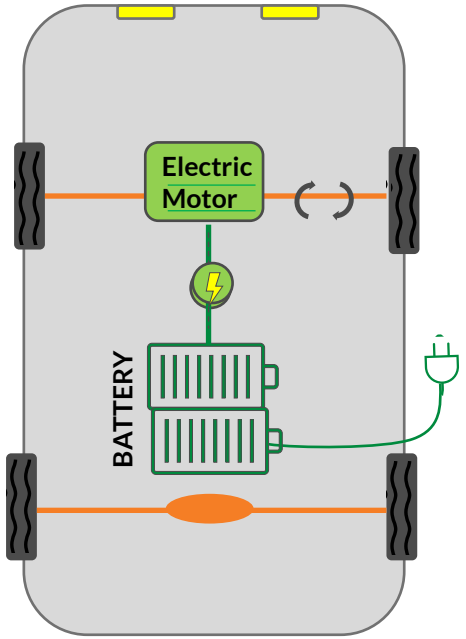
Clean Fuels and Energy Team

Hosted within the North Central Texas Council of Governments (NCTCOG) Transportation Department

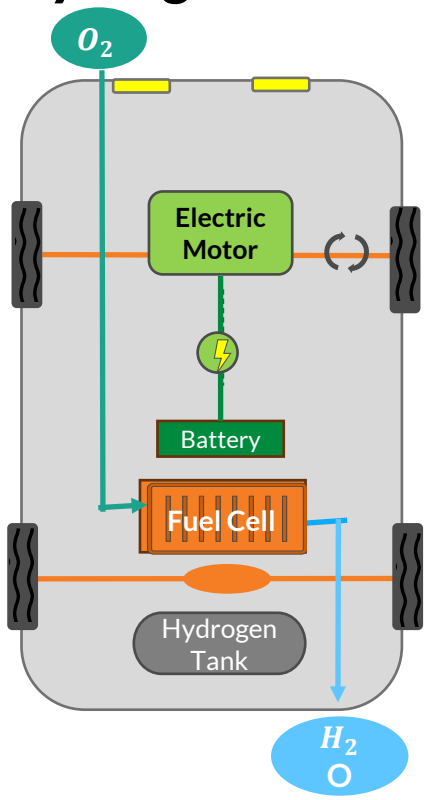
- Clean Vehicle Initiatives
- Alternative Fuel Infrastructure Initiatives
- Energy Integration & Community Readiness
- Funding Support
- Technical Assistance
- Planning the Future
- Raising Awareness

Battery-Electric vs Hydrogen Vehicles

Battery- Electric Vehicle

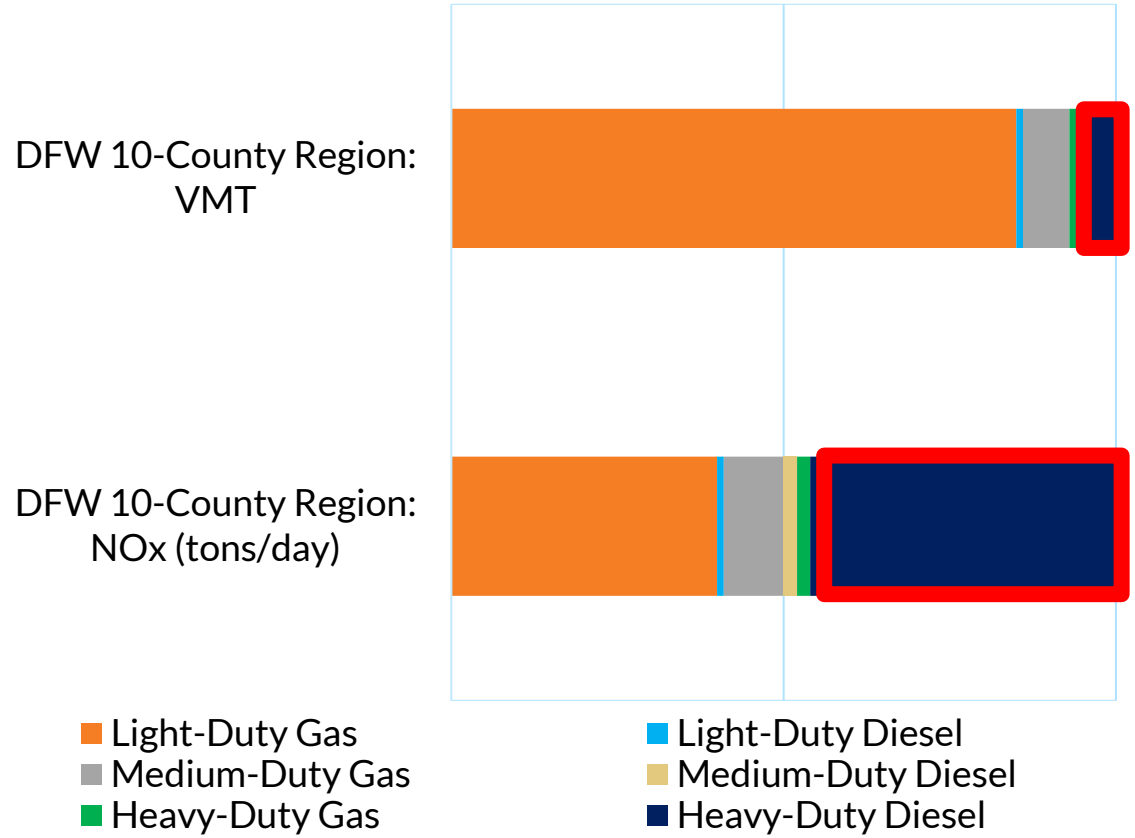


Hydrogen Vehicle



Current Ozone design value of 78 ppb continues to exceed the EPA standard

Vehicle Miles Traveled Versus Nitrogen Oxides Contribution by On-Road Vehicle Type in Dallas-Fort Worth



Ideal Duty Cycles for Heavy-Duty (HD)Vehicles*

	Hydrogen Fuel Cell	Battery Electric
Ideal Range (miles)	≤ 650	≤ 250
Ideal Freight Payload (lbs)	≤ 48,000	≤ 43,000

*Source: North American Council for Freight Efficiency
NACFE | Hydrogen Trucks: Long-Haul's Future?

Planning for Heavy-Duty ZEV Infrastructure

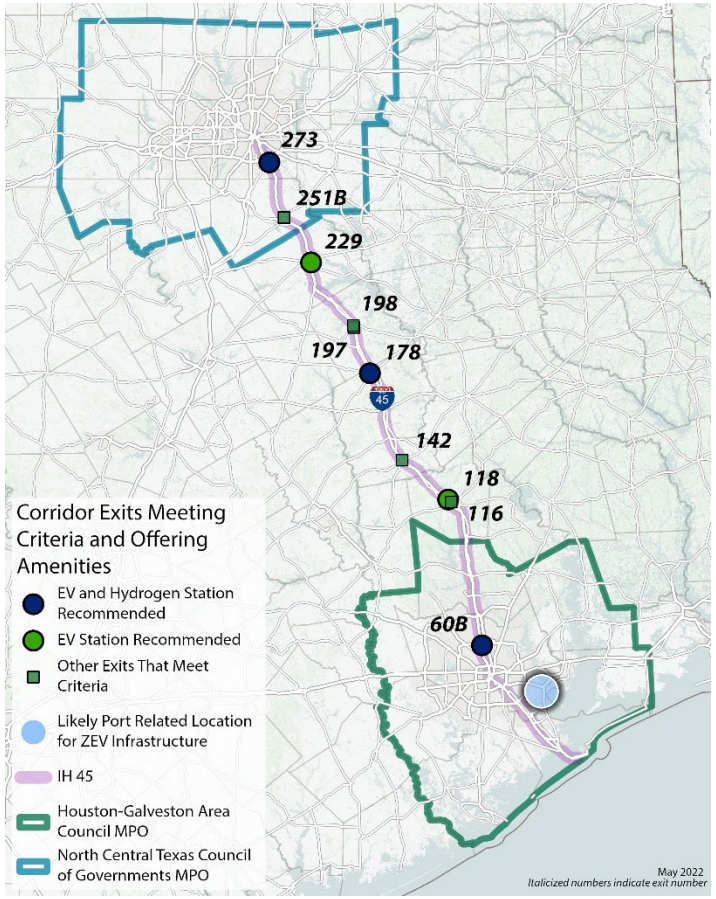
Houston to Los Angeles (H2LA) Plan
(Hydrogen Only)

Funded by Department of Energy (DOE) Grant
Led by GTI Energy; NCTCOG Partner

Go to www.dfwcleancities.org/hydrogen-in-north-texas for more information

IH-45 ZEV Plan
(BEV and Hydrogen)

Funded by FHWA Grant
Led by NCTCOG



Other Planning Initiatives:
(BEV and Hydrogen)

Texas Department of Transportation's Rider 48 Report Evaluation of Medium-Duty and Heavy-Duty Vehicle Charging Infrastructure and Capacity:
Provides findings and recommendation to deploy zero-emission medium and heavy-duty vehicle charging infrastructure

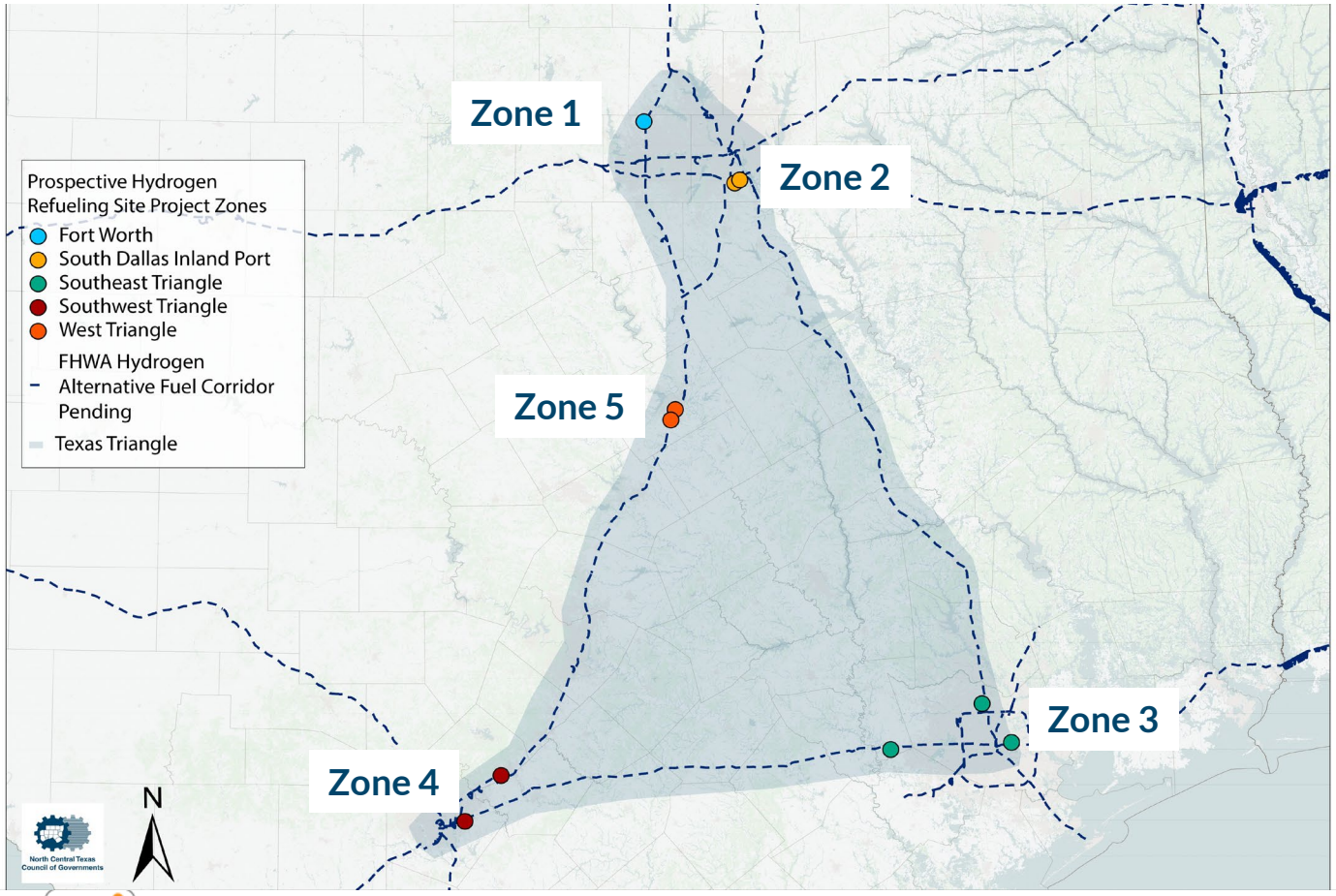
Texas Hydrogen Alliance:
Educate and advocate for policies, legislation, and rulemaking to advance hydrogen in Texas

Texas Hydrogen Production Policy Council (TxH2 Council):
Makes recommendations to the Texas Legislature on updates for the oversight and regulation of production, pipeline transportation, and storage of hydrogen

Building ZEV Infrastructure

Texas Hydrogen and Electric Freight Infrastructure Project(Tx-HEFTI):

$70M for 5 hydrogen stations; Construction expected to start in **2027**



Hydrogen Investments:

FHWA Reducing Truck Emissions at Port Facilities Program:

$150M to Port of Houston for various projects including hydrogen fuel cell vehicles and mobile infrastructure

Gulf Coast Hydrogen Hub:

Industry-led hub administered by GTI Energy

Up to $1.2 Billion Department of Energy Award

Battery-Electric Investments:

Gage Zero and Hillwood Builds EV Fleet Charging Hub at AllianceTexas

Texas Electric Vehicle Charging Plan:

Up to $60 million to be used for Dallas-Fort Worth Region on Medium and Heavy-Duty Depot Charging

EPA Clean Ports: $105M Charging Infrastructure for Off-Road Equipment, Locomotives, and Shore Power at Corpus Christi

Heavy-Duty Hydrogen Vehicles

Hydrogen Vehicles in the U.S.

Momentum is Growing for Hydrogen as a Transportation Fuel

Federal and state funding

Commercialization will decrease cost

Multiple production pathways

Inclusion in federal, state, and local zero-emission freight plans

Advantages over BEV (longer range, shorter fueling time, less payload loss)

NACFE Hydrogen Trucks: Long-Haul's Future?

HD Hydrogen Vehicles

Street Sweeper –

Global Environmental Products: M4HSD

Tractor –

ZM Trucks: ZM8 FC
Nikola: Tre FCEV
Peterbilt: 579HFC
Accelera by Cummins

Transit-

ENC: AXESS EVO-FC
New Flyer: Xcelsior Charge FC

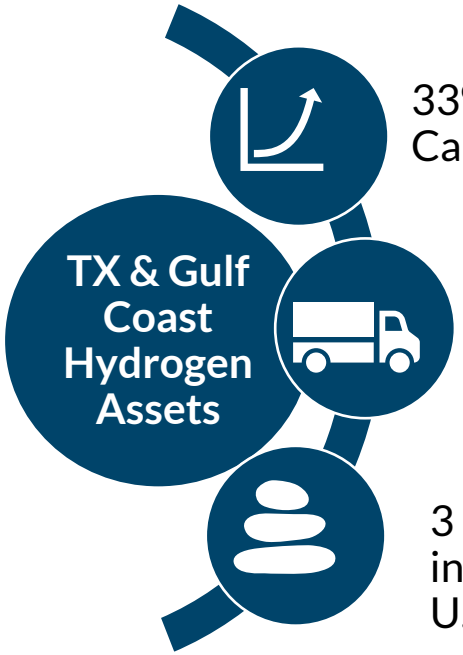
Step Van-

Unique Electric Solutions

Source: Alternative Fuels Data Center: Vehicle Search and Global Drive to Zero

Hydrogen Vehicles in Texas

No hydrogen vehicles are operating in Texas, but the first hydrogen vehicles were selected in 2024 for State funding



33% of U.S. Production Capacity

>1,000 miles of hydrogen pipelines

3 of 6 storage caverns in the world (all of the U.S. locations)

For information on Hydrogen visit: www.afdc.energy.gov/fuels/hydrogen

Heavy-Duty All-Electric Vehicles

Available All-Electric HD Vehicles

15 Original Equipment Manufacturers (OEM) Offering HD BEVs:

BYD	Freightliner
HINO Trucks	International Trucks
Kenworth	Lion
Mack Trucks	Motiv
Peterbilt	Unique Electric Solutions
Workhorse	XL Fleet & Curbtender
XOS	Zeus Electric Chassis
ZM Trucks	

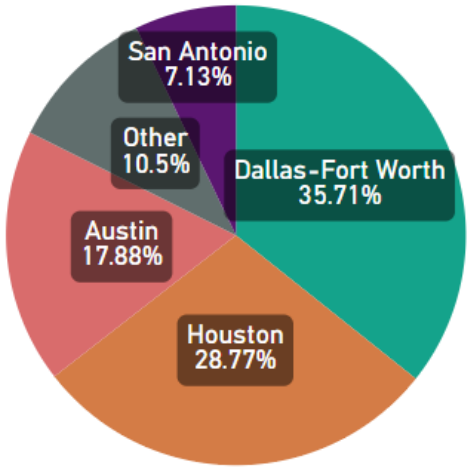
Source: Alternative Fuels Data Center: Vehicle Search and Global Drive to Zero

Registered BEV Medium and HD Vehicles in Texas

Dallas-Fort Worth CLEAN CITIES

18,335 EVs

EV's in Texas as of March 18, 2025



Class 2B – 6 EV: 18,187
Class 7 - 8 EV: 148

Data Source: EVs in Texas | DFWCC

Coming Soon or Recently Deployed HD- BEVs in DFW

Electric School Buses:
Bluff Dale ISD, Carrollton-Farmers Branch ISD, Cedar Hill ISD, Dallas ISD, Fort Worth ISD, Plano ISD, Princeton ISD

Electric Fire Truck: City of Denton

Electric Semi: Truck Kings LLC

Electric Refuse Trucks: City of Plano, City of Dallas

For information on available EVs and resources to help deployment visit: **www.afdc.energy.gov**

Other Ways to Improve Air Quality

Request ZEV in Contract Specifications for Fleets

Examples:
NCTCOG Clean Construction

NCTCOG Waste to Fuel Study

City of Fort Worth Request for Proposals for Natural Gas Refuse Haulers

ZEV in Contract Specifications included in NCTCOG Clean Fleet Policy

Use Renewable or Lower-Emitting Electricity or Clean Hydrogen

Renewable or Lower-Emitting Electricity
In 2024, 40% of the net electricity generation was from a zero-emission source*

100% renewable or zero-emission electricity can be purchased

Clean Hydrogen Standard
- Defined by Hydrogen and Fuel Cell Technologies Office
- Determines eligibility for Clean Hydrogen Production Tax Credit, which provides up to $3/kg to producers of clean hydrogen
- *Note: Producers cannot receive credit if hydrogen produces more than 4kg of CO_{2e}/kg of hydrogen*

Hydrogen Shot
- Goal to reduce cost of clean hydrogen by 80% *($1 per 1kg in 1 decade)*

*Source: EIA: Electricity data browser - Net generation for all sectors

Use On-Site Power Generation and Other Resilience Strategies

Smart Charging Management

Energy Storage Systems (batteries or hydrogen fuel cell)

Generators

Mobile Charging

Bidirectional Charging (i.e. Vehicle to Grid)

Microgrids

Read More:
Planning for Resilient EV Charging Infrastructure
Developed by NCTCOG through funding from the Texas State Energy Conservation Office (SECO)

North Texas Zero-Emission Vehicle Project (NTx-ZEV)

	Vehicle & Infrastructure ~$58 million	ZEV Workforce Development ~$1.2M
Eligible Projects	Any battery-electric or hydrogen fuel cell Class 6 or 7 vocational vehicle and infrastructure replacing a non-zero emission (gasoline, diesel, propane, natural gas) Class 6 or 7 vehicle Public and private entities eligible*	Fund workforce development projects, such as: - First responder training - Mechanic training for vehicles/infrastructure - Driver training
Project Selection	Call for Projects – Expected to open Spring 2025 Priority given to operations in 10 county nonattainment area**; but all 16 counties are eligible	Strategic Selection or Other Selection Process
Funding Level	Maximum federal share allowed by EPA 33% to 65% per battery-electric vehicle 60% to 80% per hydrogen fuel cell vehicle	Workforce costs not subject to maximum federal share

NTX-ZEV provides new opportunities for the region, including:

- Increased funding levels for hydrogen fuel cell vehicles and electric vehicles
- Replacement of non-diesel (gasoline, compressed natural gas, propane) vehicles
- Flexible scrappage alternatives
- Funding for infrastructure, renewable power generation systems, and workforce activities

*Must adopt Clean Fleet Policy
**Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise

Go to www.nctcog.org/NTxZEV for more information

Funding for Heavy-Duty ZEV– Texas Commission on Environmental Quality

Rebate Grants - Expected to open Summer 2026

Alternative Fueling Facilities Program (AFFP) - Expected to open Spring 2026

Texas Clean School Bus Program (TCSB) – Expected to open Spring 2026

Governmental Alternative Fuel Fleet Grant Program (GAFF) – Expected to open Spring 2027

Seaport and Rail Yard Areas Emissions Reduction Program (SPRY) – Expected to Open Spring 2027

Texas Hydrogen Infrastructure, Vehicles, and Equipment (THIVE) - Expected to open Fall 2025

Texas Volkswagen Environmental Mitigation Program – All-Electric Grant Round – Open through August 31, 2025

Emissions Reduction Incentive Grants (ERIG) – Expected Fall 2026

Texas Clean Fleet Program (TCFP) – Expected to open Spring 2027

Go to www.tceq.texas.gov/airquality/terp/programs for a full list of programs

Additional Funding Opportunities

Program/Incentive	Eligible Activities	Funding Amount	Key Dates
Commercial Electric Vehicle (EV) and Fuel Cell Electric Vehicle (FCEV) Tax Credit	New all-electric, plug-in hybrid vehicle, or fuel-cell electric vehicle – **Available to tax-exempt entities through the new DIRECT PAY option**	Up to $7,500 <14,000 lbs GVWR Up to $40,000 for >14,000 lbs GVWR	No deadline
North Texas Diesel Emissions Reduction Project (funded through Environmental Protection Agency's (EPA) Diesel Emissions Reduction Act)	Replace on-road diesel vehicles with a GVWR of over 16,001 or non-road diesel equipment and drayage with GVWR of over 33,001 lbs Replace diesel transport refrigeration unit with all-electric Install EPA verified idle reduction technologies	Up to 45% for zero-emission vehicle Up to 35% for CARB Low NO_X Vehicle Up to 25% for all other fuels	NCTCOG Call for Projects is open through Friday, June 13, 2025

Find more funding at: www.nctcog.org/aqfunding

Upcoming Involvement Opportunities

Contact us at cleancities@nctcog.org for any questions on fleet electrification, funding opportunities, or other inquiries

Upcoming webinars and events posted regularly at dfwcleancities.org/events

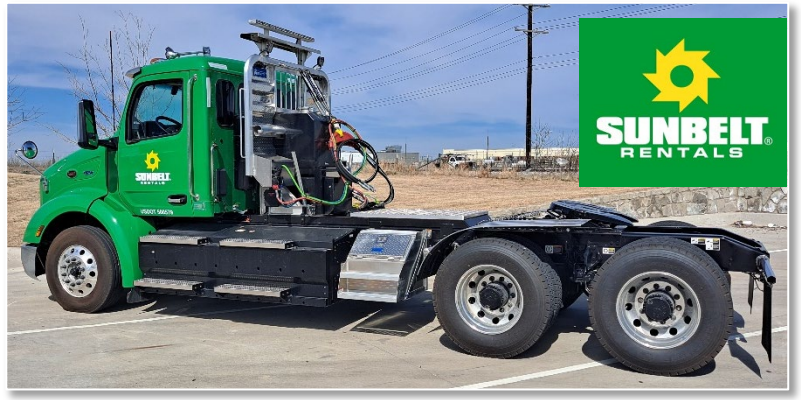
- March 25-27 : Heavy-Duty Zero-Emission Vehicle Webinar Series

Complete the **DFWCC Annual Survey** NOW, to report your fleets efforts to improve air quality help measure regional efforts to reduce emissions at www.dfwcleancities.org/annualreport

Sign up for DFWCC weekly email list and follow DFWCC LinkedIn at:dfwcleancities.org/getinvolved


Peterbilt

Leader in Electric Vehicles



BAE SYSTEMS

FedEx

SWIFT

KNIGHT TRANSPORTATION

SAVAGE

CITY OF LOS ANGELES FOUNDED 1781

bge AN EXELON COMPANY

DTE

greenwaste

Coca-Cola

KNIGHT TRANSPORTATION

SWIFT

UnivarSolutions

Quantix

KAG KENAN ADVANTAGE GROUP, INC.

SOUTHERN CALIFORNIA EDISON Energy for What's Ahead

PacLease

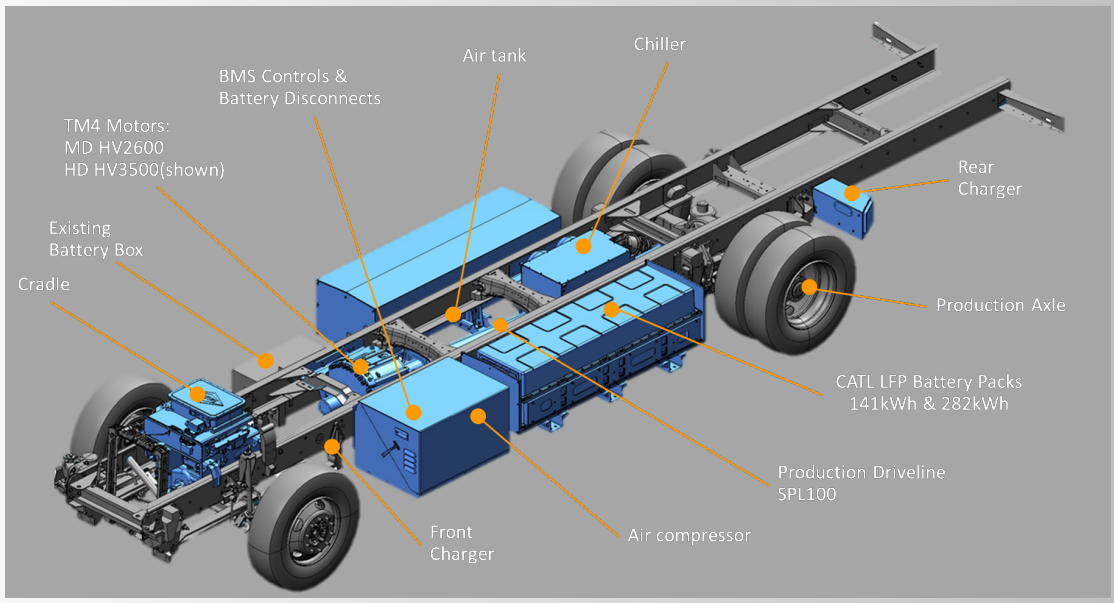
JACK COOPER

FERGUSON

220EV

220EV Spec Overview

- Dana/TM4 Midship Electric Motor
  - 4X2 – 26,000 lbs. (Class 6)
  - 4X2 – 33,000 lbs. (Class 7)
- 206" / 218" / 274"
- Power
  - Class 6: 207 hp Continuous; 355 hp Peak
  - Class 7: 347 hp Continuous; 499 hp Peak
- 141 / 209 / 282 kW-hr Battery; 100 / 150 / 200 miles
- Fast DC Charging: 2 Hours; AC Charging: 6.5 – 13 Hours



220EV Customer Examples

26k Box Truck

- Duration: 9-11 Hours
- Typical Range: 45 Miles
- Efficiency: 1.3 kWh/mile
- Charge Remaining: 50%
  - ~60 kWh Used

Stake Bed

- Duration: 9-11 Hours
- Typical Range: 60 Miles
- Efficiency: 1.55 kWh/mile
- Charge Remaining: 25%
  - ~93 kWh Used

Selling the Full Value

The Truck

Peterbilt

The Funding

Grant Funding Opportunities

CALIFORNIA HVIP

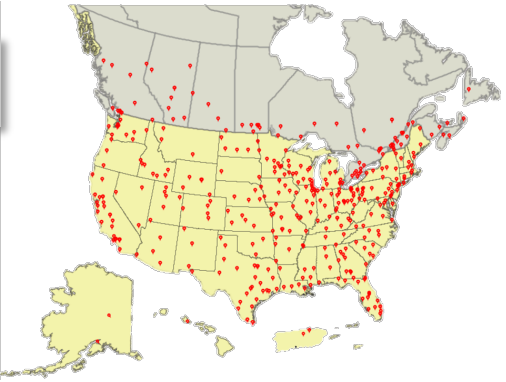
The Charger

The Infrastructure

Qmerit

Schneider Electric

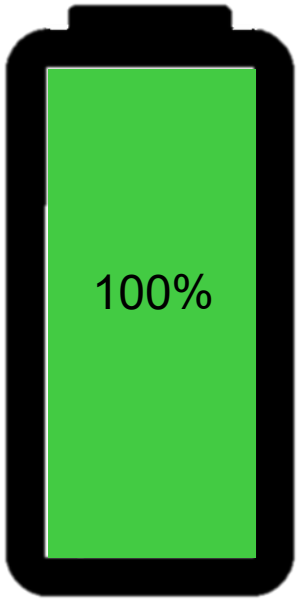
The Support



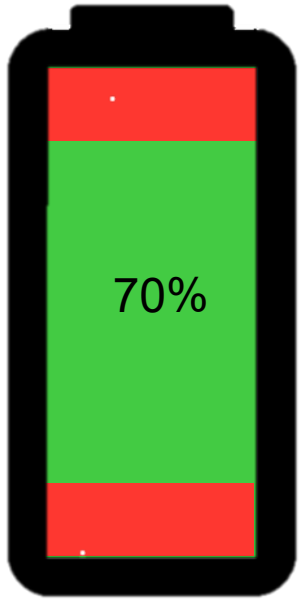
Peterbilt's Batteries

Battery Usage for Max Life

LFP



NMC



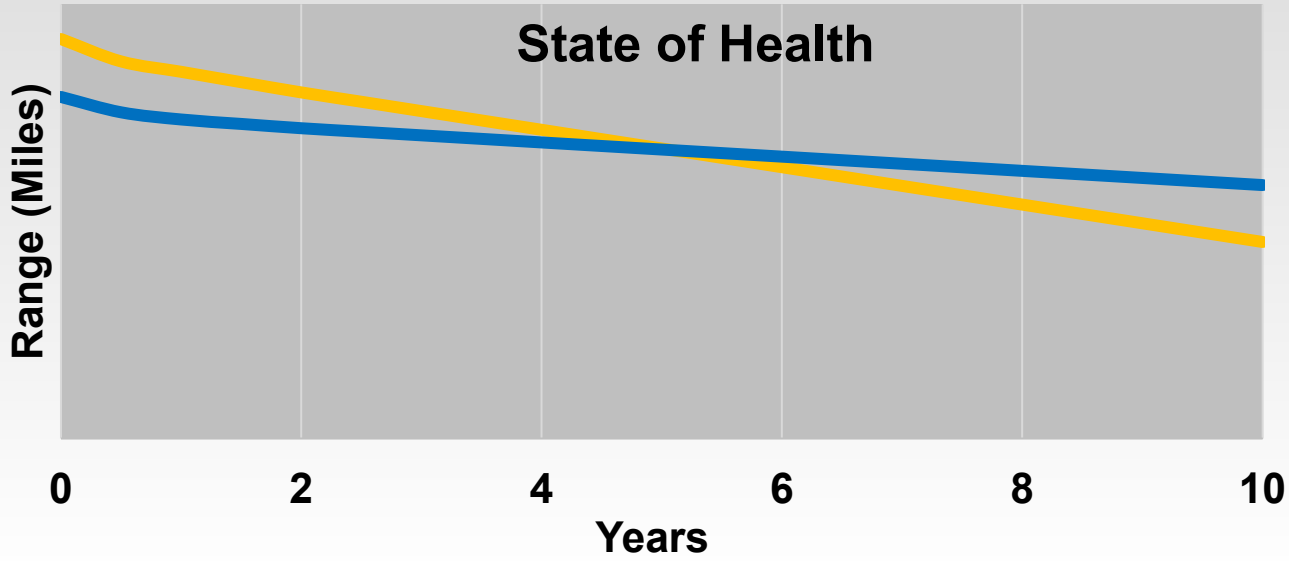
Cycles Until Replacement (80%)

LFP

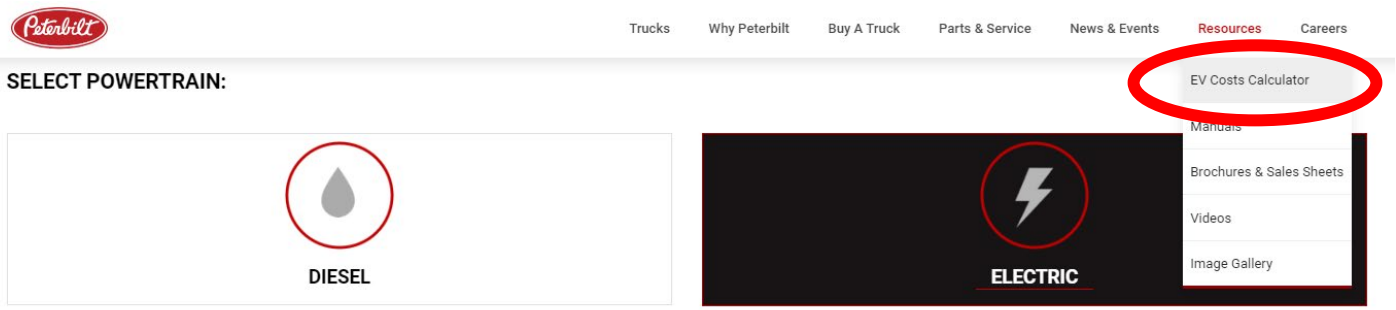
NMC

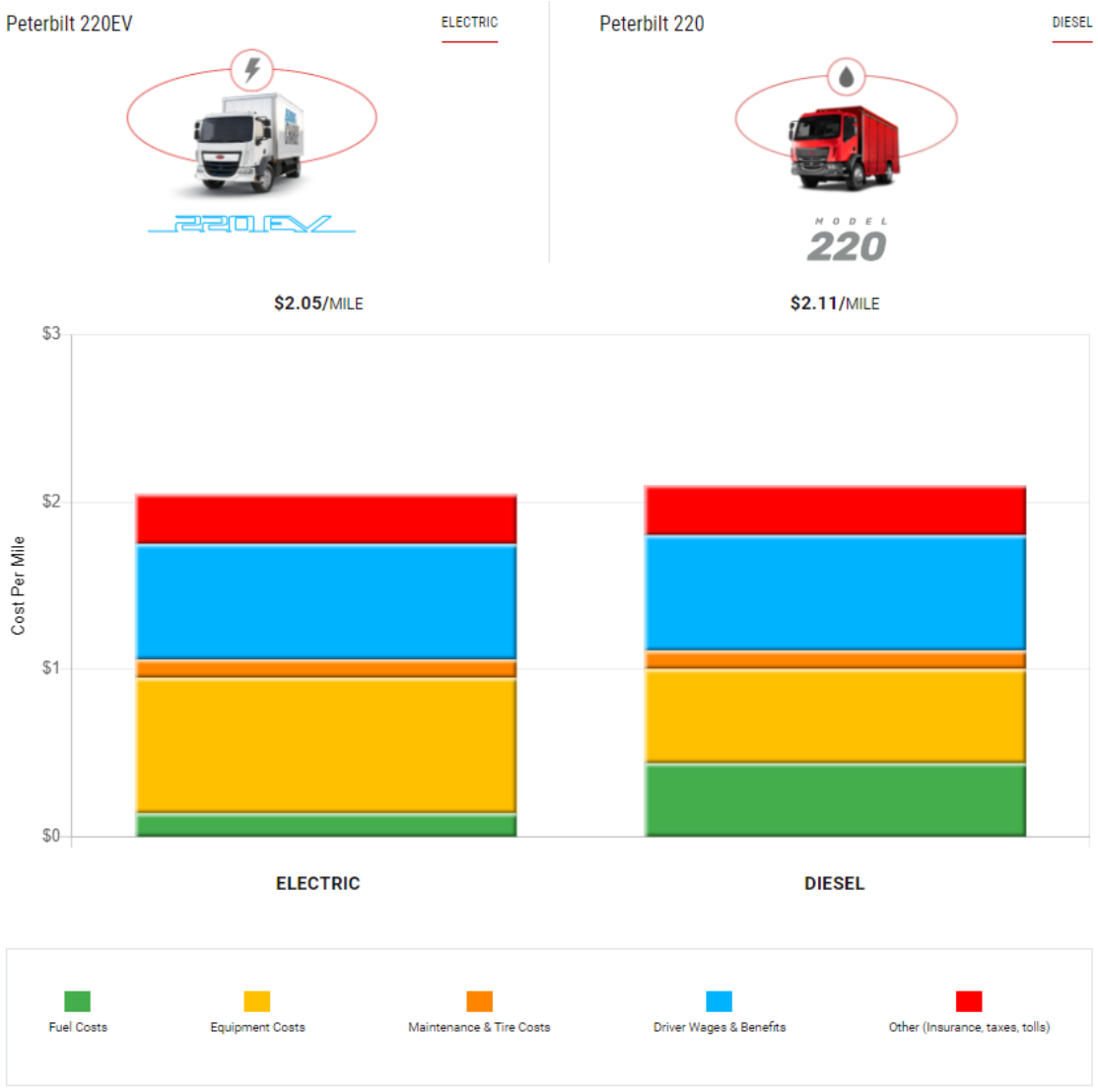
4,000 Cycles

1,000-2,000 Cycles



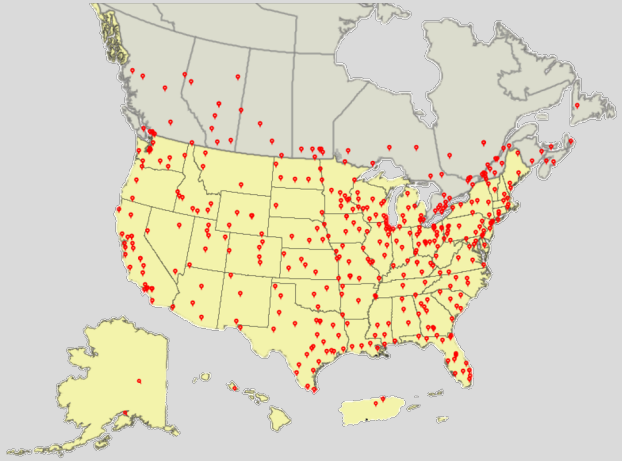
ZEV Range & Applications





Dealer Support

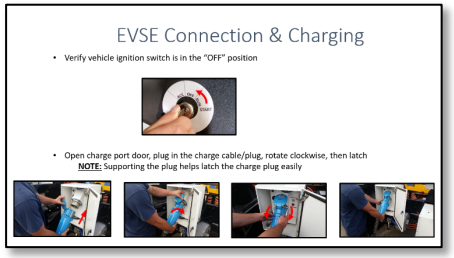
433 Dealer Locations

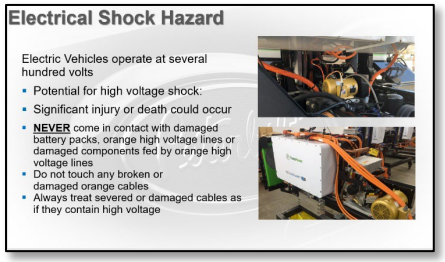


Sales Training

Peterbilt Academy

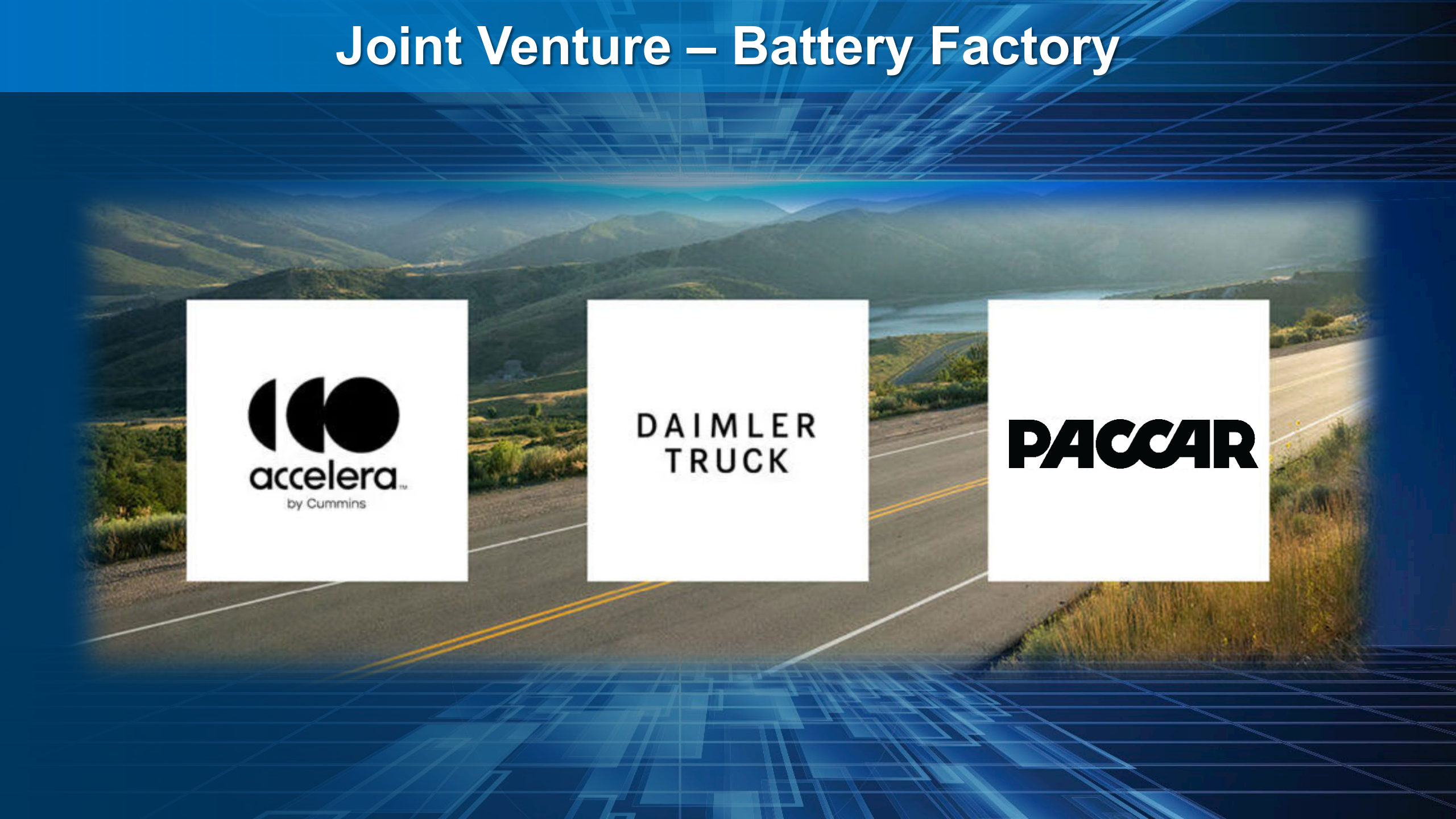
Service Training





Dealer Infrastructure

Joint Venture – Battery Factory

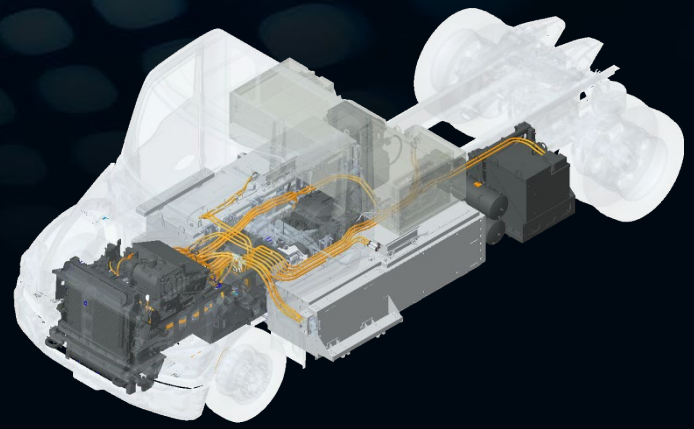


Next Gen Medium Duty EV

Conventional Cab Medium Duty EV

- 536EV (Class 6)
- 537EV (Class 7)
- 548EV (Class 8 up to 82,000 GCW)
- Truck or Tractor
- Minimum Wheelbase: 163”
- Mid-Ship Motor Configuration

- Integrated 3-Speed Transmission
- Front Axle: 13K – 20K
- Rear Axle: 17 – 23K Single
- Rear Axle: 40 – 46K Tandem
- Pushers & Tags
- ePTOs
- 1Q 26 Launch



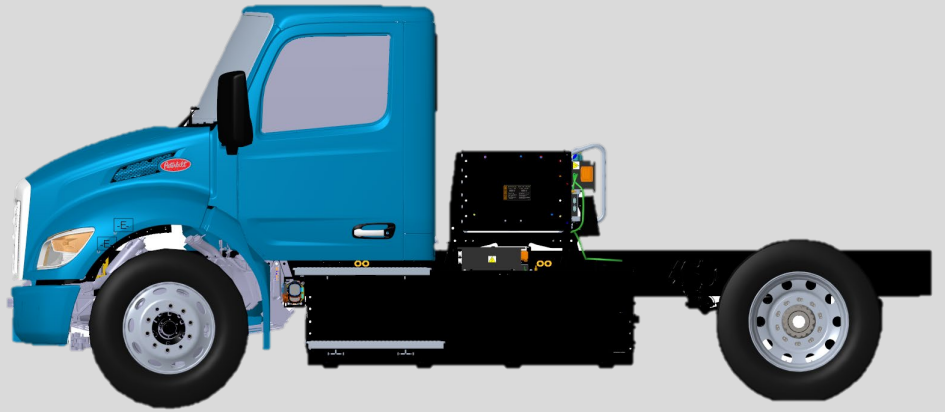
Conventional Cab Medium Duty EV

Standard Configuration

- 2 Battery Modules
- Usable Capacity 250 kWh
- Saddle Mounted to Frame Rails
- AC Charging Approx: 11 Hours
- DC Charging Approx: 1.2 Hour
- Weight Approx: 15,000 lbs.
- Range: 150 – 200 miles

Optional Configuration

- 3 Battery Modules
- Usable Capacity 375 kWh
- Saddle Mounted to Frame Rails and Back of Cab
- AC Charging Approx: 17.5 Hours
- DC Charging Approx: 1.2 Hour
- Weight Approx: 19,000 lbs.
- Range: 150 – 250 miles



Conventional Cab Medium Duty EV

Continuous Motor Power

Hp Peak (kW)	Hp Cont. (kW)	Torque Peak lb-ft	536	537	548
335 (250)	228 (170)	1,100			
402 (300)	295 (220)	1,100			
470 (350)	362 (270)	1,100			
470 (350)	362 (270)	1,850			
536 (400)	416 (310)	1,850			
603 (450)	470 (350)	1,850			

Optimize

- Tire Life
- Performance
- Cost

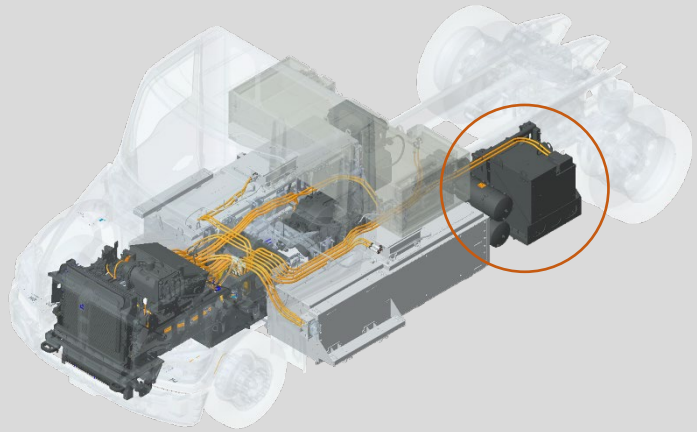
PTO Options

All Battery Configurations

- 25 kW Plug/Single Cable

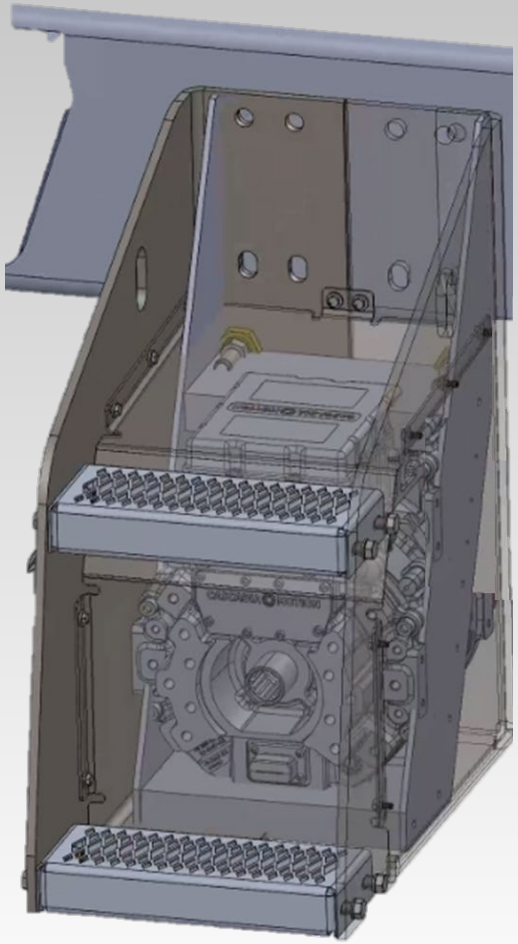
3 Battery Module Configuration

- 150 kW Plug/Two Cable
- 100 kW Motor Fully Integrated

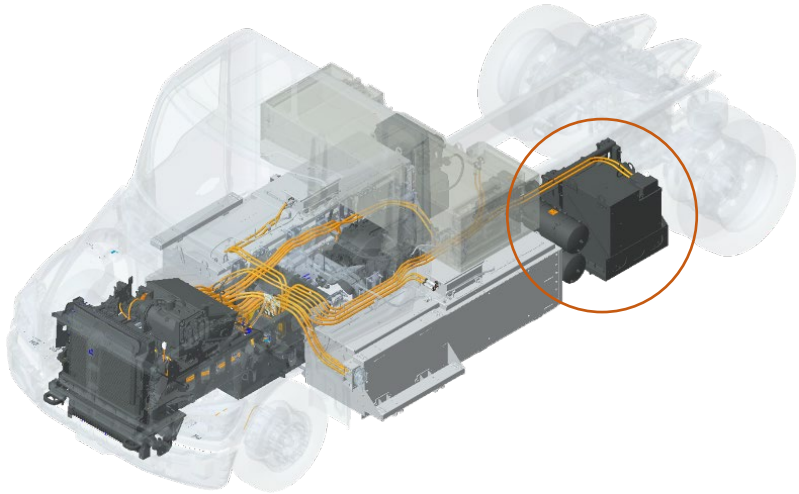


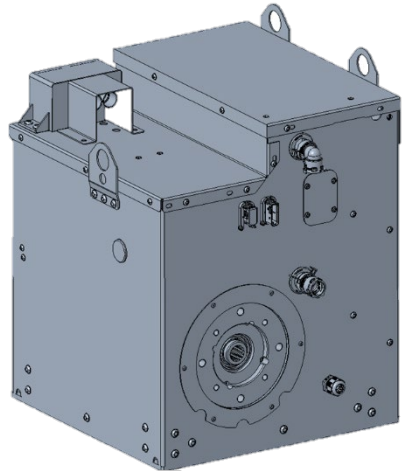
Future Integrations

Muncie 77 kW Motor

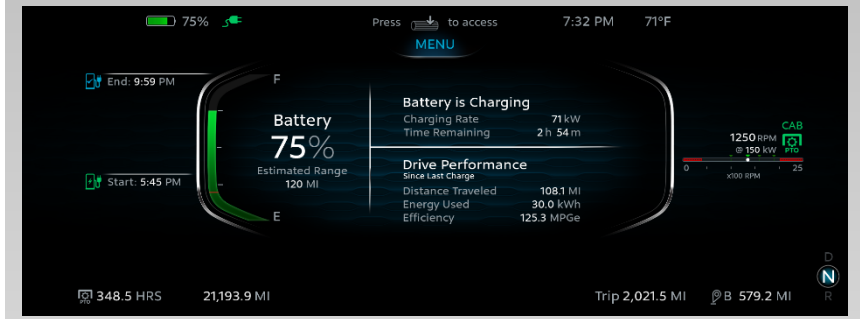


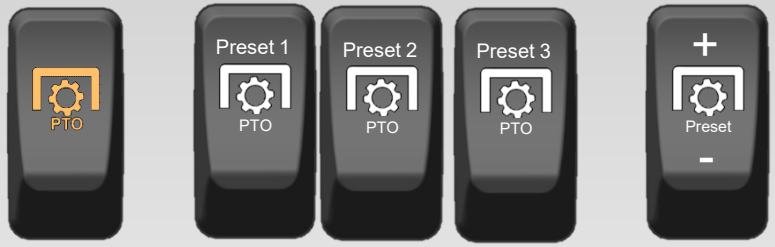
Peterbilt 100 kW Motor

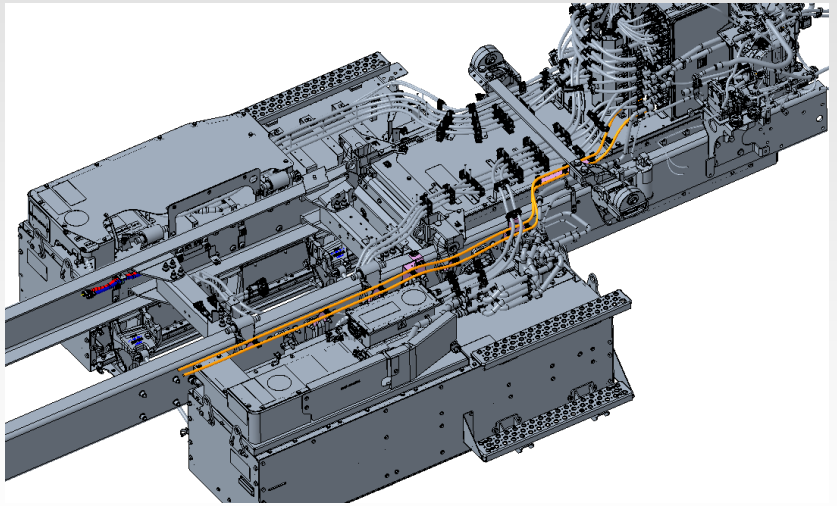




Truck Integration








LEADING
Peterbilt