



2025 GUIDE TO COMMERCIAL AND INDUSTRIAL ELECTRIC TRANSPORTATION



JANUARY 2025



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BEVs are electric vehicles in which the traditional combustion engine and transmission are replaced by batteries and electric motors. The battery size can vary just as fuel tank sizes can vary in combustion vehicles. BEVs rely on electricity as fuel, so they have no tailpipe emissions.

WHY ELECTRIC?

ELECTRIC TRANSPORTATION FOR BUSINESS





























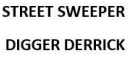





The Guide to Commercial and Industrial On-Road Electric Vehicles introduces the electric vehicles that are currently in use or can be used for commercial and industrial applications. Electricity currently moves materials, goods, and people through many means of transportation. The market for commercial and industrial electric vehicles and equipment continues to accelerate due to the continuous technology innovation and market synergies.

This guide is organized by commercial and industrial market segment and type of equipment.

ELECTRIC VEHICLE CHARACTERISTICS

This guide highlights battery-electric medium and heavy-duty vehicles that plug into the grid to charge their batteries.

VEHICLE CLASS DEFINITIONS

CLASS 1 – 6,000 lbs. or less				
				
SEDAN	PASSENGER VAN	SUV	COMPACT PICKUP	
CLASS 2 – 6,001 lbs. to 10,000 lbs.				
				
MID-SIZE PICKUP	FULL-SIZE PICKUP	CARGO VAN	STEP VAN	
CLASS 3 – 10,001 lbs. to 14,000 lbs.				
				
WALK-IN VAN	BOX TRUCK	CITY DELIVERY	HEAVY-DUTY PICKUP	
CLASS 4 – 14,001 lbs. to 16,000 lbs.				
				
LARGE WALK-IN	SHUTTLE BUS	UPFITTED TRUCK	STEP VAN	
CLASS 5 – 16,001 lbs. to 19,500 lbs.				
				
BUCKET TRUCK	DELIVERY TRUCK	LARGE WALK-IN VAN	OTHER UPFITTED TRUCK	
CLASS 6 – 19,501 lbs. to 26,000 lbs.				
				
TRANSIT BUS	SCHOOL BUS	STAKE BODY TRUCK	OTHER UPFITTED TRUCK	
CLASS 7 – 26,001 lbs. to 33,000 lbs.				
				
TRANSIT BUS	SCHOOL BUS	TRUCK TRACTOR	REFUSE TRUCK	STREET SWEEPER
				DIGGER DERRICK
				TANK TRUCK
CLASS 8 – 33,001 lbs. and above				
				
TRUCK TRACTOR	SLEEPER CAB	REFUSE TRUCK	CEMENT TRUCK	TANK TRUCK
				FIRE TRUCK

Gross Vehicle Weight Rating (lbs)	Federal Highway Administration		US Census Bureau
	Vehicle Class	GVWR Category	VIUS Classes
> 6,000	Class 1: < 6,000 lbs	Light Duty < 10,000 lbs	Light Duty < 10,000 lbs
10,000	Class 2: 6,001 – 10,000 lbs		
14,000	Class 3: 10,001 – 14,000 lbs	Medium Duty 10,001 – 26,000 lbs	Medium Duty 10,001 – 19,500 lbs
16,000	Class 4: 14,001 – 16,000 lbs		
19,500	Class 5: 16,001 – 19,500 lbs		
26,000	Class 6: 19,501 – 26,000 lbs		Light Heavy Duty 19,001 – 26,000 lbs
33,000	Class 7: 26,001 – 33,000 lbs	Heavy Duty > 26,001 lbs	Heavy Duty > 26,001 lbs
> 33,000	Class 8: > 33,001 lbs		

MEDIUM AND HEAVY-DUTY VEHICLES IN OPERATION

	TRANSIT BUSES	SCHOOL BUSES	M-DUTY TRUCKS	H-DUTY TRUCKS
Number of Vehicles	2,497	1,583	15,551	2,366
Number of OEMs	6	3	11	8
Number of OEMs not included	1	3	4	4
Manufacturers not Included:	Gillig	Green Power Lion Thomas Built	Bollinger Toyota Volvo Workhorse	Orange EV Nikola Mercedes Volvo

ELECTRIC TRANSIT BUSES



APPLICATION

Transit buses are designed to carry large numbers of passengers on fixed scheduled routes as public transportation. Cities will have fleets of hundreds of transit buses.

TECHNOLOGY

Electric transit buses have become very popular in the cities. Currently, there are nearly 2,500 transit buses on the road across the nation. There are at least four manufacturers with 23 different models.

CHARGING CAPABILITIES

Most transit buses are charged with DC only (Level 2 AC is not used). BYD has used 3 phase power to their inverters as a charger. Automated charging is an option that is generally used. The automated charging uses a pantograph defined by SAE J3105-1.

See the charging section, p 14.

AVAILABLE ELECTRIC TRANSIT BUSES

Year	Make	Model	Type	Length (feet)	Seating (max)	Battery Energy (kWh)	Charge Systems			Reported Range (miles)	Propulsion Configuration	Peak Drive Power (kW)	Price	Ref (pg 15)
							AC Level 2 (kW)	DC CCS1 (kW)	Other					
2024	Gillig	Battery Electric	Transit	29	n/a	686	No	150	450 J3105	150	BEV	300	\$988,311	5
2024	Gillig	Low Floor Plus	Transit	29	26	444	No	150	450 J3105	150	BEV	350	\$950,000	5
2024	BYD	K7M	Transit	30	22	313	n/a	n/a	n/a	185	BEV	n/a	n/a	1
2024	BYD	K7MER	Transit	30	20	313	n/a	150	n/a	196	BEV	300	n/a	2
2024	Gillig	Battery Electric	Transit	35	29	686	No	150	450 J3105	n/a	BEV	n/a	n/a	5
2024	Gillig	Low Floor Plus	Transit	35	n/a	444	No	150	450 J3105	n/a	BEV	n/a	\$950,000	5
2024	New Flyer	Xcelsior Charge NG	Transit	35	32	345	No	150	450 J3105	182	BEV	160	\$587,912	3
2024	New Flyer	Xcelsior Charge NG	Transit	35	32	435	No	150	450 J3105	220	BEV	160	\$587,912	3
2024	BYD	B12	Transit	40	105	500	No	200	500 J3105	372	BEV	300	n/a	56
2024	BYD	K8M	Transit	40	n/a	n/a	n/a	n/a	n/a	n/a	BEV	n/a	n/a	2
2024	BYD	K9M	Transit	40	n/a	n/a	n/a	n/a	n/a	n/a	BEV	n/a	n/a	2
2024	BYD	K9MD	Transit	40	n/a	n/a	n/a	n/a	n/a	n/a	BEV	n/a	n/a	2
2024	Gillig	Battery Electric	Transit	40	35	588	No	150	300 Induct	n/a	BEV	n/a	\$988,311	5
2024	Gillig	Low Floor Plus	Transit	40	38	444	No	150	450 J3105	150	BEV	n/a	\$950,000	6/7
2024	New Flyer	Xcelsior Charge NG	Transit	40	40	345	No	150	450 J3105	176	BEV	160	n/a	3
2024	New Flyer	Xcelsior Charge NG	Transit	40	40	435	No	150	450 J3105	216	BEV	160	n/a	3
2024	New Flyer	Xcelsior Charge NG	Transit	40	40	520	No	150	450 J3105	254	BEV	160	n/a	3
2024	Nova	LFSe+	Transit	40	41	564	No	150	450 J3105	n/a	BEV	200	n/a	4
2024	BYD	B19	Transit	60- articulate	140	563	No	200	500 J3105	292	BEV	300	n/a	57
2024	BYD	K11M	Transit	60- articulate	n/a	n/a	n/a	n/a	n/a	n/a	BEV	n/a	n/a	2
2024	New Flyer	Xcelsior Charge NG	Transit	60- articulate	61	520	No	150	450 J3105	143	BEV	280	\$1,500,000	3
2024	New Flyer	Xcelsior Charge NG	Transit	60- articulate	61	605	No	150	450 J3105	165	BEV	280	n/a	3
2024	New Flyer	Xcelsior Charge NG	Transit	60- articulate	61	690	No	150	450 J3105	186	BEV	280	n/a	3

n/a = data not publicly/readily available at time of publication.

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ELECTRIC SCHOOL BUSES



APPLICATION

School buses typically begin their day by picking up students in the morning and delivering them to school. Afterward, they return to the bus yard between routes. In the afternoon, the buses are sent back out to transport students home, and later in the day, they return to the yard and are charged overnight, ready for the next day's routes. This makes school buses well-suited for electrification: since they only need to run specific routes, the amount of energy required is relatively low, and there's ample time for charging between routes. However, it's important to account for other activities, such as transporting students to after-school events like games across town, which can impact the charging schedule.

TECHNOLOGY

Electric school buses have become popular by school districts. Currently, there are nearly 1,600 school buses on the road across the nation. There are at least five manufacturers with 11 different models. *See the list.*

CHARGING CAPABILITIES

Most school buses are charged with Level 2 AC, but DC with CCS is also an option (85-150kW). Automated charging has not been attractive for school buses. Many people believe that V2G could be used on school buses using the DC charging interface. It has been shown that a higher power Level 2 AC EVSE is quite adequate for most applications since the school bus has an extended period to charge. Based on the state of the V2G market, this currently added significant costs and complexity with unclear benefits.

AVAILABLE ELECTRIC SCHOOL BUSES

Year	Make	Model	Type	Length (feet)	Seating (max)	Battery Energy (kWh)	Charge Systems			Reported Range (miles)	Propulsion Configuration	Peak Drive Power (kW)	Price	Ref (pg 15)
							AC Level 2 (kW)	DC CCS1 (kW)	Other					
2025	Blue Bird	All American	School	23	84	155	Yes	85	n/a	120	BEV	232	n/a	13/14
2025	Blue Bird	Vision	School	23	77	155	Yes	85	n/a	120	BEV	232	n/a	13
2025	Daimler	Thomas Built Jouley	School	38	81	246	Yes	90	n/a	150	BEV	295	\$300,000	12
2025	Green Power	Beast A	School	40	90	194	Yes	85	60 Inductive	150	BEV	n/a	\$310,000	15/16
2024	Green Power	Beast D	School	40	90	194	Yes	85	60 Inductive	150	BEV	360	\$370,000	15/16
2024	Green Power	Mega Beast D	School	40	90	387	Yes	85	60 Inductive	300	BEV	n/a	\$375,000	15/16
2024	Green Power	Nano Beast	School	25	24	118	Yes	85	60 Inductive	140	BEV	150	\$285,000	15/17
2025	Lion	LionC	School	39	77	210	Yes	150	n/a	125	BEV	365	\$300,000	9/10
2025	Lion	LionD	School	39	83	210	Yes	150	n/a	155	BEV	250	\$405,000	9/10/11
2024	Navistar	CE Series	School	18	29	210	Yes	150	n/a	135	BEV	255	\$395,000	8/51
2024	Navistar	CE Series	School	24	78	315	Yes	150	n/a	200	BEV	255	\$395,000	8/51

ELECTRIC REFUSE TRUCKS



APPLICATION

Refuse trucks, also known as “garbage trucks”, are used in the collection of waste in the sanitation industry. Hydraulics are used to compact as well as pick up trash cans and empty them in the truck. The waste is then transported to a dump or recycle center for processing.

TECHNOLOGY

Electric refuse trucks are becoming popular. The trucks are usually all Class 7 or 8. The Heil refuse trucks does not use hydraulics but rather use electric motors to do the compacting and picking up trash cans. It still uses the diesel engine to move the vehicle. *See the list.*

CHARGING CAPABILITIES

Most refuse trucks are charged with DC using the CCS connector at 150kW or more. Some trucks are equipped with Level 2 AC. The typical on-route speed is minimal (going from house to house). The hydraulics uses power from the battery at each house. Unloaded refuse trucks drive at higher speeds when either returning a load or picking up a new one. On a typical day, a fleet of refuse trucks can make 80 to 120 waste bin pickups. Larger battery packs will be required for extended operation.

AVAILABLE ELECTRIC REFUSE TRUCKS

Year	Make	Model	Type	Class	Battery Energy (kWh)	Charge Systems		Reported Range (miles)	Propulsion Configuration	Peak Drive Power (kW)	Price	Ref (pg 15)
						AC Level 2 (kW)	DC CCS1 (kW)					
2024	Heil	Heil	Refuse	5	n/a	n/a	n/a	n/a	ICE w/ Electric Collection	n/a	n/a	27
2024	McNeilus	Volterra ZSL	Refuse	5	n/a	n/a	n/a	80 -120	BEV	n/a	n/a	32/33
2025	Battle Motors	13YD Viper	Refuse	7	240	Yes	240	140	BEV	372	n/a	58/60
2024	BYD	8R	Refuse	8	403	No	120	80	BEV	300	n/a	31
2025	Paccar	Peterbilt 520EV	Refuse	8	400	Yes	150	80 -120	BEV	500	n/a	34/35
2024	Volvo	Mack LR	Refuse	8	376	No	150	230	BEV	334	\$616,154	28/29

ELECTRIC MEDIUM-DUTY VEHICLES



APPLICATION

Medium-duty trucks range from Class 3 to Class 6. The Class weights are shown on page 18. The Class 3 types are typically vans and heavier pickup trucks and SUVs. The other classes are either cab-on-chassis, or Box trucks. Box trucks are storage units that are assembled on a cab-on-chassis chassis. Delivery step vans are also included. Currently, there are more than 13,766 electric medium-duty trucks on the road made by 11 different manufacturers.

TECHNOLOGY

The electric medium-duty trucks are typically last mile vehicles with storage for delivery. The vehicles range from 120 to 400 miles on a charge. The Class 3 purchase price ranges from \$60K to \$100K. Class 4 and beyond range up to \$330K. *See the list sorted by class size and the manufacturer.*

CHARGING CAPABILITIES

Most medium-duty trucks are charged with DC with CCS up to almost 300 kW. Some trucks are equipped with Level 2 AC.



AVAILABLE MEDIUM-DUTY TRUCKS

Year	Make	Model	Type	Class	Battery Energy (kWh)	Charge Systems		Reported Range (miles)	Propulsion Configuration	Peak Drive Power (kW)	Price	Ref (pg 15)
						AC Level 2 (kW)	DC CCS1 (kW)					
2024	Cenntro Automotive	Logistar 300	Van	3	81	No	Yes	214	BEV	85	n/a	61/62
2025	Chevrolet	Silverado	SUV	3	205	Yes	287	400	BEV	560	\$57K to \$98K	22
2025	Chevrolet	BrightDrop 400	Van	3	121 to 173	Yes	Yes	178	BEV	178	\$78,625	23
2025	Chevrolet	BrightDrop 600	Van	3	121 to 173	Yes	Yes	180	BEV	178	\$78,625	23
2025	GMC	Hummer	Pickup 2 motor	3	205	No	287	318	BEV	745	\$98,845	21
2025	GMC	Hummer	Pickup 3 motor	3	205	No	287	318	BEV	745	\$106,945	21
2025	GMC	Hummer	SUV	3	205	No	287	312	BEV	425	\$96,550	21
2025	Mercedes	Sprinter	Pass Van	3	113	Yes	115	206	BEV	150	\$72,000	66
2024	Mullen	THREE	Cab on Chassis	3	89	Yes	78	125	BEV	120	\$68,500	64
2025	Bollinger	B4	Cab on Chassis	4	158	Yes	Yes	185	BEV	235	\$158,000	37
2024	Cenntro Automotive	Logistar 400	Cab on Chassis	4	81	No	Yes	124	BEV	85	n/a	61/62
2025	Daimler	FUSO eCanter	Box Truck	4	41 to 83	11 to 22	104	43 to 86	BEV	110	n/a	52
2024	Daimler	Rizon e16L	Box Truck	4	124	Yes	104	160	BEV	129	n/a	47
2024	Daimler	Rizon e16M	Box Truck	4	82	Yes	104	110	BEV	129	n/a	47
2025	Workhorse	W4 CC	Cab on Chassis	4	118	Yes	61	150	BEV	150	n/a	38/40
2025	Workhorse	W750	Step Van	4	118	Yes	61	150	BEV	n/a	\$52,000	38/41
2026	Bollinger	B5	Cab on Chassis	5	160	Yes	Yes	160	BEV	240	\$158,000	37
2024	Daimler	Rizon e18L	Box Truck	5	124	Yes	104	155	BEV	150	n/a	47
2024	Daimler	Rizon e18M	Box Truck	5	82	Yes	104	105	BEV	129	n/a	47
2024	Isuzu	NNR EV	Cab on Chassis	5	60 to 180	19.2	80	40 to 235	BEV	150	\$115K to \$190K	63
2025	Toyota	Hino M5e	Box Truck	5	148	Yes	80	190	BEV	125	\$57,000	54
2025	Workhorse	W56	Step Van	5 or 6	210	Yes	100	150	BEV	295	\$265,000	38/39
2024	Daimler	Freightliner MT50e	Van Chassis	5 to 6	226	No	60 to 150	150 to 170	BEV	237	\$260,000	50/51
2025	Battle Motors	Striker Tractor	Tractor	6	240	Yes	240	140	BEV	372	n/a	58/59
2025	Navistar	International eMV	Cab on Chassis	6	210	No	Yes	135	BEV	255	\$183,000	65
2025	Paccar	Peterbilt 220EV	Cab on Chassis	6	141	Yes	150	100	BEV	265	\$336,000	36
2025	Toyota	Hino L6e	Box Truck	6	220	Yes	80		BEV	250	n/a	54
2024	Volvo	Mack MD	Cab on Chassis	6	240	No	150	230	BEV	194	n/a	29/30

ELECTRIC HEAVY-DUTY VEHICLES



APPLICATION

Heavy-duty trucks range from Class 7 to 8. The class weights are shown on page 18. The heavy-duty classes include long haul tractors, cab-on-chassis chassis, and yard trucks. Currently, there are nearly 2,400 electric heavy-duty trucks on the road made by 8 different manufacturers.

TECHNOLOGY

The electric medium-duty trucks are typically last mile vehicles with storage for delivery. The vehicles range from 120 to 400 miles on a charge. The Class 3 purchase price ranges from \$60K to \$100K. Class 4 and beyond range up to \$330K.

CHARGING CAPABILITIES

Most heavy-duty trucks are charged with DC-CCS up to 400 kW. Only a few trucks are equipped with Level 2 AC. No special charging is available on heavy-duty trucks. The Daimler (Freightliner) eActros 600 and the Tesla Semi are planning on using the 1000 kW MCS (MegaWatt Charging).



AVAILABLE HEAVY-DUTY TRUCKS

Year	Make	Model	Type	Class	Battery Energy (kWh)	Charge Systems			Reported Range (miles)	Propulsion Configuration	Peak Drive Power (kW)	Price**	Ref (pg 15)
						AC Level 2 (kW)	DC CCS1 (kW)	Other					
2025	Daimler	Freightliner eM2	Cab on Chassis	7	194 to 291	No	180 to 270	n/a	180 to 250	BEV	190	\$275K to \$330K	42/46
2025	Navistar	International eMV	Cab on Chassis	7	210	No	Yes	n/a	135	BEV	255	n/a	65
2025	Paccar	Peterbilt 220EV	Cab on Chassis	7	282	Yes	150	n/a	200	BEV	350	n/a	36
2025	BYD	C9M	Motor Coach	8	446	Yes	Yes	Induct	200	BEV	n/a	n/a	1
2025	Daimler	Freightliner eCascadia	Tractor	8	194 to 438	No	180 to 270	n/a	155 to 230	BEV	350	\$440K to \$500K	42/44/45
2026	Mercedes	eActros 600	Tractor	8	621	No	400	1000 MCS	310	BEV	600	\$450,000	49
2025	Nikola	Semi truck	Tractor	8	738	No	Yes	n/a	330	BEV	797	n/a	43
2025	Orange EV	e-Triever	Yard Trucks	8	243	No	105	n/a	*See Comment	BEV	n/a	\$200K to \$300K	53
2025	Orange EV	Husk-e	Yard Trucks	8	243	No	105	n/a	*See Comment	BEV	n/a	\$200K to \$300K	53
2025	Paccar	Kenworth T680E	Tractor	8	396	No	150	n/a	150	BEV	500	\$120K	55
2025	Paccar	Peterbilt 579EV	Tractor	8	400	Yes	150	n/a	150	BEV	500	\$350K	34/35
2026	Tesla	Semi	Tractor	8	900	No	No	1000 MCS	300 to 500	BEV	n/a	\$150K to \$180K	19/20
2024	Volvo	FMX	Cab on Chassis	8	360 to 540	Yes	250	n/a	186	BEV	491	\$72K to \$163K	24
2024	Volvo	FM	Cab on Short Chassis	8	360 to 540	Yes	250	n/a	186	BEV	491	n/a	24
2024	Volvo	FH	Tractor	8	360 to 540	Yes	250	n/a	186	BEV	490	n/a	24
2024	Volvo	FH Aero	Tractor	8	360 to 540	Yes	250	n/a	186	BEV	490	n/a	24

*Top Speed 25 mph, operates up to 24 hours on a charge

**Pricing is difficult to attain. Most times it is given as HVIP pricing in California.

CHARGING PRIMER

SAE J1772

Both AC and DC charging are suitable for fueling electric vehicles. SAE J1772(TM) and J3400(TM) standards describe interfaces for both AC and DC charging. However, based on factors such as distance and charge time, one method could be better than another.

AC charging can be done at different voltage, with power levels up to 20 kW.

DC Fast charge uses DC at the connection at the same voltage as the battery on board.

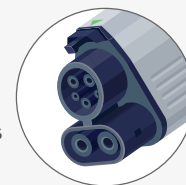
AC charging has the charger located on the vehicle. Whereas the DC charger has the charger in the infrastructure.



AUTOMATED CONDUCTIVE CHARGING SAE J3105

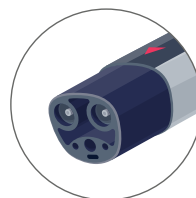
Most transit buses are using a CCS1 charger (*right*) for manually charging. Automated charging is also being used both on the route and at the depot. At the depot, no manual work is required to charge the buses. The bus is parked under the pantograph, WiFi and RFID are used to communicate, and the pantograph comes down properly onto the conductive rails on the roof of the bus. Charging begins. It is all initiated by properly parking the bus under the pantograph and then setting the parking brake.

On-route charging tends to be higher power than in the depot. On-route the bus is only charged for a few minutes to accomplish the bus getting back on route. Whereas the depot charging is lower power since much more charge time is allowed.



MEGAWATT CHARGING SYSTEM (MCS)

The MCS is being defined by SAE J3271. This document describes the megawatt-level DC charging system requirements for couplers/inlets, cables, cooling, communication and interoperability. The intended application is for commercial vehicles with larger battery packs requiring higher charging rates for moderate dwell time. A simplified analog safety signaling approach is used for connection-detection to guarantee de-energized state for unmated couplers with superimposed high-speed data for EVSE-EV charging control and other value-added services.



NORTH AMERICAN CHARGE SYSTEM (NACS)

The NACS is being defined by SAE J3400. A document covering the general physical, electrical, functional, and performance requirements for conductive power transfer to an electric vehicle using a handheld conductive coupler capable of transferring either DC or single-phase power using two current-carrying contacts. The charging control protocol is derived from the original SAE J1772 connector and the Tesla NACS connector.

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9	https://schoolbus.thelionelectric.com/	41	https://workhorse.com/work-trucks/w750-electric-step-van/
10	google search: price of a lion bus	42	https://www.daimlertruck.com/en/innovation/powertrain/our-eportfolio
11	https://thelionelectric.com/documents/en/liond_specs_en.pdf	43	https://www.nikolamotor.com/tre-bev
12	https://thomasbuiltbuses.com/content/uploads/2024/04/brochure-c2_jouley_and_proterra-spring-2024.pdf	44	google search: ecascadia battery size
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OTHER EPRI PUBLICATIONS TO REVIEW ARE LISTED BELOW:

<u>3002028353</u>	<u>Commercial and Industrial Report for Electric Transportation, October 2023</u>
<u>3002025749</u>	<u>Commercial and Industrial Report for Electric Transportation, December 2022</u>
<u>3002023381</u>	<u>Consumer Guide to Commercial and Industrial On-Road Electric Vehicles, March 2022</u>
<u>3002022986</u>	<u>Commercial and Industrial Report for Electric Transportation, November 2021</u>
<u>3002020009</u>	<u>Technology Overview: On Route Charging, March 2021</u>
<u>3002020051</u>	<u>Commercial and Industrial Report for Electric Transportation, November 2020</u>
<u>3002017483</u>	<u>Commercial and Industrial Report for Electric Transportation, November 2019</u>
<u>3002014729</u>	<u>Commercial and Industrial Report for Electric Transportation, November 2018</u>
<u>3002017140</u>	<u>Overview of North American Electric Transit Bus Pilots</u>



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