Electric Trucks and Buses in California

By John Benson

March 2022

1. Introduction

This paper is much longer that I like to post, but I thought it better to leave this paper together rather than splitting it. This post is not just for my normal reader, but also for stake-holders of private and public organization that are involved in the title subject. Mostly in California, but also outside of our state. For more details, read on.

My last post similar to this one is described and linked below:

Electric Trucks & Buses, Early 2022: *Tesla delayed the rollout of the Cybertruck and Semi until 2023. This opened the door for, respectively, Ford and Daimler. There is also news form other RV manufacturers including Tesla, Rivian, and GM. Also some government moves are described (Federal and the Santa Clara Valley Transportation Authority).*

https://energycentral.com/c/ec/electric-trucks-buses-early-2022

This post will take a deep dive into California requirements and incentives for medium and heavy electric trucks, buses and related technologies, and look at why California is doing this. This paper will also dive into truck and bus manufacturers and their products. And finally we will review U.S. federal incentives for electric trucks and buses.

2. California Requirements and Incentives

The following are, respectively, the regulations for medium / heavy duty trucks and those for transit agency buses.

2.1. Advanced Clean Trucks Regulation

The Advanced Clean Truck Regulation is part of a holistic approach to accelerate a large-scale transition of zero-emission medium-and heavy-duty vehicles from Class 2b to Class 8. The regulation has two components including a manufacturer sales requirement, and a reporting requirement:[1]

Zero-emission truck sales: *Manufacturers who certify Class 2b-8 chassis or complete vehicles with combustion engines would be required to sell zero-emission trucks as an increasing percentage of their annual California sales from 2024 to 2035. By 2035, zero-emission truck/chassis sales would need to be 55% of Class 2b – 3 truck sales, 75% of Class 4 – 8 straight truck sales, and 40% of truck tractor sales.*

Company and fleet reporting: *Large employers including retailers, manufacturers, brokers and others are required to report information about shipments and shuttle services. Fleet owners, with 50 or more trucks, are required to report about their existing fleet operations. This information will help identify future strategies to ensure that fleets purchase available zero-emission trucks and place them in service where suitable to meet their needs.*

[1] California Air Resources Board (CARB), "Advanced Clean Trucks Fact Sheet," Aug 2021, https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-trucks-fact-sheet

2.2. Innovative Clean Transit (ICT) Regulation

The California Air Resources Board (CARB) has created the Innovative Clean Transit (ICT) Regulation: *The ICT regulation was adopted in December 2018 and requires all public transit agencies to gradually transition to a 100 percent zero-emission bus (ZEB) fleet. Beginning in 2029, 100% of new purchases by transit agencies must be ZEBs, with a goal for full transition by 2040. It applies to all transit agencies that own, operate, or lease buses with a gross vehicle weight rating (GVWR) greater than 14,000 lbs. It includes standard, articulated, over-the-road, double-decker, and cutaway buses.*[2]

Author's Note: A cutaway bus is built on a standard cab-and-frame chassis that is offered by many large truck and van manufacturers. They are completed and offered by smaller third-party bus and truck manufacturers. Many of these chassis have been electrified and thus have created a large manufacturing infrastructure consisting of large cab-and-frame chassis manufacturers (Like Ford, GM and others), electric drivetrain manufacturers (like Proterra and others) and custom vehicle integrators (many of the "Small Vehicle Builders" in subsection 3.3.1.3 below.

2.3. Incentives

California's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) plays a crucial role in the deployment of zero-emission and near-zero-emission technologies. HVIP accelerates commercialization by providing point-of-sale vouchers to make advanced vehicles more affordable. Launched by the California Air Resources Board in 2009, the project is part of California Climate Investments. HVIP is the earliest model in the U.S. to demonstrate the function, flexibility, and effectiveness of first-come first-served incentives that reduce the incremental cost of commercial vehicles.[3]

Purchasers: *get in on base vehicle price breaks from $20,000 to $240,000, depending on the vehicle you purchase. Whether you operate one vehicle or hundreds, HVIP dealers are ready to work with you. Individual owner-operators, small businesses, corporate leaders, school districts, and municipal fleets are all eligible. HVIP is anticipated to open to new requests in late March.*

Sellers: *we make it easy for you to close the deal. Become an eligible dealer and offer your customers' point-of-sale price breaks with funding set aside at the time a voucher is requested. Training is required on an individual basis for each person who makes HVIP sales representing a dealership or Original Equipment Manufacturer.*

3. Significant Electric Trucks, Buses and Related

The last subsection covered the California HVIP Program. This site (reference 3) has an excellent directory of models of trucks, buses and related products. I will use this as my roadmap to the various models of these vehicles and components.[4]

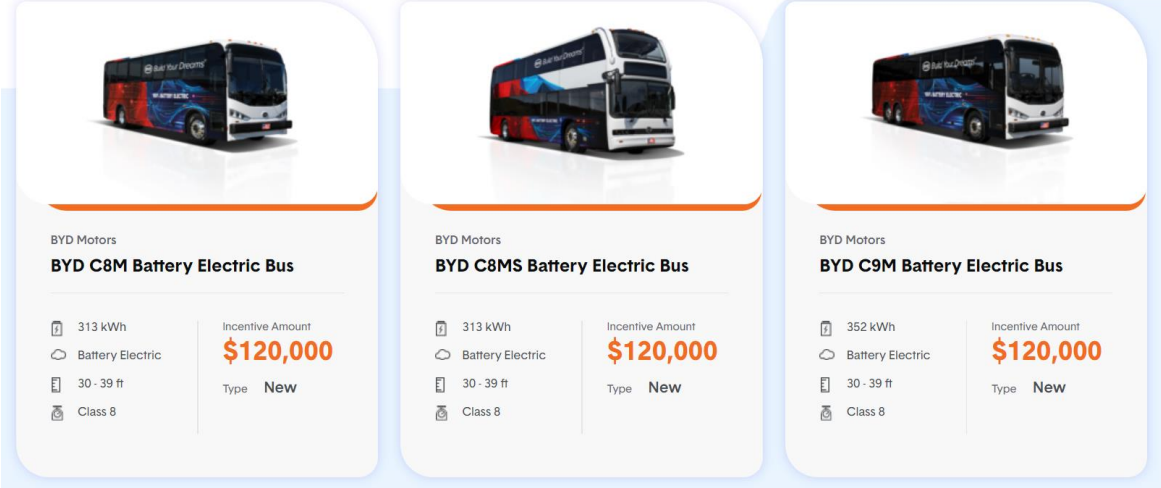
[2] CARB, "Innovative Clean Transit (ICT) Regulation Fact Sheet," May 2019, https://ww2.arb.ca.gov/resources/fact-sheets/innovative-clean-transit-ict-regulation-fact-sheet
[3] California Incentives for Clean Trucks and Buses, Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), https://californiahvip.org/
[4] HVIP, "HVIP Eligible Vehicles," https://californiahvip.org/vehiclecatalog/

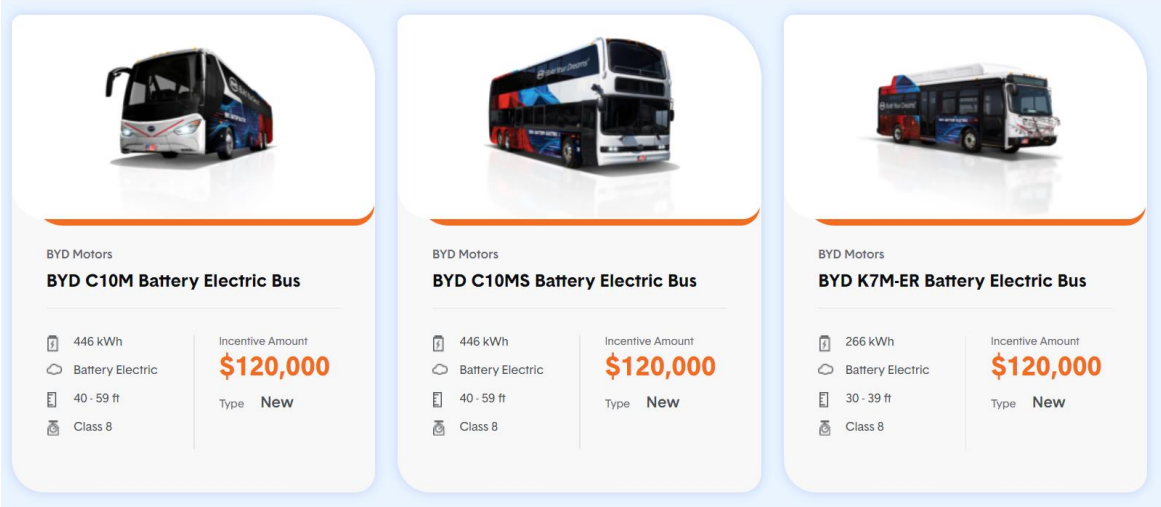
My rational for this is that California is implementing the most aggressive program for implementing these EVs. These incentives are substantial. If a vehicle isn't in this list, it probably means that manufacturer is not a significant player in these markets.

3.1. Buses

Note that the subsections titles / categories below are per the HVIP website (references 3 and 4 above).

3.1.1. Heavy Duty Buses





BYD Motors

BYD K7M Battery Electric Bus

215 kWh
Battery Electric
30 - 39 ft
Class 7

Incentive Amount
$85,000
Type New

BYD Motors

BYD K8M Battery Electric Bus

352 kWh
Battery Electric
30 - 39 ft
Class 8

Incentive Amount
$120,000
Type New

BYD Motors

BYD K9M Battery Electric Bus

352 kWh
Battery Electric
30 - 39 ft
Class 8

Incentive Amount
$120,000
Type New

BYD Motors

BYD K9MD Battery Electric Bus

352 kWh
Battery Electric
40 - 59 ft
Class 8

Incentive Amount
$120,000
Type New

BYD Motors

BYD K11M Battery Electric Bus

578 kWh
652 kWh
Battery Electric
Class 8

Incentive Amount
$120,000
Type New

BYD Motors

BYD Type-D Battery Electric School Bus

230 kWh
Battery Electric
30 - 39 ft
Class 8

Incentive Amount
$198,000
Type New

ElDorado National

ElDorado National AXESS 35′ Fuel Cell Hybrid Transit Bus

Hydrogen Fuel Cell
30 - 39 ft
Class 8

Incentive Amount
$240,000
Type New

ElDorado National

ElDorado National AXESS 40′ Fuel Cell Hybrid Transit Bus

Hydrogen Fuel Cell
30 - 39 ft
Class 8

Incentive Amount
$240,000
Type New

Gillig

GILLIG Low Floor Battery Electric Bus

444 kWh
Battery Electric
25 - 29 ft
30 - 39 ft
Class 8

Incentive Amount
$120,000
Type New

GreenPower Motor Company

GreenPower EV250 – 30′ Low Floor Transit Bus

210 kWh
Battery Electric
30 - 39 ft
Class 8

Incentive Amount
$120,000
Type New

GreenPower Motor Company

GreenPower EV350 – 40′ Low Floor Transit Bus

320 kWh
Battery Electric
40 - 59 ft
Class 8

Incentive Amount
$120,000
Type New

GreenPower Motor Company

GreenPower EV550 – 45′ Double Decker Bus

478 kWh
Battery Electric
40 - 59 ft
Class 8

Incentive Amount
$120,000
Type New

GreenPower Motor Company

GreenPower SYNAPSE Shuttle Bus

200 kWh
Battery Electric
30 - 39 ft
Class 8

Incentive Amount
$120,000
Type New

Lightning Systems

Lightning Systems Coach Bus LEV Repower

640 kWh
Battery Electric
Class 8

Incentive Amount
$60,000
Type Conversion

Motor Coach Industries

Motor Coach Industries D45 CRT CHARGE

389 kWh
544 kWh
Battery Electric
40 - 59 ft
Class 8

Incentive Amount
$120,000
Type New

Motor Coach Industries

Motor Coach Industries D45 CRT LE CHARGE

389 kWh
Battery Electric
40 - 59 ft
Class 8

Incentive Amount
$120,000
Type New

Motor Coach Industries

Motor Coach Industries J4500 CHARGE

389 kWh
544 kWh
Battery Electric
40 - 59 ft
Class 8

Incentive Amount
$120,000
Type New

New Flyer

New Flyer XCELSIOR XE 35 Battery Electric Bus

350 kWh
440 kWh
Battery Electric
30 - 39 ft
Class 8

Incentive Amount
$120,000
Type New

New Flyer

New Flyer XCELSIOR XE 40 Battery Electric Bus

350 kWh
440 kWh
525 kWh

Battery Electric

30 - 39 ft

Class 8

Incentive Amount
$120,000

Type **New**

New Flyer

New Flyer XCELSIOR XE 60 Battery Electric Bus

525 kWh

Battery Electric

Class 8

Incentive Amount
$120,000

Type **New**

New Flyer

New Flyer Xcelsior XHE40 Fuel Cell Electric Bus

Hydrogen Fuel Cell

40 - 59 ft

Class 8

Incentive Amount
$240,000

Type **New**

New Flyer

New Flyer Xcelsior XHE60 Fuel Cell Electric Bus

Hydrogen Fuel Cell

Class 8

Incentive Amount
$240,000

Type **New**

Nova Bus

Nova Bus LFSe+ Long Range Battery Electric Bus

374 kWh
564 kWh

Battery Electric

40 - 59 ft

Class 8

Incentive Amount
$120,000

Type **New**

Proterra

Proterra 35′ ZX5

225 kWh
450 kWh

Battery Electric

30 - 39 ft

Class 8

Incentive Amount
$120,000

Type **New**

Proterra

Proterra 40′ ZX5

225 kWh
450 kWh
675 kWh

Battery Electric

Class 8

40 - 59 ft

Incentive Amount
$120,000

Type **New**

SEA Electric

SEA Econic EV (on Freightliner Econic with SEA-Drive® Power-System)

220 kWh

Battery Electric

Class 8

Incentive Amount
$120,000

Type **New**

Van Hool NV

Van Hool NV CX45E Battery Electric Bus

676 kWh

Battery Electric

Class 8

Incentive Amount
$120,000

Type **New**

3.1.2. Medium Duty Buses

Alpha Mobility

Alpha Mobility Model G Shuttle Bus

108 kWh
144 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

BYD Motors

BYD C6M Battery Electric Bus

141 kWh
Battery Electric
20 - 24 ft
Class 4
Class 5

Incentive Amount
$85,000
Type New

GreenPower Motor Company

GreenPower EV Star Min-eBus

118 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

GreenPower Motor Company

GreenPower EV Star Plus

118 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Lightning Systems

Lightning eMotors FT3-43/86 Battery Electric Vehicle

43 kWh
86 kWh
Battery Electric
20 - 24 ft
Class 3

Incentive Amount
$45,000
Type New

Lightning Systems

Lightning Systems FE4-86/129 Bus (Ford E-450 with Lightning Electric Powertrain)

129 kWh, 86 kWh
Battery Electric
25 - 29 ft
Class 4

Incentive Amount
$60,000
Type New

Lightning Systems

Lightning Systems FF5-128/160 Bus (Ford F-550 with Lightning Electric Powertrain)

128 kWh, 160 kWh
Battery Electric
30 - 39 ft
Class 5

Incentive Amount
$60,000
Type New

Lion Electric

Lion Electric LIONM Paratransit Bus

Up to 160 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

Lion Electric

Lion Electric LIONM Shuttle Bus

Up to 160 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

Micro Bird

Micro Bird D-Series Electric Shuttle Bus on E450 Platform

88 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Motiv Power Systems

Motiv EPIC F-53

127 kWh
Battery Electric
Class 6

Incentive Amount
$85,000
Type New

Motiv Power Systems

Motiv on F-53 Platform – Hometown Trolley

127 kWh
Battery Electric
Class 6

Incentive Amount
$85,000
Type New

Motiv Power Systems

Motiv on Ford E-450 Platform – Shuttle Bus

127 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Phoenix

Phoenix Motorcars ZEUS 300 Passenger Shuttle

63 kWh, 94 kWh, 125 kWh, 156 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Phoenix

Phoenix Motorcars ZEUS 400 Shuttle

63 kWh, 94 kWh, 125 kWh, 156 kWh
Battery Electric
25 - 29 ft
Class 4

Incentive Amount
$60,000
Type New

Phoenix

Phoenix Motorcars ZEUS 400 Transit Bus

63 kWh, 94 kWh, 125 kWh, 156 kWh
Battery Electric
25 - 29 ft
Class 4

Incentive Amount
$60,000
Type New

SEA Electric

SEA MB65 EV (on Freightliner MB65 with SEA-Drive® Power-System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

SEA Electric

SEA S2 C EV (on Freightliner S2 C with SEA-Drive® Power-System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

SEA Electric

SEA S2 EV (on Freightliner S2 with SEA-Drive® Power-System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

3.1.3. School Buses

Blue Bird

Blue Bird Electric All American Bus – Activity

155 kWh
Battery Electric
40 - 59 ft
Class 8

Incentive Amount
$120,000
Type New

Blue Bird

Blue Bird Electric All American Bus – Activity

155 kWh
Battery Electric
40 - 59 ft
Class 7

Incentive Amount
$85,000
Type New

Blue Bird

Blue Bird Electric All American School Bus

150 kWh
155 kWh
Battery Electric
Class 8

Incentive Amount
$198,000
Type New

Blue Bird

Blue Bird Electric All American School Bus

150 kWh, 155 kWh
Battery Electric
Class 7

Incentive Amount
$140,250
Type New

Blue Bird

Blue Bird Electric Vision Bus – Activity

155 kWh
Battery Electric
30 - 39 ft
Class 6
Class 7

Incentive Amount
$85,000
Type New

Blue Bird

Blue Bird Electric Vision School Bus

155 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$140,250
Type New

BYD Motors

BYD Type-D Battery Electric School Bus

230 kWh
Battery Electric
30 - 39 ft
Class 8

Incentive Amount
$198,000
Type New

GreenPower Motor Company

GreenPower BEAST

193.5 kWh
Class 8

Incentive Amount
$198,000
Type New

GreenPower Motor Company

GreenPower SYNAPSE 72 School Bus

200 kWh
Class 8

Incentive Amount
$198,000
Type New

Lightning Systems

Lightning Systems FE4-86/129 Type A School Bus (Ford E-450 with Lightning Electric Powertrain)

86 kWh 129 kWh
Battery Electric
Class 4

Incentive Amount
$99,000
Type New

Lion Electric

Lion Electric LIONA Mini School Bus

Up to 160 kWh
Battery Electric
Class 6

Incentive Amount
$140,250
Type New

Lion Electric

Lion Electric LIONC School Bus

126 kWh, 168 kWh, 210 kWh
Battery Electric
Class 7

Incentive Amount
$140,250
Type New

Lion Electric

Lion Electric LIOND School Bus

Up to 210 kWh
Battery Electric
Class 8

Incentive Amount
$198,000
Type New

Micro Bird

Micro Bird G5 Electric School Bus on E450 Platform

88 kWh
Battery Electric
Class 4
Class 5

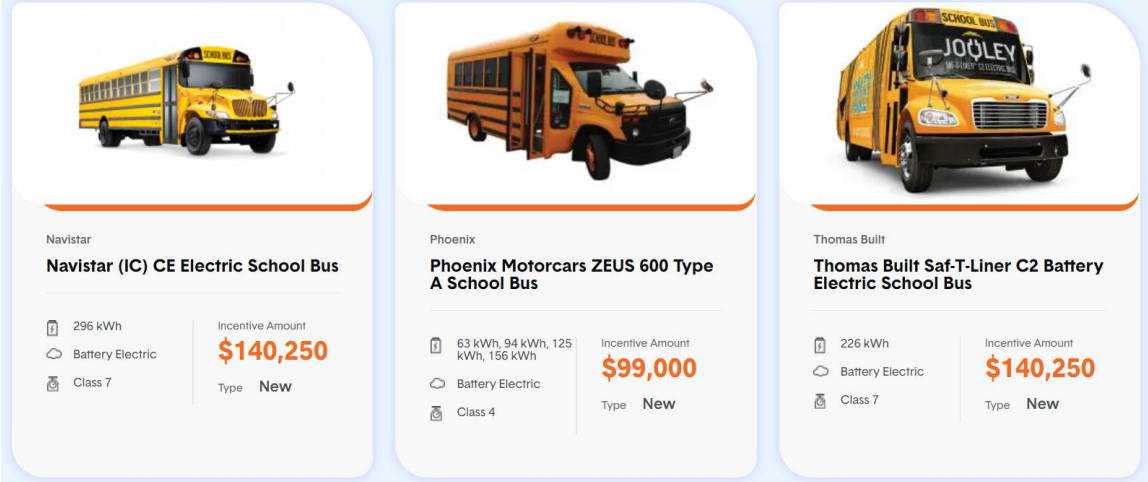
Incentive Amount
$99,000
Type New

Motiv Power Systems

Motiv on Ford E-450 Platform – School Bus

127 kWh
Battery Electric
Class 4

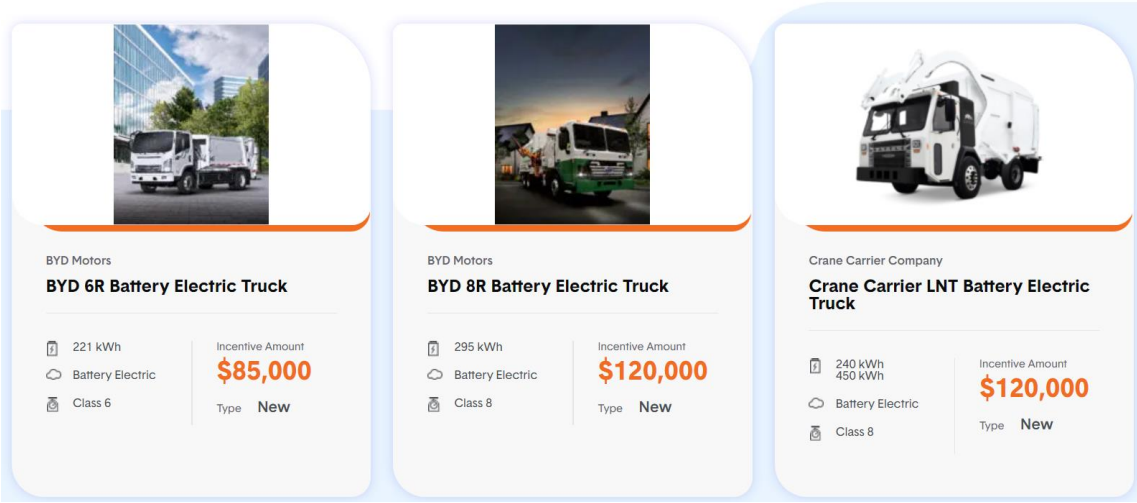
Incentive Amount
$99,000
Type New

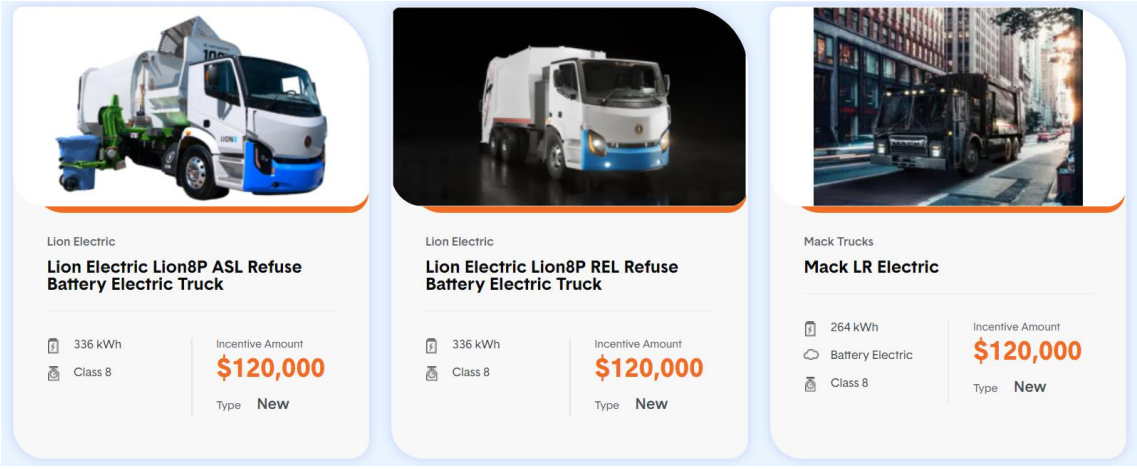


3.2. Electric Trucks and Related

The categories below are per the HVIP website (see reference 3 above).

3.2.1. Refuse Trucks





Peterbilt

Peterbilt Model 520 Battery Electric Truck

396 kWh
Battery Electric
Class 8

Incentive Amount
$120,000
Type New

SEA Electric

SEA Econic EV (on Freightliner Econic with SEA-Drive® Power-System)

220 kWh
Battery Electric
Class 8

Incentive Amount
$120,000
Type New

XL Fleet

XL Electric Class 6 Battery Electric Vehicle

180 kWh
Battery Electric
Class 6

Incentive Amount
$85,000
Type New

3.2.2. Step and Panel Vans

Envirotech Drive Systems Incorporated

EVT C Series 4×2

106.2 kWh, 90.8 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Freightliner Custom Chassis Corporation

Freightliner MT50e Battery Electric Truck

220 kWh
Battery Electric
Class 5

Incentive Amount
$60,000
Type New

Freightliner Custom Chassis Corporation

Freightliner MT50e Battery Electric Truck

220 kWh
Battery Electric
Class 6

Incentive Amount
$85,000
Type New

GreenPower Motor Company

GreenPower EV Star CarGo

118 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Lightning Systems

Lightning eMotors FT3-43/86 Battery Electric Vehicle

43 kWh
86 kWh
Battery Electric
Class 3

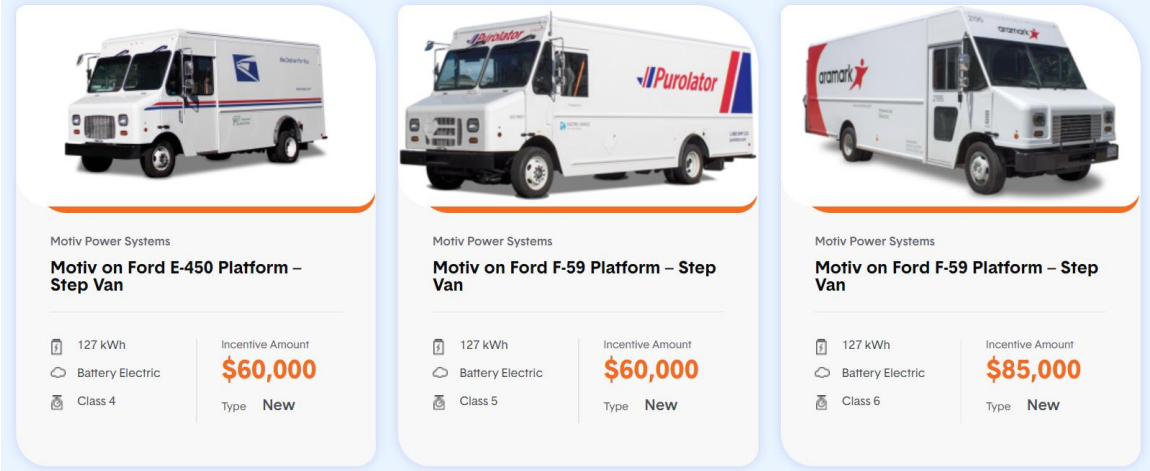
Incentive Amount
$45,000
Type New

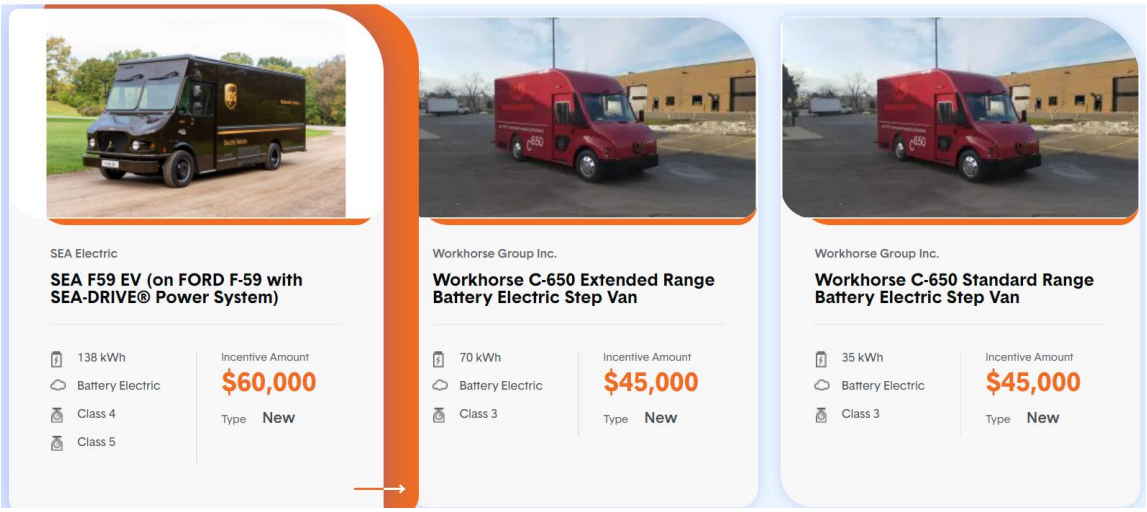
Lightning Systems

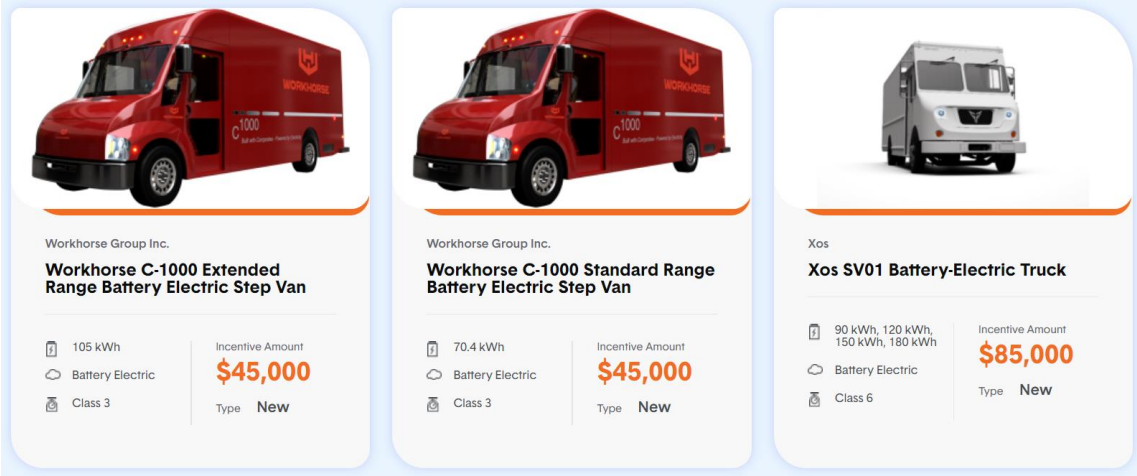
Lightning Systems FT3-43/86 Repower Bus (Ford Transit T-350 with Lightning Electric Powertrain)

43 kWh 86 kWh
Battery Electric
Class 3

Incentive Amount
$22,500
Type Conversion







3.2.3. Straight Truck

Note that a “straight truck” is a truck with a 1-piece rigid frame (verses a separate tractor and trailer). Box trucks and flat-bed trucks are straight trucks but so are many specialized trucks (vocational trucks in the lingo). This is perhaps the most popular truck.

Alpha Mobility

Alpha Mobility Model G Truck

108 kWh
144 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

BYD Motors

BYD 6F Battery Electric Truck

221 kWh
Battery Electric
Class 6

Incentive Amount
$85,000
Type New

BYD Motors

BYD 6F Plus Battery Electric Truck

221 kWh
Battery Electric
Class 6

Incentive Amount
$85,000
Type New

BYD Motors

BYD 6R Battery Electric Truck

221 kWh
Battery Electric
Class 6

Incentive Amount
$85,000
Type New

Crane Carrier Company

Crane Carrier LNT Battery Electric Truck

240 kWh
450 kWh
Battery Electric
Class 8

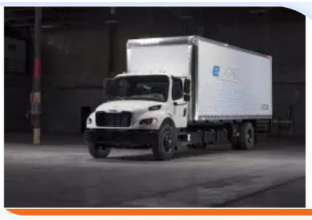
Incentive Amount
$120,000
Type New

Envirotech Drive Systems Incorporated

EVT C Series Cutaway, Urban Cab Over

77.8 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New



Freightliner

Freightliner eM2 Battery Electric Truck

315 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

GreenPower Motor Company

GreenPower EV Star Cargo Plus

118 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

GreenPower Motor Company

GreenPower EV Star CC

118 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Hexagon Purus Systems

Hexagon Purus eM2 Battery Electric Truck

220 kWh
440 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

Navistar

International MV Battery Electric Truck

105 kWh
210 kWh
315 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

Kenworth

Kenworth K270E Battery Electric Truck

141 kWh
209 kWh
282 kWh
Battery Electric
Class 7

Incentive Amount
$85,000
Type New

Kenworth

Kenworth K370E Battery Electric Truck

141 kWh
282 kWh
Battery Electric
Class 7

Incentive Amount
$85,000
Type New

Lightning Systems

Lightning Systems FE4-86/129 Truck (Ford E-450 with Lightning Electric Powertrain)

129 kWh, 86 kWh
Battery Electric
Class 4

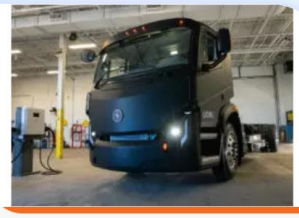
Incentive Amount
$60,000
Type New

Lightning Systems

Lightning Systems G65-96/128/160/192 Truck (Chevrolet/Isuzu 6500XD LCF with Lightning Electric Powertrain)

96 kWh, 128 kWh,
160 kWh, 192 kWh
Battery Electric
Class 6

Incentive Amount
$85,000
Type New



Lion Electric

Lion Electric LION6 Battery Electric Truck

Up to 252 kWh
Battery Electric
Class 6

Incentive Amount
$85,000
Type New

Lion Electric

Lion Electric Lion8P Battery Electric Straight Truck

336 kWh
Battery Electric
Class 8

Incentive Amount
$120,000
Type New

Motiv Power Systems

Motiv E-450 – Box Truck

127 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Motiv Power Systems

Motiv E-450 – Utility Truck

127 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Peterbilt

Peterbilt Model 220 Battery Electric Truck

141 kWh
209 kWh
282 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

Phoenix

Phoenix Motorcars E450 Battery Electric Vehicle

63 kWh, 94 kWh, 125 kWh, 156 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Phoenix

Phoenix Motorcars ZEUS 500 Cargo Truck

63 kWh, 94 kWh, 125 kWh, 156 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Phoenix

Phoenix Motorcars ZEUS 500 Flatbed Truck

63 kWh, 94 kWh, 125 kWh, 156 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

Phoenix

Phoenix Motorcars ZEUS 500 Utility Truck

63 kWh, 94 kWh, 125 kWh, 156 kWh
Battery Electric
Class 4

Incentive Amount
$60,000
Type New

ROUSH CleanTech

ROUSH CleanTech Ford F-650 Battery Electric Vehicle

138 kWh
Battery Electric
Class 6

Incentive Amount
$85,000
Type new

SEA Electric

SEA 4500 EV (on GMC 4500 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 4
Class 5

Incentive Amount
$60,000
Type New

SEA Electric

SEA 5500 EV (on GMC 5500 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 4
Class 5

Incentive Amount
$60,000
Type New

SEA Electric

SEA 6500 EV (on GMC 6500 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

SEA Electric

SEA F-450 EV (on FORD F-450 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 4
Class 5

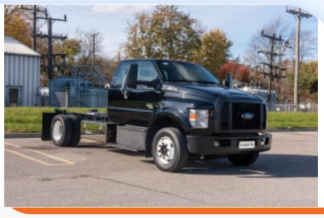
Incentive Amount
$60,000
Type New

SEA Electric

SEA F-550 EV (on FORD F-550 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 4
Class 5

Incentive Amount
$60,000
Type New



SEA Electric

SEA F-650 EV (on FORD F-650 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

SEA Electric

SEA F-750 EV (on FORD F-750 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$120,000
Type New

SEA Electric

SEA F53 EV (on FORD F-53 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 4
Class 5

Incentive Amount
$60,000
Type New

SEA Electric

SEA F53 EV (on FORD F-53 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

SEA Electric

SEA F59 EV (on FORD F-59 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

SEA Electric

SEA FSR EV (on Isuzu FSR with SEA-Drive® Power-System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

SEA Electric

SEA L6 EV (on HINO L6 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

SEA Electric

SEA L7 EV (on HINO L7 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

SEA Electric

SEA M2 106 EV (on Freightliner M2 106 with SEA-DRIVE® Power System)

220 kWh
Battery Electric
Class 8

Incentive Amount
$120,000
Type New

SEA Electric

SEA M4 EV (on HINO M4 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 4
Class 5

Incentive Amount
$60,000
Type New

SEA Electric

SEA M5 EV (on HINO M5 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 4
Class 5

Incentive Amount
$60,000
Type New

SEA Electric

SEA MT45 EV (on Freightliner MT45 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 4
Class 5

Incentive Amount
$60,000
Type New

SEA Electric

SEA MT55 EV (on Freightliner MT55 with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$85,000
Type New

SEA Electric

SEA NPR EV (on ISUZU NPR with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 4
Class 5

Incentive Amount
$60,000
Type New

SEA Electric

SEA NQR EV (on ISUZU NQR with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 4
Class 5

Incentive Amount
$60,000
Type New

SEA Electric

SEA NRR EV (on ISUZU NRR with SEA-DRIVE® Power System)

138 kWh
Battery Electric
Class 6
Class 7

Incentive Amount
$60,000
Type New

Volvo

Volvo VNRe Battery Electric Truck

375 kWh
Battery Electric
Class 7

Incentive Amount
$85,000
Type New

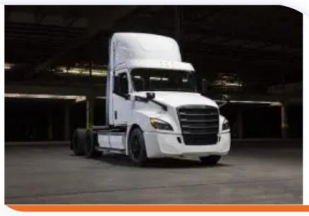
3.2.4. Tractors

BYD Motors

BYD 8TT Battery Electric Truck

435 kWh
Battery Electric
Class 8

Incentive Amount
$120,000
Type New



Freightliner

Freightliner eCascadia Battery Electric Truck

475 kWh
Battery Electric
Class 8

Incentive Amount
$120,000
Type New

Kenworth

Kenworth T680E Battery Electric Truck

396 kWh
Battery Electric
Class 8

Incentive Amount
$120,000
Type New

Lion Electric

Lion Electric Lion8T Battery Electric Truck

653 kWh
Battery Electric
Class 8

Incentive Amount
$120,000
Type New

Nikola

Nikola TRE Battery Electric Truck

753 kWh
Battery Electric
Class 8

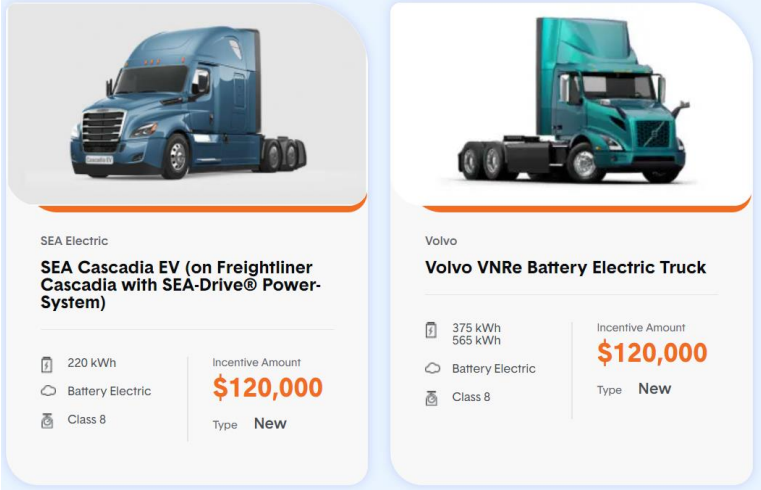
Incentive Amount
$120,000
Type New

Peterbilt

Peterbilt 579 Battery Electric Truck

396 kWh
Battery Electric
Class 8

Incentive Amount
$120,000
Type New

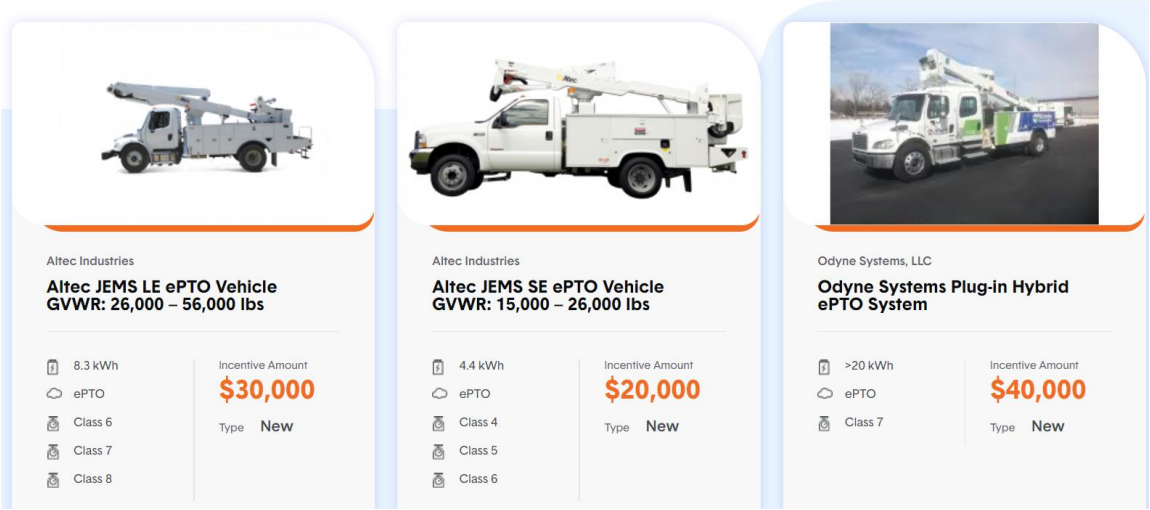


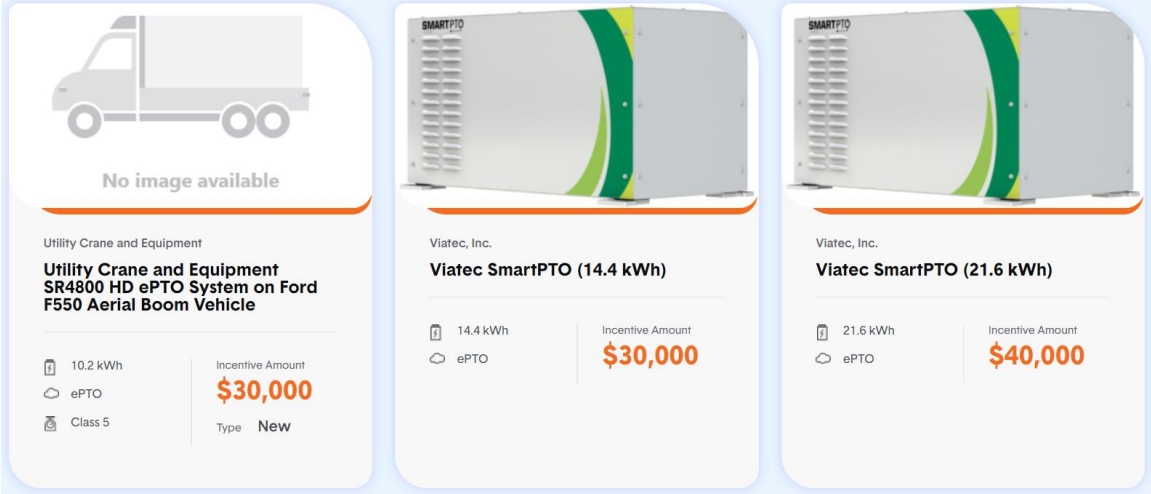
3.2.5. ePTO

This section needs a bit of explanation, because it has vehicles (mostly IC, but there is one hybrid), and vehicle accessories, that are primarily intended for IC trucks.

Back when fuel was cheap, many trucks had hydraulic systems to power various types of actuators (like cranes, bucket booms, lift-gates, etc.). Although hydraulics work well for this, there is just one problem: the hydraulic pump is powered from the engine, and you need to keep it running to use the actuators, and it burns fuel, which emits pollution (GHG and other pollutants).

A PTO is a power takeoff, jargon for the system I described in the above paragraph. An ePTO is an electric power takeoff, which typically an electric hydraulic pump (and typically a battery, control system and other components so the engine does not need to be running when actuators are used). Both of these devices have HVIP incentives, as described below. Note that I have not put their manufacturers in the "…Maufacturers" section below (do a Web-search on the companies if you are interested in these).





3.3. Bus, Truck and Related Manufacturers

Bus and Truck manufacturers come in a wide variety of types. First there are EV-only manufacturers, like BYD and Proterra. Then there are manufacturers of both EV and internal-combustion (IC) vehicles like New Flyer and Peterbilt. Then there are many small-to medium-sized bus and truck manufacturers that convert existing buses and trucks or rely on other chassis manufacturers and/or other component manufacturers for the pieces needed to assemble vehicles, like Lightning Systems and XL Fleet. Below we will categorize these as “Large EV Builders,” “Large ICV & EV builders,” and “Small Vehicle Builders.” Each subsection is in alphabetical order by manufacturer.

3.3.1.1. Large EV Builders

BYD manufactures electric buses in the U.S. China and Europe, and is (mostly) a U.S. company although its roots (and largest market) are in China. Last year BYD indicated that it had sold 1,000 buses in the U.S. BYD builds battery-electric buses and coaches at BYD's 550,000 square foot manufacturing facility in Lancaster, California.[5]

GreenPower Motor Company has headquarters in Vancouver, BC, Canada, with sales offices and manufacturing facilities in California and West Virginia. GreenPower designs, builds and distributes a full suite of high-floor and low-floor all-electric medium and heavy-duty vehicles, including transit buses, school buses, shuttles, cargo van and a cab and chassis. GreenPower employs a clean-sheet design to manufacture all-electric vehicles that are purpose-built to be battery-powered with zero emissions while integrating global suppliers for key components.[6]

Hexagon Purus Systems is based in Norway but has offices in California, Maryland Nebraska, and Canada (BC).

We are global leaders in key technologies needed for zero emission mobility, providing type 4 high-pressure cylinders, fuel storage and distribution systems for hydrogen, complete vehicle systems and battery packs for fuel cell electric and battery electric vehicles (FCEV and BEV).[7]

[5] BYD Buses, https://en.byd.com/bus/
[6] Green Power Motor Company, https://greenpowermotor.com/
[7] Hexagon Purus, https://hexagonpurus.com/

Hexagon Purus appears to mainly be a major component supplier for battery-electric and fuel-cell (hydrogen) electric vehicles. However they also make complete class-6 and class-7 box trucks, and these appear to be specifically for the U.S. and Canadian market.

Lion Electric *is a leader in the design, development, manufacturing, and distribution of purpose-built all-electric medium and heavy-duty urban vehicles.*[8]

Lion's growing line-up of purpose-built all-electric vehicles consists of seven mid-range truck and bus models available for purchase today. Lion further has an active product development pipeline and expects to launch eight new mid-range truck and bus models over the next two years.

Lion's vehicles and technology benefit from more than nine million miles driven by more than 550 of its purpose-built all-electric vehicles that are on the road today, in real-life operating conditions.

Lion Electric has offices in Canada (PQ), California and Illinois.

Proterra has helped more than 100 public transit customers throughout the continent implement battery-electric buses and charging infrastructure, powering the shift to 100% electric fleets. Proterra's headquarters are in the San Francisco Bay Area, and they have manufacturing facilities in Southern California and South Carolina. [9]

Recently Proterra has evolved from an EV bus manufacturer to providing components to other bus manufacturers, and many smaller manufacturers use their products. Go through the link below for details.

https://www.proterra.com/proterra-powered/

Workhorse *has more electric delivery vehicles on the road than any other company.*[10]

Our next generation C-Series Vans are all-electric by design, with composite technology, and a 100-mile range. Our previous delivery vans, E-100 and E-GEN, have more than 8.5 million miles on them and are used by some of the premier package delivery companies in the world.

Workhorse has three facilities – two in Ohio and one in Indiana.

3.3.1.2. Large ICV & EV Builders

Battle Motors *began in 1946 as* ***Crane Carrier Company (CCC)*** *by modifying, reinforcing and re-manufacturing surplus military vehicles for the construction and petroleum industries. As the company grew with their markets' requirements, modifying commercial and military chassis became less suitable for their customers' needs, and the company began designing and manufacturing their own custom chassis for the mobile crane market.*[11]

Battle Motors is a leader in the vocational truck industry, providing custom, severe-service chassis and purpose built vehicles for the refuse and recycling, infrastructure

[8] Lion Electric, https://thelionelectric.com/en
[9] Proterra, Public Transit, https://www.proterra.com/applications/public-transit/
[10] Workhorse, https://workhorse.com/
[11] Battle Motors, https://www.cranecarrier.com/

maintenance, ground support, agriculture and oil and gas industries under Battle Motors Engineered Chassis brands.

CCC was acquired by Hines Corporation in June of 2013 and the company's headquarters was relocated to New Philadelphia, Ohio. Under Hines, a strategic merger was initiated to join CCC and Kimble Manufacturing forming Hines Specialty Vehicle Group – manufacturer of custom heavy-duty chassis and purpose built vehicles for the refuse and recycling, infrastructure maintenance, ground support, agriculture, oil and gas, and concrete mixer markets.

CCC has now embarked on a new chapter in the company's long and distinguished history via acquisition by Battle Motors, a company committed to accelerating the world's transition to sustainable energy through manufacturing the most durable and performance-driven class 7 and 8 electric trucks.

Battle Motors is positioned to lead the way in electrification of the severe-service vocational truck market.

Battle Motors has facilities in California and Ohio.

***Blue Bird** offers a complete line of Type A, C and D school buses in a variety of options and configurations. Since 1927, Blue Bird Corporation has continued to set industry standards with its innovative design and manufacturing capabilities. Additionally, Blue Bird provides comprehensive financial solutions through Blue Bird Capital Services. Today, Blue Bird has more than 1,500 employees, Georgia-based manufacturing facilities and an extensive network of Dealers and Parts & Service facilities throughout North America. Its global presence can be seen in more than 60 countries through sales into Africa, Asia, the Caribbean, Latin America, Europe and the Middle East.*[12]

Note that **"Micro Bird"** is a Blue Bird Product.

***Freightliner** marks its 80th anniversary in 2022. While its history is integral to the brand, Freightliner remains future-focused, always advancing new technologies and leading the industry through innovation. A continuing emphasis on quality through innovation intersects perfectly with our ongoing, technologically inspired, passionate drive to create the best-of-the-best trucks on the road.*[13]

Freightliner is a division of Daimler Truck North America. They make two EV Trucks, the eCascadia heavy-duty truck and the eM2 medium duty truck. They also have a "Custom Chassis" division that seems to just build chassis for custom fabricators.

Another division makes *"The all-new, all-electric MT50e commercial-grade walk-in van chassis merges Freightliner Custom Chassis' legendary performance with Proterra's advanced EV technology to meet the demands of last-mile delivery by generating incredible power and range – with zero emissions."*[14]

Kenworth has been making trucks since 1923. Their primary location is in Washington. Kenworth has been a wholly owned subsidiary of PACCAR since 1945. They make a wide range of IC trucks and two battery-electric trucks: A class-8 in a day-cab tractor and

[12] Blue Bird, https://www.blue-bird.com/
[13] Freightliner, https://freightliner.com/why-freightliner/
[14] https://www.electricwalkinvan.com/

straight truck, and a class 6/7 box truck. They also have ten pilot fuel-cell electric vehicles deployed to the Port of Los Angeles.[15]

***Mack** was founded in 1900, and our trucks are sold and serviced in nearly 30 countries worldwide. We are one of North America's largest manufacturers of medium-duty trucks, heavy-duty trucks, proprietary engines and transmissions.[16]*

Mack is part of the Volvo Group, one of the world's leading manufacturers of diesel, natural gas and electric trucks, buses, construction equipment, marine and industrial engines.

Every heavy-duty class 8 Mack truck built for the North American market is assembled at its Mack Lehigh Valley Operations facility in Macungie, PA. Class 7 and 6 Mack trucks are built at the Roanoke Valley Operations facility in Roanoke, VA. Engines, transmissions and rear axles for the North American market are manufactured at its powertrain facility in Hagerstown, MD.

***MCI (Motor Coach Industries)** delivered its first coach in 1933 and is now the leading coach manufacturer in North America, with fabrication, manufacturing, and service centers in the United States and Canada…[17]*

MCI is a subsidiary of NFI Group Inc. (NFI) and is North America's public and private market motor coach leader. MCI is North America's public and private market motor coach leader. Products include the luxury J-Series (an industry best-seller for over a decade), the workhorse D-Series, and the brand new zero-emission luxury and commuter coaches: the battery-electric J4500 CHARGE™ and MCI D45 CRT LE CHARGE™. With nearly 30,000 MCI coaches on the road, MCI also provides maintenance, repair, 24-hour roadside assistance, parts, and technician training through the industry's only Automotive Service Excellence (ASE) accredited MCI Academy.

As indicated by the above, this manufacturer offers two electric coach models. The "LE…" offers *a revolutionary patented low entry vestibule with a seating area and ramp that significantly improves dwell times and the boarding and ride experience for passengers with disabilities and mobility challenges.[18]*

Navistar makes school buses and **International** trucks. It has a single EV school bus model, the "Electric CE." I was also able to find a single truck model that appeared to be electric, but it wasn't easy.[19]

New Flyer is the buses product name. The Company name is NFI Group. Each has its own web site (links below).

https://www.newflyer.com

https://www.nfigroup.com/press-releases/

[15] Kenworth, https://www.kenworth.com/
[16] Mack Trucks, https://www.macktrucks.com/
[17] MCI, https://www.mcicoach.com/
[18] MCI, https://www.mcicoach.com/coach/electric-series/features/
[19] Navistar, https://www.navistar.com/our-path-forward/battery-electric and International Trucks, https://www.internationaltrucks.com/trucks/emv-series

Except the NFI Group also owns a UK Bus Manufacturer (Alexander Dennis Limited) that seems to have ties to BYD.

From the above New Flyer site:

New Flyer was founded in 1930 and is now the largest transit bus manufacturer in North America, with fabrication, manufacturing, and service centers in the United States and Canada. We continue building on our 90+ year legacy of innovation to deliver innovative mobility solutions and technology that meets the demands of communities today, and into the future.

New Flyer offers both battery-electric buses and fuel-cell-electric buses, and there are several of each in the above "picture-book" from the California HVIP Program.

NovaBus was founded in 1979, and was originally part of GMC. The company went through several owners before becoming exclusively owned by Volvo in 2006. They delivered their first EV bus in 2017. This was internally developed. One calling card for their EV model is the availability of a battery with a total capacity of 564 kWh, providing a range of 350 miles.[20]

***Peterbilt** has supplied the North American commercial vehicle market with the industry's most rugged, reliable and efficient products for 80 years.*

Based in Denton, Texas, Peterbilt manufactures on highway, vocational and medium duty trucks that provide value to their owners and pride to their drivers. These vehicles are supported through industry-leading aftermarket programs and a dedicated network of independent dealerships.[21]

Peterbilt builds several EV Trucks.

***Thomas Built Buses** is a leading manufacturer of school, activity, commercial and childcare buses based in High Point, North Carolina. We serve communities and schools throughout the U.S. and Canada through our network of independently owned dealerships. And as a subsidiary of Daimler Truck North America LLC (DTNA), the leading commercial vehicle manufacturer in North America, we have the resources to continually push innovation forward and put the needs of our customers first.[22]*

Why electric school buses? Because tomorrow has never been more important. It's no secret that electric school buses are built to make tomorrow cleaner, greener and brighter. But they're also designed with innovations to make todays' school routes smarter, more efficient—and even safer. The future has arrived, right on schedule.

The Saf-T-Liner® C2 Jouley® is the culmination of years of electric school bus research, development and testing—and it's ready today. We built Jouley on our popular Saf-T-Liner C2 chassis to deliver all the driver comfort, ease of maintenance and exceptional durability that you'd expect from a Thomas Built bus.

Volvo makes one electric model for the U.S., the VNR electric: *Our constant drive to innovate has made us the global leader in electro-mobility for Class 8 vehicles. The VNR Electric is proof of our commitment to reduce pollution, noise, and traffic on crowded*

[20] NovaBus, https://novabus.com/
[21] Peterbilt, https://www.peterbilt.com/electric-vehicles
[22] Thomas Built Buses, https://thomasbuiltbuses.com/

urban streets. Today we are proud to introduce enhanced VNR Electric models that feature up to 85% improvement in range, faster charging, and a wider range of configurations.[23]

This is available as both a straight truck and a semi-tractor.

3.3.1.3. Small Vehicle Builders

Alpha Mobility: Probably no longer in business. My search engine found multiple pages, but the only thing I saw when I clicked through was "Website Expired."

Envirotech Vehicles (EVTV) *is a transportation industry-leading provider and manufacturer of purpose-built, all-electric, zero-emission vehicles and zero-emission drive trains for integration in medium to heavy-duty commercial fleet vehicles. We serve commercial and last-mile delivery fleets, school districts, public and private transportation service companies, colleges, and universities and meet the increasing demand for heavy-duty electric vehicles.*[24]

Envirotech Vehicles brings over 30 years of in-depth industry expertise to our valued customers, as well as access to an innovative, growing customer-ready product line of vehicles, systems and technology. We focus on providing our customers with unique, cost-effective solutions and addressing the challenges of traditional fuel price cost instability and local, state and federal environmental regulatory compliance.

Envirotech Vehicles formed as the result of the merger of two leaders in the commercial electric vehicle space: ADOMANI Inc., a trusted provider of state-of-the-art vehicles and systems, and Envirotech Drive Systems, Inc. ("EVT"), North America's first and only manufacturer of purpose-built all-electric zero-emission Class 3, 4, 5, and 6 vehicles – resulting in the combined power of best-in-class green technology and convenient product availability, all at cost-effective prices.

Envirotech Vehicles HQ is in California and they are building a manufacturing facility in Arkansas. They are definitely small. They seem to have a single chassis design with three varients.

ENC: Finding the real El Dorado National Company (ENC) has been a strange search. The original company was once a single company with two manufacturing locations (Kansas and California). It split a few years ago, and only the California Company (ENC) manufactures EVs plus IC-Buses. The former include a fuel-cell bus and a battery electric bus (see below).

Based on the proven Axess platform, the Axess Battery Electric Bus (BEB) is a true zero emission transportation solution. ElDorado National (California), Inc. (ENC) has partnered with Cummins Inc. the industry leader in heavy-duty bus propulsion systems. Cummins supports the electric propulsion system and batteries through over 600 distributors world-wide. The Axess-BEB is the perfect climate neutral mobility solution for transit, airport, university and other high demand applications.[25]

Note that ENC seems to prefer Cummins IC engines.

[23] Volvo VNR Electric, https://www.volvotrucks.us/trucks/vnr-electric/
[24] EVTV, https://evtvusa.com/
[25] https://www.eldorado-ca.com/electric-bus

ENC says the Axess FC, a hydrogen fuel cell bus, also known as "battery dominant fuel cell bus," offers an innovative alternative fuel solution relying on compressed hydrogen for power. Electric fuel cells produce electricity and that energy is stored in hydrogen tanks. The resulting energy storage is twice that of a battery electric bus. ENC notes that it has increased range, extending beyond 300 miles, and a faster fueling time which means no major disruption to the bus facility.[26]

I found a 2019 article that that said the fuel cell was provided by Ballard, and BAE was also a partner in the integration of the ENC bus. The bus was being used for demonstrations.[27]

Lightning eMotors in Loveland, CO specialized in converting existing (used) buses and trucks to EVs, or using existing platforms (like Ford Vans) to convert these to new EVs. They were formerly known as Lightning Systems. The text below is from their site (also linked below).

Lightning eMotors (NYSE: ZEV), based in Loveland, Colorado, has been providing specialized and sustainable fleet solutions since 2009, deploying complete zero-emission-vehicle (ZEV) solutions for commercial fleets since 2018 – including Class 3 cargo and passenger vans, Class 4 and 5 cargo vans and shuttle buses, Class 4 Type A school buses, Class 6 work trucks, Class 7 city buses, and Class A motor coaches. The Lightning eMotors team designs, engineers, customizes, and manufactures zero-emission vehicles to support the wide array of fleet customer needs including school buses and ambulances, with a full suite of control software, telematics, analytics, and charging solutions to simplify the buying and ownership experience and maximize uptime and energy efficiency. Lightning eMotors also offers charging technologies and "charging as a service" (CaaS) to commercial and government fleets via its Lightning Energy division. To learn more, visit https://lightningemotors.com

Motiv Power Systems have been in business since 2009. They use standard Ford medium-duty (F-450) platforms and customize them for many short-range applications (slightly over 100 miles range, which is OK for delivery and other similar applications). Their headquarters and manufacturing is in the San Francisco Bay Area.[28]

Nikola Corporation: Yes these guys are still alive. After the fiascos in years past, I'm guessing you wondered (I wrote them off). They have also taken the same path that many other small companies have taken – find some proven components, then take the path of least resistance.

Nikola Corporation (Nasdaq: NKLA), a global leader in zero-emission transportation and energy infrastructure solutions, and Proterra Inc (Nasdaq: PTRA), a leading innovator in commercial vehicle electrification technology, today announced a strategic, multi-year

[26] Mass Transit, "ENC introduces next generation of fuel cell buses," Sep 2019, https://www.masstransitmag.com/bus/vehicles/hybrid-hydrogen-electric-vehicles/press-release/21107641/eldorado-national-enc-introduces-next-generation-of-fuel-cell-buses
[27] https://www.sartaonline.com/sarta-takes-hydrogen-fuel-cell-bus-on-tour/
[28] https://www.motivps.com/

supply agreement to power Nikola zero-emission semi-trucks with Proterra's industry-leading battery technology.[29]

Proterra product is expected to be incorporated in the Nikola Tre battery-electric vehicle (BEV) and Tre fuel cell electric vehicle (FCEV). The first Proterra Powered Nikola semi-trucks are expected to be produced in the fourth quarter of 2022, with Proterra delivering prototype systems to Nikola starting in the second quarter of 2022.

…Nikola also recapped some of its more notable progress toward commercialization, including pilot testing with customers like Anheuser-Busch and Total Transportation Services Inc. (TTSI), securing a battery deal with Proterra, and working with Corcentric Fleet Funding Solutions to help finance its trucks.[30]

The company said it delivered the first two Tre BEVs to TTSI in California as a part of a three-month pilot program. The trucks have hauled multiple loads per day and logged more than 4,500 miles combined and have completed a 204-mile journey on a single charge, the longest range of any BEV TTSI has tested, the company said…

Nikola also began piloting its fuel cell electric truck, the Tre FCEV, with Anheuser-Busch. The company said that two Nikola Tre FCEV alphas are undergoing a three-month pilot in daily service within the brewer's Southern California distribution network…

Phoenix Motorcars is in Anaheim, California. They use a Ford platform (E450), and offer various trucks and buses. They offer an assortment of different battery sizes to give anywhere from 70 to 160 miles of range.[31]

***SEA Electric** was founded in Australia in 2012 and headquartered in Los Angeles, CA, creating its proprietary electric power-system technology (known as SEA-Drive®) for the world's urban delivery and distribution fleets.*[32]

SEA Electric launched its first model in 2017 and has since released several medium and heavy duty commercial electric vehicles including delivery trucks, garbage trucks, tipper trucks, tilt tray trucks, reefer trucks, cherry picker trucks, shuttle buses, cargo vans and passenger vans. SEA Electric's power-system known as the SEA-Drive® is adaptable to most OEM glider chassis from Class 3 to Class 8 (3.5t to 29t).

My take on this company is that they build semi-custom EV buses and trucks. They have converted a huge number of truck models from major manufacturers. They have two offices in the U.S., one in California (of course) and one in Iowa.

Roush Cleantech is a vehicle converter that mainly converts trucks to use "clean fuel" (read: propane/LNG). They converted a Ford F650 to battery-electric operation using Proterra components. They are located in Michigan.[33]

---

[29] Nikola, "Nikola and Proterra Agree to Long-Term Battery Supply for Zero-Emission Class 8 Semi Trucks," Jan 18, 2022, https://nikolamotor.com/press_releases/nikola-and-proterra-agree-to-long-term-battery-supply-for-zero-emission-class-8-semi-trucks-150

[30] Kirsten Korosec, Alex Wilhelm, Tech Crunch, "Nikola reports EV truck progress, stiff losses as it closes out turbulent 2021," Feb 24, 2022, https://techcrunch.com/2022/02/24/nikola-earnings-report-ev-truck-progress-stiff-losses-2021/

[31] https://www.phoenixmotorcars.com/

[32] https://www.sea-electric.com/about/

[33] Roush Cleantech, https://www.roushcleantech.com/

Van Hool *of Belgium manufactures approximately 1,400 buses and coaches, and as many as 3,000 commercial vehicles annually of which 80 % are exported worldwide. With a workforce of over 4,500, Van Hool is a major bus manufacturer in Europe, offering a complete range of buses for public transport for international markets, ranging from a 9 m midi bus to a 25 m double articulated low floor bus.*[34]

No EVs sold in the U.S. per their web site. Their chances of selling a significant number here are slim, given the local competition.

XL Fleet *was founded as XL Hybrids in 2009 when the green transportation market looked very different than it does today. The average price of gas in the US was $1.84/gallon (diesel was $2.27) and electrification for fleet vehicles was in its infancy. In fact, very few of the companies selling hybrids, plug-in hybrids, or all-electric fleet vehicles in 2009 are still around today.*[35]

Founded by MIT alumni and green energy veterans, the company was on a mission to provide simple, sustainable electrification solutions to the commercial fleet market – a previously untapped space with a large number of vehicles with low mileage and high emissions.

Over one decade and more than 170 million customer miles later, that mission continues. XL Fleet has become the undisputed leader in fleet electrification solutions for Class 2-6 commercial and municipal vehicles. With thousands of XL-equipped vehicles on the road, we have helped save our customers well over 3 million gallons of fuel and eliminated over 26,000 metric tons of CO_2 emissions from the atmosphere.

XL at a Glance: Driving Fleet Sustainability:

- *Industry leader in electrification for Class 2-6 commercial fleet vehicles*
- *Strong partnerships with major OEMs (Ford, GM, Isuzu, Stellantis)…*

Xos *is a leading manufacturer of fully electric, zero-emission medium- and heavy-duty commercial vehicles, powertrain components, and charging infrastructure. The company was founded in 2016 by Dakota Semler and Giordano Sordoni, two former fleet owners and operators, who sought to build an electric vehicle to solve the issues they were facing first-hand around increasing emissions regulations and the rising costs of maintenance and diesel. Xos' mission is to decarbonize commercial transportation and facilitate a seamless transition for fleet owners from traditional internal combustion engines to fully-electric vehicles. Its proprietary battery system, the X-Pack, and modular chassis, the X-Platform, are purpose-built for medium- and heavy-duty commercial vehicles in the last-mile sector. The fleet-as-a-service offering provides customers with a comprehensive suite of products and services, such as vehicle maintenance and purchase financing, to help fleets more easily make the transition from diesel to electric.*[36]

Xos vehicles have been in use by commercial fleets since 2018 and are currently operated by multiple Fortune 500 companies. Notable customers include FedEx ISPs, Loomis, UniFirst, and Wiggins Lift Co. to name a few. The company is headquartered in Los Angeles, where its battery packs are built in-house, and has additional manufacturing facilities in Tennessee and Mexico, with more to come in the near future.

[34] Van Hool, https://www.vanhool.be/en/
[35] XL Fleet, https://www.xlfleet.com/
[36] Xos, https://xostrucks.com/

4. Federal Funding for EV Buses

The Grants for Buses and Bus Facilities Program (49 U.S.C. 5339) makes federal resources available to states and direct recipients to replace, rehabilitate and purchase buses and related equipment and to construct bus-related facilities including technological changes or innovations to modify low or no emission vehicles or facilities. Funding is provided through formula allocations and competitive grants.[37]

4.1. Eligible Recipients

Eligible applicants include designated recipients that allocate funds to fixed route bus operators, states or local governmental entities that operate fixed route bus service, and Indian tribes. Eligible subrecipients include all otherwise eligible applicants and also private nonprofit organizations engaged in public transportation.

4.2. Eligible Activities

Capital projects to replace, rehabilitate and purchase buses, vans, and related equipment, and to construct bus-related facilities, including technological changes or innovations to modify low or no emission vehicles or facilities.

4.3. Funding

Funds remain available for obligation for four fiscal years. This includes the fiscal year in which the amount is made available or appropriated plus three additional years.

There are three components to this program. The first is a continuation of the formula bus program established on under MAP-21.[38] *The remaining two components include the bus and bus facilities competitive program based on asset age and condition, and a low or no emissions bus deployment program. A pilot provision allows designated recipients in in urbanized areas between 200,000 and 999,999 in population to participate in voluntary state pools to allow transfers of formula funds between designated recipients during the period of the authorized legislation.*

4.4. Match

The federal share of eligible capital costs is 80 percent of the net capital project cost, unless the grant recipient requests a lower percentage. The Federal share may exceed 80 percent for certain projects related to the ADA, the Clean Air Act (CAA), and certain bicycle projects.

4.5. Low or No Emission Vehicle Program

The Low or No Emission competitive program provides funding to state and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities.[39]

[37] U.S. Department of Transportation, Federal Transit Administration "Grants for Buses and Bus Facilities Program," https://www.transit.dot.gov/bus-program
[38] See https://www.transit.dot.gov/regulations-and-guidance/safety/map-21-overview
[39] U.S. Department of Transportation, Federal Transit Administration, "Low or No Emission Vehicle Program," https://www.transit.dot.gov/lowno

4.6. The Latest News

…In the coming weeks, EPA plans to announce a new Clean School Bus rebate program under the Bipartisan Infrastructure Law, which provides an unprecedented $5 billion over five years, to replace existing school buses with low- or zero-emission school buses.

"The historic investments in clean transportation resulting from President Biden's leadership will have lasting impacts on protecting clean air for children for generations," said EPA Administrator Michael S. Regan. "This round of school bus grants from the American Rescue Plan is just the beginning. The unprecedented $5 billion investment that's on the way for clean and zero-emission school buses from the Bipartisan Infrastructure Law will transform how millions of children get to school and help build a better America for a new generation."

Go through the link below for the rest of this press release.

https://www.epa.gov/newsreleases/epa-awards-rebates-totaling-17-million-fund-clean-school-buses-reduce-diesel-emissions