

Interstate Highway 45 ZEV Corridor: Vehicle Availability

Agenda:

1. Welcome/Housekeeping
2. Review of Subgroup Role/Objectives
3. Lion Electric Product Availability
4. Discussion and Closing Remarks

October 21, 2020

1:30 pm – 2:30 pm

Next Meeting: November 19, 2020 at 11:00 AM

Call-In Information: 1-346-248-7999

Meeting ID: 865 8955 3421

Please mute yourself when you are not speaking

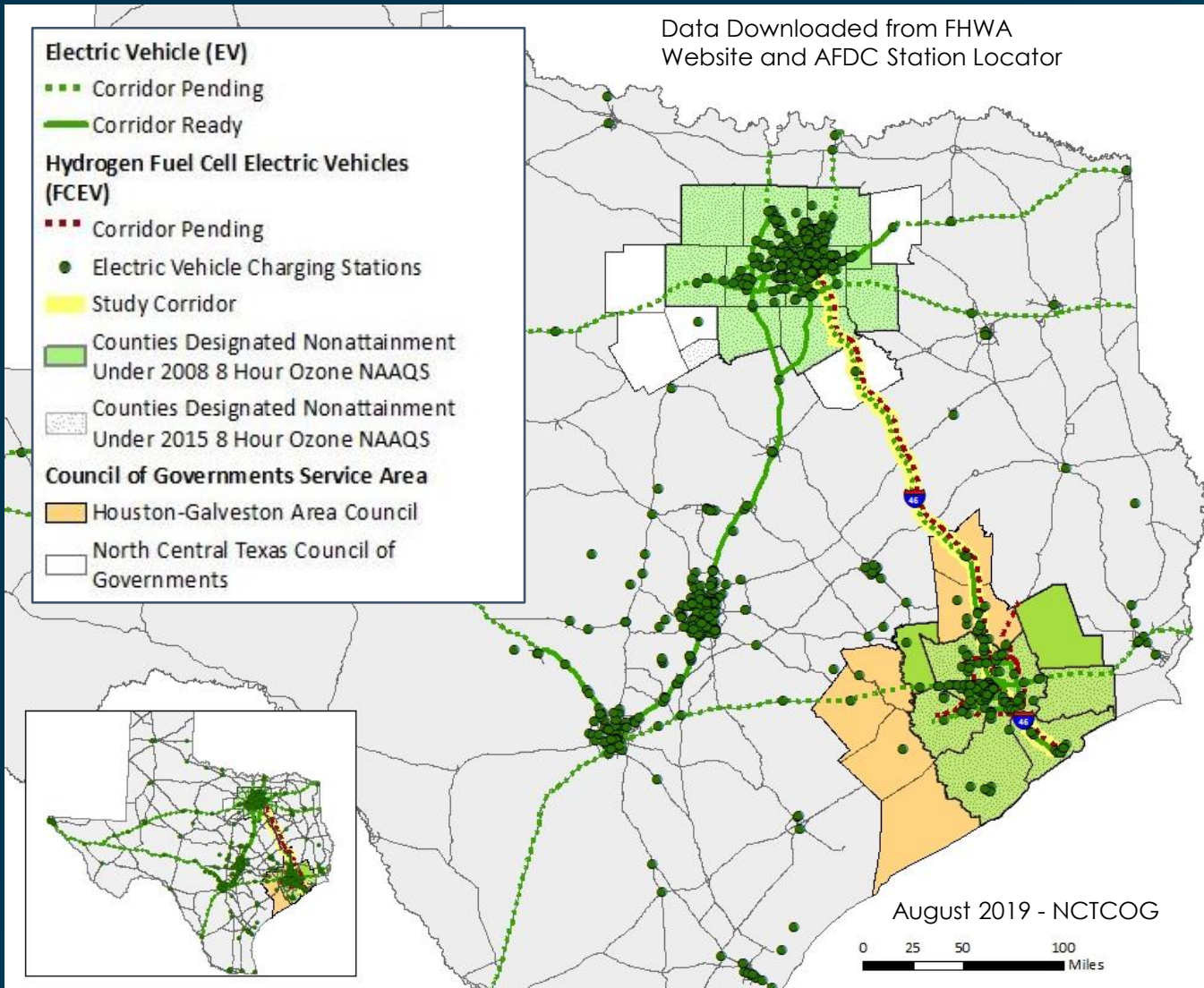


Dallas-Fort Worth
CLEAN CITIES



North Central Texas
Council of Governments

IH-45 ZEV Corridor Plan Goals



Create an Actionable Infrastructure Plan that Facilitates BEV and FCEV Pilot Projects Along the Corridor

- Focused on Medium and Heavy-Duty Applications

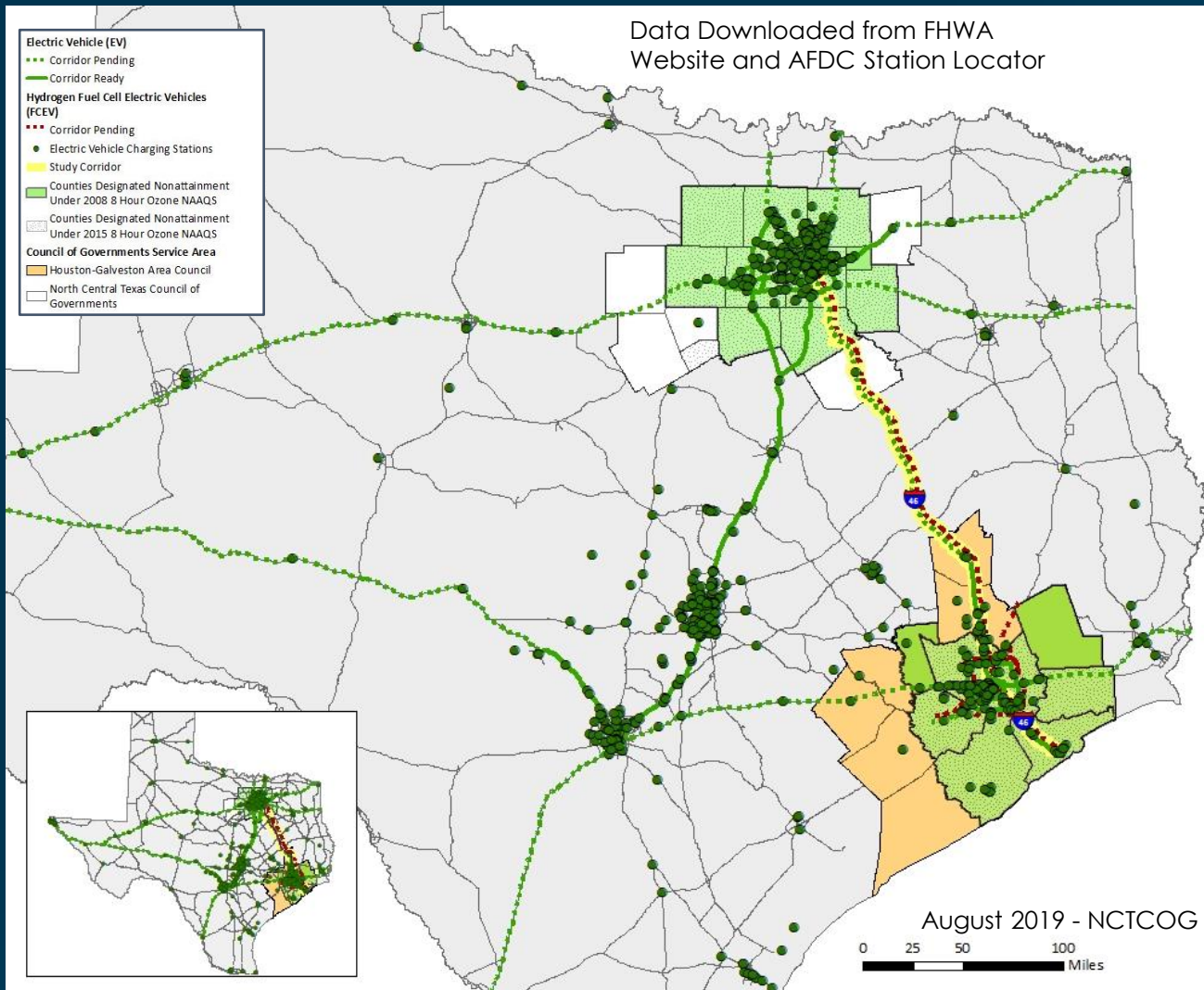
Support Future Strategic Initiatives in the Corridor

- AV Technology
- Truck Platooning

Expect Plan will Need Revisiting in 3-5 years

Stakeholder Role: Guide Plan Development, Lend Expertise, Ensure Appropriate Details Addressed

IH-45 ZEV Corridor Plan Goals



Infrastructure Development:

- Solicit Infrastructure Needs and Criteria
- Identify and Contact Property Owners

Customer Identification:

- Identify and Engage End-User Fleets
- Match User Needs to Vehicle Availability

Vehicle Availability:

- Identify Best Technologies Suitable for Vocational Needs
- Evaluate Commercialization Status of Suitable Vehicles

Policy/Incentives:

- Identify and Prioritize Non-Monetary Policies/Incentives
- Assess Existing and Needed Monetary Incentives

Assumptions

Federal Highway Administration designation intervals are appropriate.

Hydrogen: 100 miles between stations, Within 5 Miles

Electric: 50 miles between stations, Within 5 Miles

Plan should focus on build-out of facilities to support medium/heavy-duty vehicles.

Critical Minimum on Light-Duty BEV in Place

FCEV Adoption Expected First in MD/HD Sectors

Momentum for hydrogen vehicles is on the heavy-duty side.

MD/HD trips originating in either Houston or DFW, bound for other end of corridor, minimal stops in-between metros.

What we Have Now/Work in Progress

Existing DC Fast Charge BEV Infrastructure (Electrify America)

Truck Stops along I-45

Developing Surveys

Fueling Providers
Fleets

Origin/Destination Data

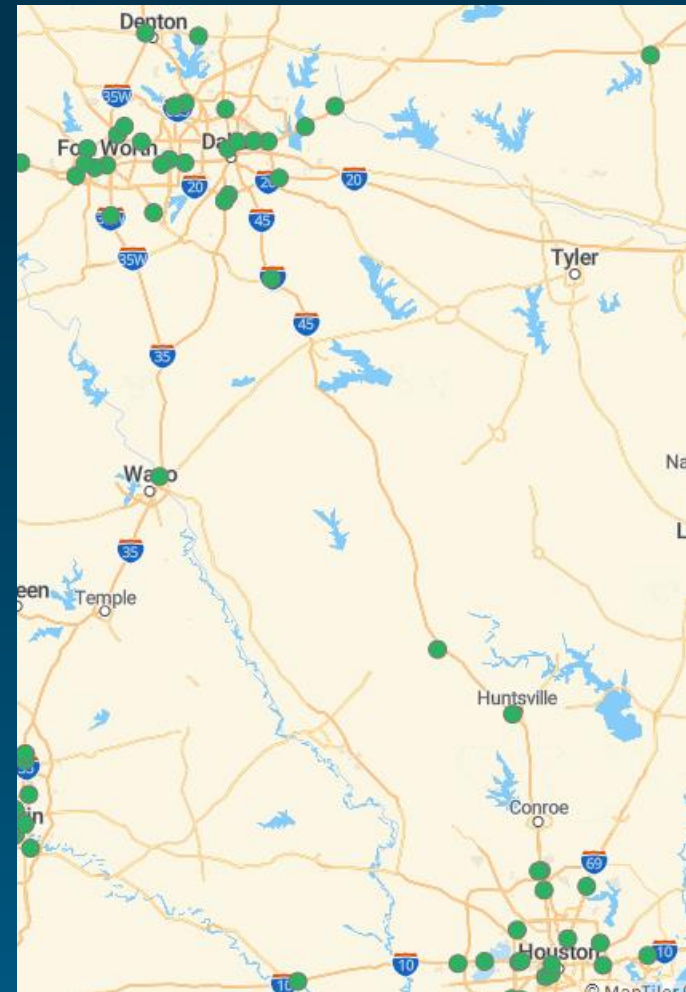
[Heavy-Duty Diesel Inspection & Maintenance Pilot Program](#)

Data from 496 Trucks at New Waverly Weigh Station

~46% Destined for DFW as Final Destination

~23% Passing Through DFW, not Final Destination

Remaining ~31% Not Passing Through DFW



What we Have Now/Work in Progress

**Total Truck Volumes Along Corridor
(current and future forecasted volume)**

**Potential Fuel Volumes Needed (calculated from truck
volume and origin/destination fraction)**

Total Truck Volume -> Trucks Suitable for BEV or FCEV
Transition based on Weight Class/Type and
Origin/Destination

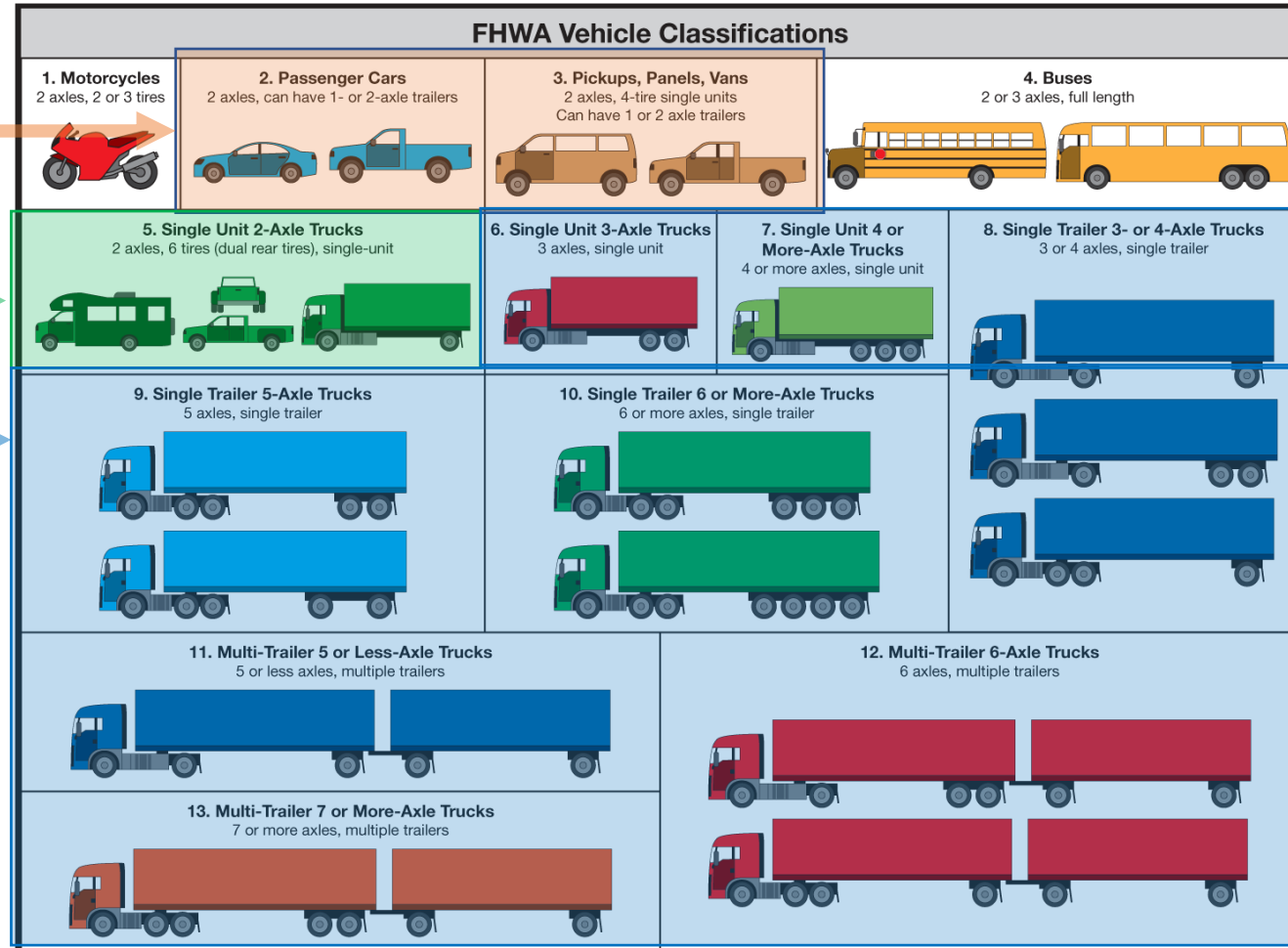
Suitable Trucks -> Fuel Consumption

Three Commercial Vehicle Classes

Light CV

Medium CV

Heavy CV



ZEV Incentives



Texas Volkswagen Environmental Mitigation Program (TxVEMP)

Level 2 Charging Infrastructure

Funds: Up to \$2,500, Not to exceed 70% Funding per Activity

Deadline: First-Come, First-Served Until August 11, 2021

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North Texas Emissions Reduction Project

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Deadline: January 8, 2021

For a full list of available funding opportunities, visit www.nctcog.org/aqfunding

Lion Electric

Interstate Highway
45 ZEV Corridor



 **LION ELECTRIC**

An all-electric commercial
vehicle manufacturer

OCT 20, 2020

Who is Lion



300+ electric vehicles in operation, foundation in bus. We are a tech company focused Elec Vehicles. **“If we’re going to be different we have got to be better”**



More than **6 million zero-emission miles** driven



Capacity 2,500 electric vehicles per year manufacturing, battery lab and battery manufacturing operations



R&D center in Montreal, with a total of 4 to be opened by 2022



Building a highly-automated truck factory in the U.S. next year with a total forecasted capacity of 12,000+ trucks



360+ employees (min 500 within 1 year)/ 95 R&D / 2,000 indirect jobs

Product Roadmap

2008



Lion was founded

2011



LION360
Diesel C-Type

2016



LIONC
C-Type 100% Electric

2019



LionM, Lion8, LionA
Minibus Shuttle / Paratransit
Class 8 Urban Truck
Mini Schoolbus
100% Electric

2020



Lion8 - Refuse
100% Electric

Product Roadmap

2020



LionD, Lion8 - Aerial
Type D School Bus
Aerial Truck
100% Electric

2020



Lion6
Class 6 Urban Truck
100% Electric

2021

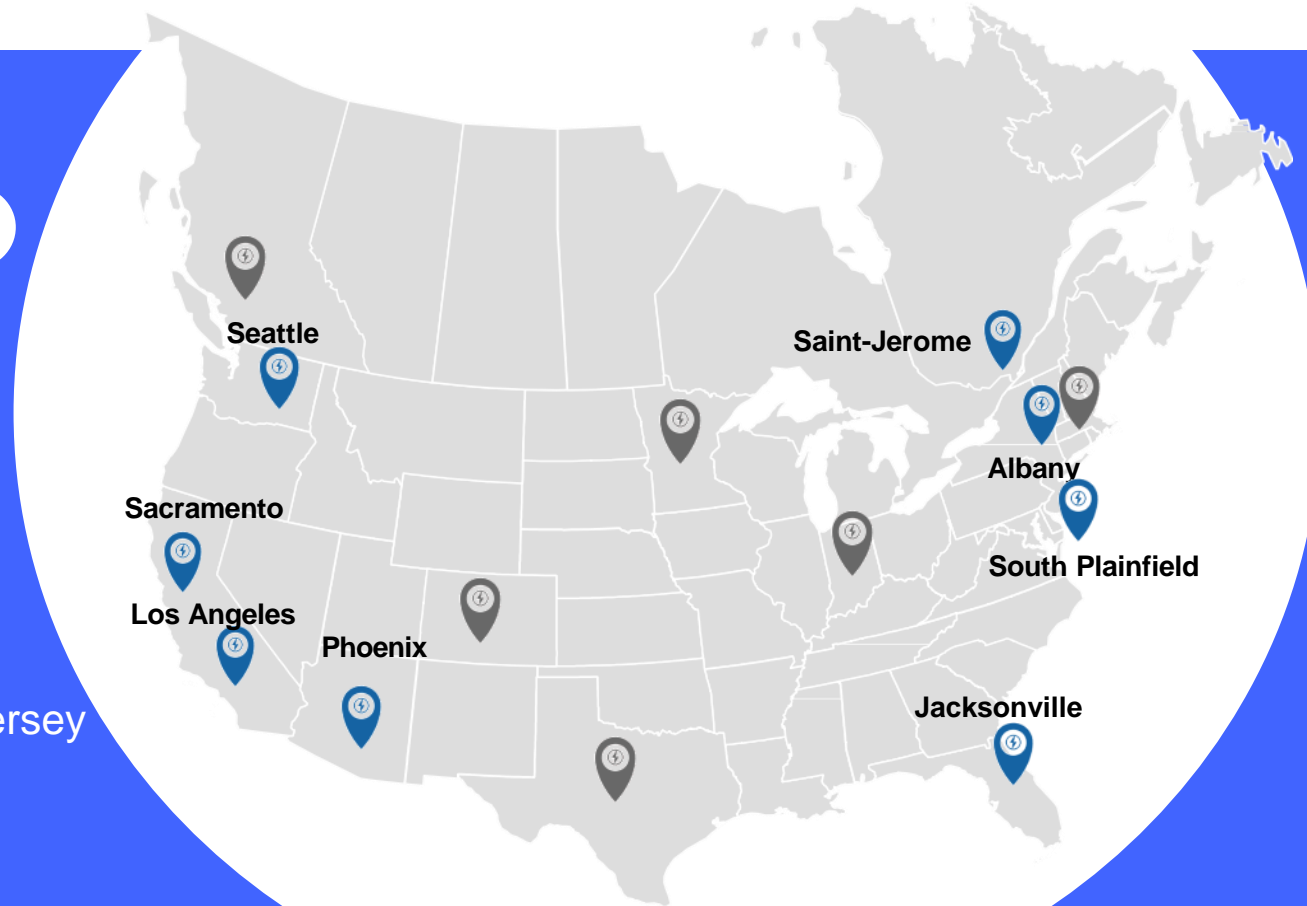


Lion5, Lion7, Lion8 – Tractor, Boom Truck
Class 6 & 7 Urban Trucks
Class 8 Tractor
Boom Truck
100% Electric

Experience / Service Centers

Currently opened

- Sacramento, California
- Los Angeles, California
- Seattle, Washington
- Jacksonville, Florida
- Albany, New York
- Phoenix, Arizona
- South Plainfield, New Jersey
- Saint-Jerome, Quebec



At least 6 more openings in 2021

- Minnesota
- British Columbia
- Colorado
- Texas
- Indiana
- Massachusetts

Purpose-Built to be Electric

LESS MOVING PARTS

Electric motor : 20 parts vs. Diesel engine : 2,000 parts

Total body parts – Electric parts: 7,000 vs. Diesel parts: 30,000

Accessible, everything goes where it belongs

- Our vehicles are not retrofitted diesel, **born to be 100% Pure Electric**
- We build our own cab and chassis
- More kWh available than any other OEM delivering trucks today
- Composite cab - no rust, no corrosion, no paint, no down time
- Regenerative braking system – brakes last 3x longer
- Custom-built driver information center & clusters

Advantages of electrification

80%

Energy Costs
Reduction

60%

Maintenance
Costs Reduction

THE MORE YOU DRIVE, THE MORE YOU SAVE!



Zero-Emission Solution



Lowest Total Cost of Ownership



No Noise Pollution



Less Maintenance and Down Time



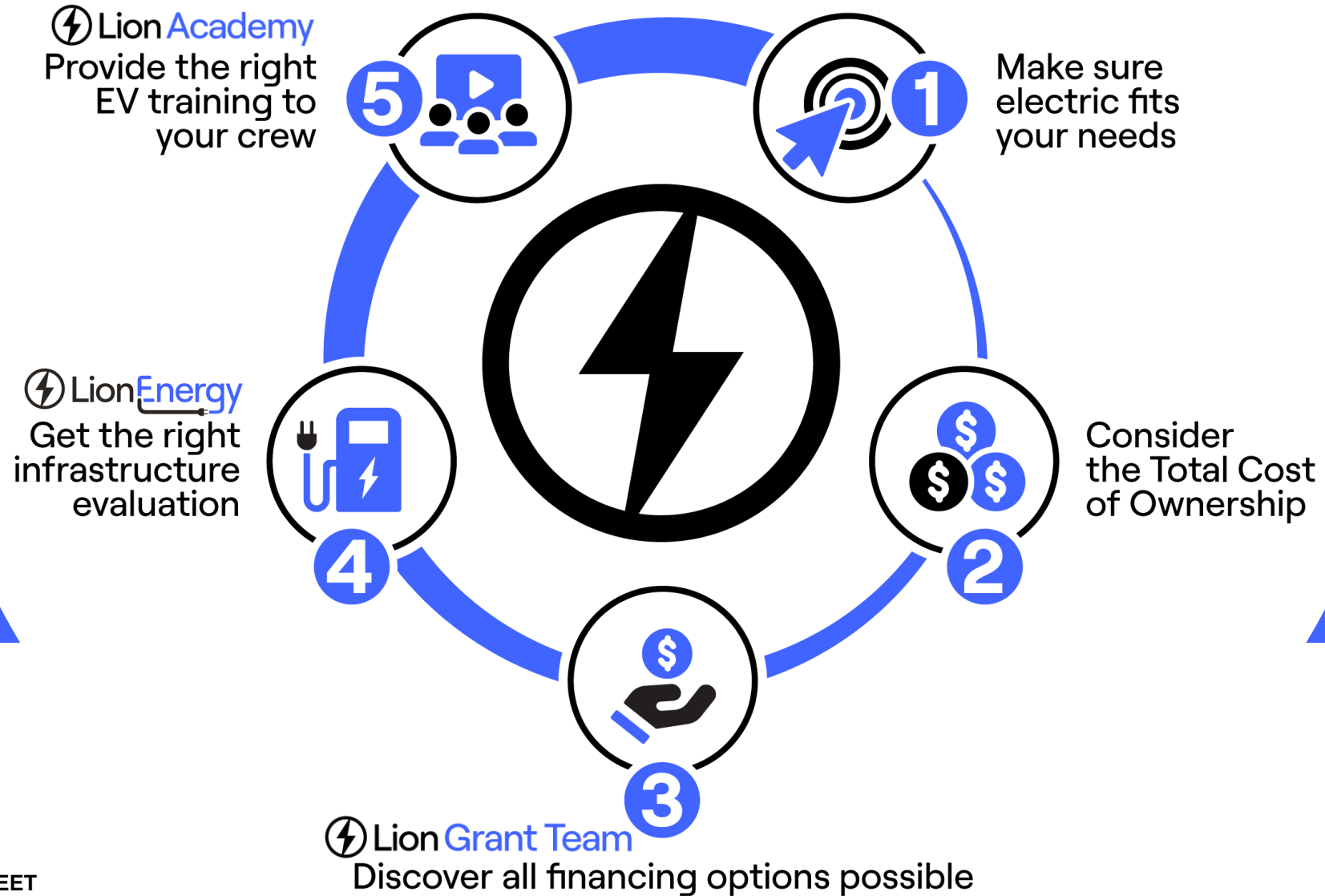
Best-in-Class Driving Experience



Safe



5 steps to electrify your fleet.



Truck Product Line



All-Electric Urban Trucks

LION6

All-Electric Class 6 Truck

26,000 lbs. GVWR
Up to 180 miles
Up to 252 kWh



LION8

All-Electric Class 8 Truck

Up to 66,000 lbs. GVWR
Up to 170 miles
Up to 336 kWh



MODULAR
BATTERY
APPROACH

The Lion chassis: a versatile platform with huge potential



Lion vocational trucks are the only heavy electric specialty vehicles perfectly integrated to date. Our chassis and electric powertrain will serve as a platform to accommodate the various applications available.



Lion Crane



Lion Stake Bed



Lion Refrigerated



Lion Utility

All-electric refuse truck



SAVINGS

Electric vs Hydraulic

50%

Reduction of energy consumption of an electric vs hydraulic on an electric chassis

ADVANTAGES

- 1,000 - 1,200 cans per day
- Integrated solution means less energy used so the truck can complete its route
- No hydraulic fluid or pumps
- All compaction and arm movements are powered by the Lion8 HV batteries that drives the electric motor
- Less weight than a hydraulic body

PROMOTIONAL VIDEO



[SEE THE TRUCK IN ACTION](#)

All-Electric Bucket Truck



Lion8 – Bucket Truck

All-electric Class 8 Bucket truck

MAXIMUM POWER

Up to 350 kW / 470 HP

BATTERY CAPACITY

Up to 336 kWh

CHARGING TYPE

Standard : Level III (DC) – CCS-COMBO

Optional : Level II (AC) – J1772

FACTORS THAT IMPACT RANGE

With an integrated solution on the Lion8 bucket trucks, there are factors that impact range:

- ✓ AC (2 kW) per hour of operation
- ✓ Heat (4 kW) per hour of operation
- ✓ Bucket operation: up to 27 kW per day
- ✓ 24 V auxiliary items

Our approach will be different with each customer due to a variety of duty cycles. Lion offers several kWh battery packs to meet the needs of each customer and their route profile.

All-Electric Urban Tractor



Lion8 - Tractor

All-electric Class 8 Tractor truck

MAXIMUM POWER

Up to 536 kW

MAXIMUM TORQUE

5,300 ft-lb

RANGE

Up to 210 miles

BATTERY CAPACITY

Up to 588 kWh

CHARGING TYPE

Standard : Level III (DC) - CCS-COMBO

Optional : Level II (AC) - J1772

Operating in cold climates since 2016

The Lion Electric powertrain has been tested and proven in all types of warm and cold weather conditions



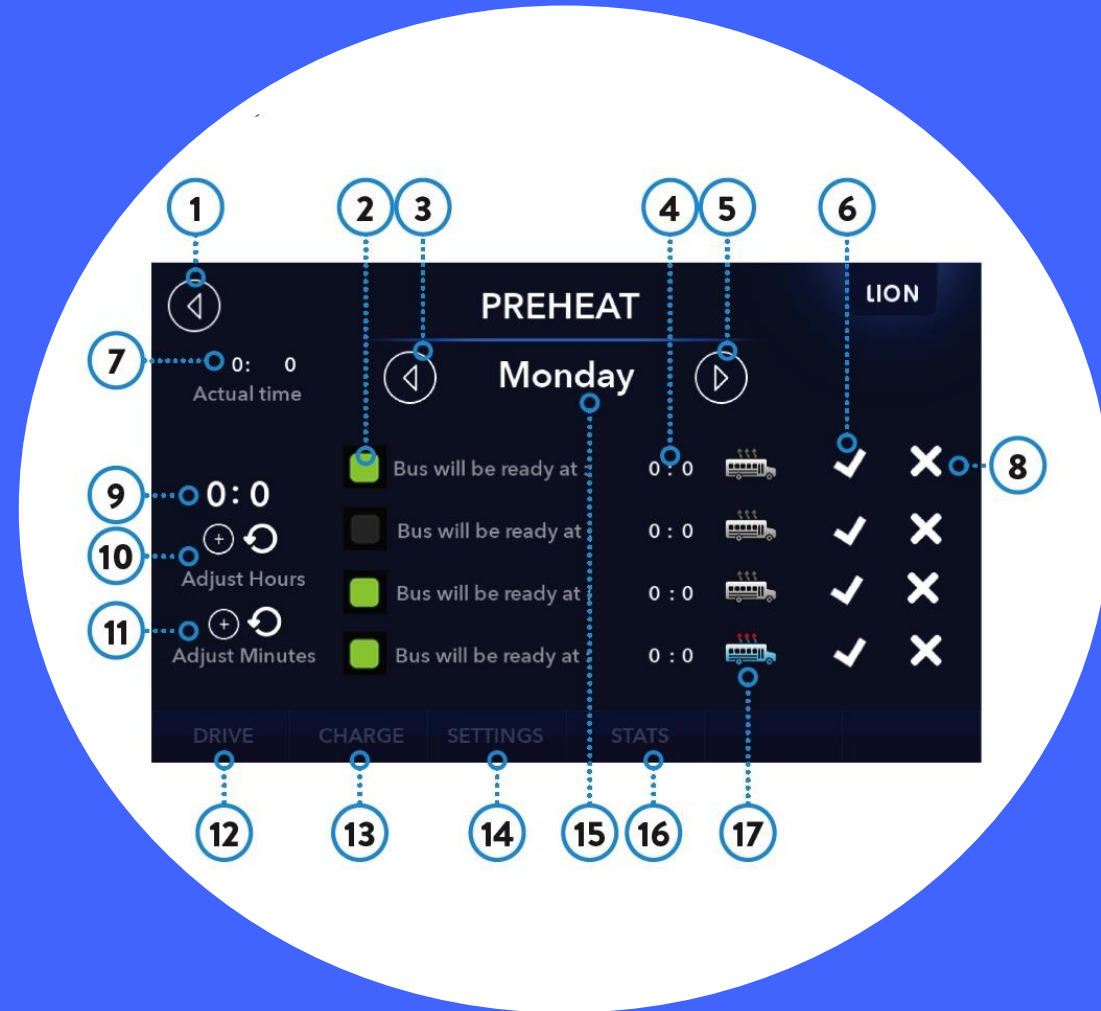
Heating

Electric heater

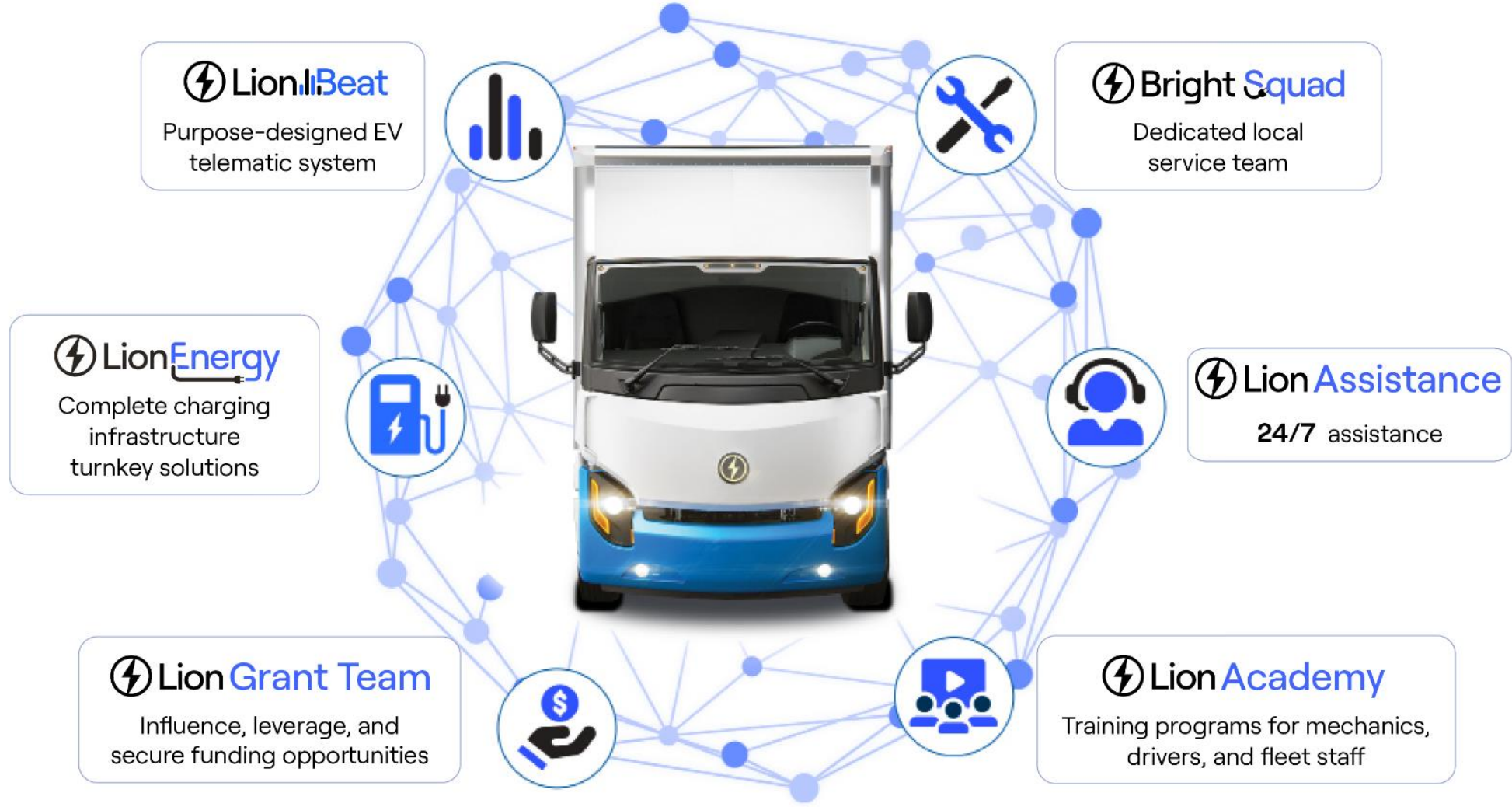
- Consumption of 4-6 kW per hour
- Pre-heat setting to heat the cabin while plugged in, using the energy from the grid
- Mandatory in certain States

Auxiliary heater

- No kW used during operation
- No draw on battery range
- Pre-heat setting to heat the cabin while plugged in, using the energy from the grid
- 10-gallon tank
- Refuel will depend on climate (average 4x per winter)



Support at every step!





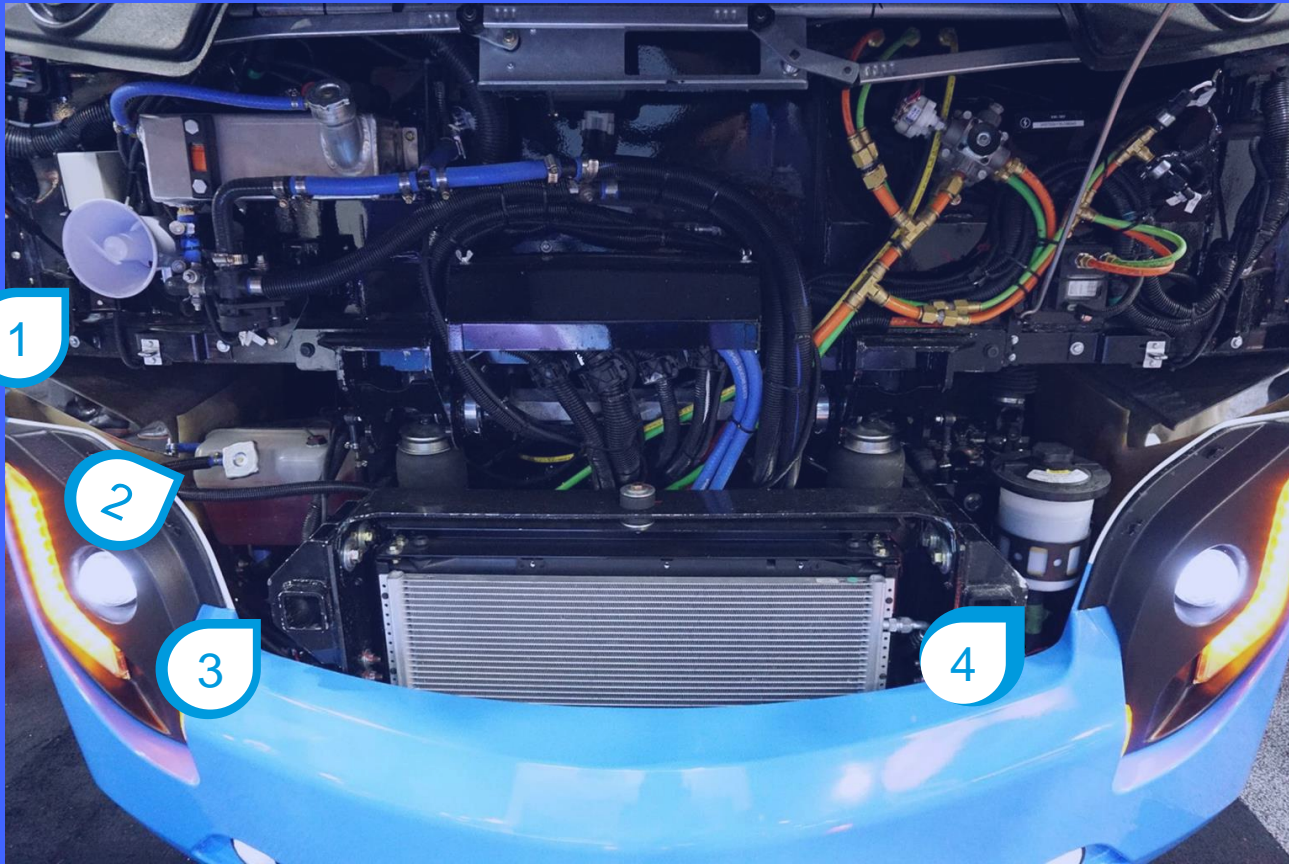
Why do you need purpose-built EV telematics?

- ✓ Measure your Electric Truck Performance
- ✓ Measure your energy use / average kWh/mile
- ✓ Measure your maintenance savings
- ✓ Measure your driver performance

Reduce Total Cost of Ownership and ROI timeline



Let's open it up!



1. Sound Generator
2. Powertrain Coolant
3. Windshield Fluid
4. Power Steering Fluid

Charging & Infrastructure



LEVEL II (J1772)

- Embedded 19.2 kW charger



LEVEL III (CCS-Combo)

- DC fast charging
- Reduce the overall charging time

All Lion's products are V2G ready!



Lion will take care of everything

- 1 Project management
- 2 Relationship with utility
- 3 Design & review

Dedicated Grant Team



- Grant writing
- Leverage funding opportunities in your region
- Full support during the entire process

Contact grant.lion@thelionelectric.com to discover funding opportunities in your region!

What makes Lion the leader?



- Global experience in the deployment of electric vehicles
- Constant support from the Lion Academy
- Purpose-built to be 100% electric
- Infrastructure support with Lion Energy
- Ability to leverage incentives

Recent truck sales



→ **amazon**

→ **CN** (CN Rail)

→  **WASTE CONNECTIONS**
Connect with the Future

→ **ecomaine**

→ **Fresh** 
PRODUCE SERVICES

→  **SAQ**

→  **Hydro Québec**

→  **Transport Canada**

→ **PARC SAFARI**

→  **CITY OF VANCOUVER**

The bright move

CONTACT

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VEHICLE AVAILABILITY

DOE Request for Information

Medium and Heavy-Duty Truck Research and Development Activities and Super Truck Initiative

DOE seeking feedback on research needs and opportunities related to medium and heavy-duty freight trucking

Category 1: Freight Operational Efficiency and System

Category 2: Internal Combustion Engine, Powertrain, Fuels, and Emissions Control

Category 3: Batteries, Electrification, and Charging of MD/HD Trucks

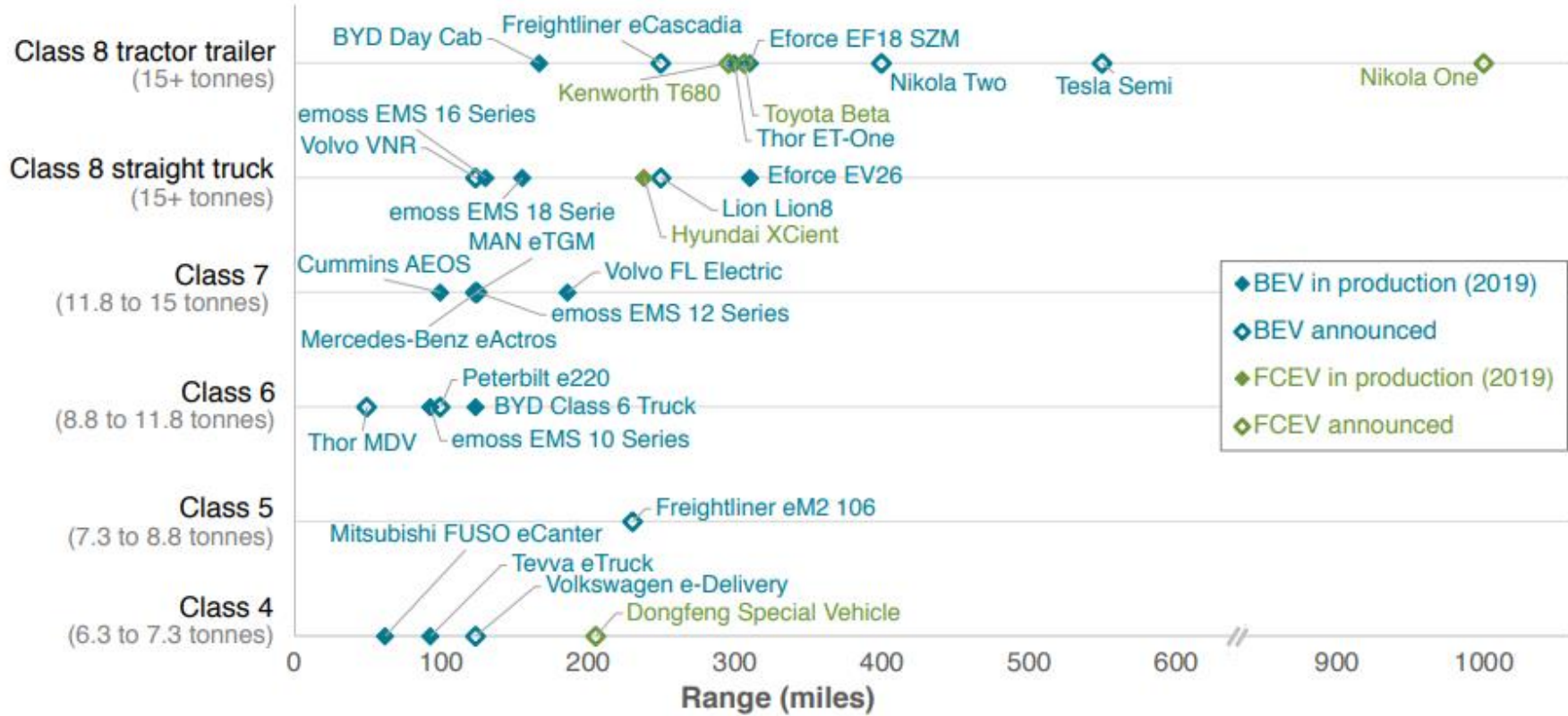
Category 4: Hydrogen and Fuel Cell Trucking

Category 5: Other Important Considerations

Deadline: 5:00 PM ET November 9, 2020

Heavy-Duty ZEV Market

Gross vehicle weight class (U.S.)



icct THE INTERNATIONAL COUNCIL ON Clean Transportation

Source: Hall (2019) updates from Moultak, Lutsey, Hall (2017)
<https://www.theicct.org/publications/transitioning-zero-emission-heavy-duty-freight-vehicles>

Heavy-Duty ZEV Market



Alternative Fuel and Advanced Vehicle Search

Find and compare alternative fuel vehicles (AFVs), engines, and hybrid/conversion systems. Some of the light-duty AFVs may count toward vehicle-acquisition requirements for [federal fleets](#) and [state and alternative fuel provider fleets](#) regulated by the Energy Policy Act (EPA).

Download a complete list:

[Light-Duty Vehicles](#)

[All Vehicles](#)

Search Results - 1 - 62 of 62 vehicles

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

Filter by: Fuel/Technology: Hydrogen Fuel Cell, Electric | Class/Type: Refuse, Tractor, Passenger Van/Shuttle Bus, Transit Bus | Manufacturer: All

View:

Refine Your Search

Vehicle	Fuel Type	Fuel Economy	Compare (up to 4)
+ Blue Bird All American RE Electric Activity	Electric	no data	<input type="checkbox"/>
+ Blue Bird Micro Bird Activity G5 Electric	Electric	no data	<input type="checkbox"/>
+ Blue Bird Vision Electric Activity	Electric	no data	<input type="checkbox"/>
+ BYD 23' Electric Motor Coach	Electric	no data	<input type="checkbox"/>
+ BYD 30' Electric transit	Electric	no data	<input type="checkbox"/>
+ BYD 35' Double Decker Electric Bus	Electric	no data	<input type="checkbox"/>
+ BYD 35' Electric Motor Coach	Electric	no data	<input type="checkbox"/>
+ BYD 35' Electric Transit	Electric	no data	<input type="checkbox"/>
+ BYD 40' Electric Motor Coach	Electric	no data	<input type="checkbox"/>
+ BYD 40' Electric Transit	Electric	no data	<input type="checkbox"/>
+ BYD 45' Double Decker Electric Bus	Electric	no data	<input type="checkbox"/>
+ BYD 45' Electric Motor Coach	Electric	no data	<input type="checkbox"/>
+ BYD 60' Electric Transit	Electric	no data	<input type="checkbox"/>
+ BYD 6R	Electric	no data	<input type="checkbox"/>
+ BYD 8R	Electric	no data	<input type="checkbox"/>
+ BYD 8TT Day Cab	Electric	no data	<input type="checkbox"/>
+ BYD 8Y Yard Truck	Electric	no data	<input type="checkbox"/>
+ COBUS Industries e.COBUS	Electric	no data	<input type="checkbox"/>
+ eBus eBus22	Electric	no data	<input type="checkbox"/>
+ ENC AXESS-FC 35'	Hydrogen Fuel Cell	no data	<input type="checkbox"/>
+ ENC AXESS-FC 40'	Hydrogen Fuel Cell	no data	<input type="checkbox"/>

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
- Hybrid - Diesel Electric

Class/Type

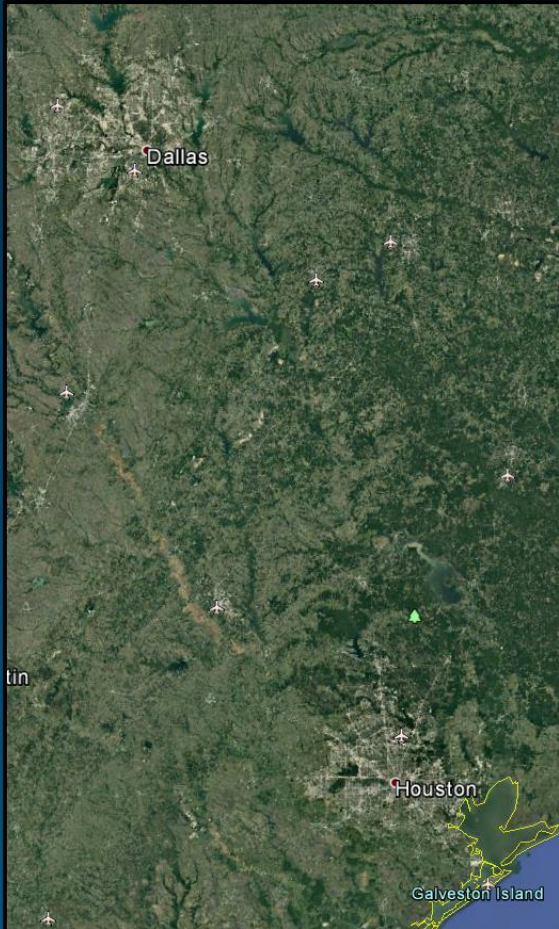
- All Classes/Types
- Sedan/Wagon
- Pickup
- SUV
- Van
- Step Van
- Vocational/Cab Chassis
- Street Sweeper
- Refuse
- Tractor
- Passenger Van/Shuttle Bus
- Transit Bus
- School Bus

Manufacturer - Light-Duty

Manufacturer - Med & Heavy-Duty

Imagery provided by <https://afdc.energy.gov/vehicles/search/>

Discussion



Will new OEM offerings in different categories be released in next 1-3 years?

What is the critical minimum needed in market demand to bring OEM offerings to Texas market?

BEV trucks
FCEV trucks

Is there a volume discount on HD ZEVs?

BEV trucks
FCEV trucks

What is the critical minimum of stations needed to bring FCEV OEM offerings to Texas market?

Light-Duty
Heavy-Duty

What policies need to be in place in Texas to drive OEM offerings of FCEV?

ZEV Policy

ZEV Incentives



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CONTACT

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**Dallas-Fort Worth
CLEAN CITIES**

www.dfwcleancities.org/altfuelcorridors

www.nctcog.org/IH45-ZEV

Lori Clark

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