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Global State of Play: Heavy-Duty and Medium-Duty Vehicle Electrification

May 2021 Monthly Report

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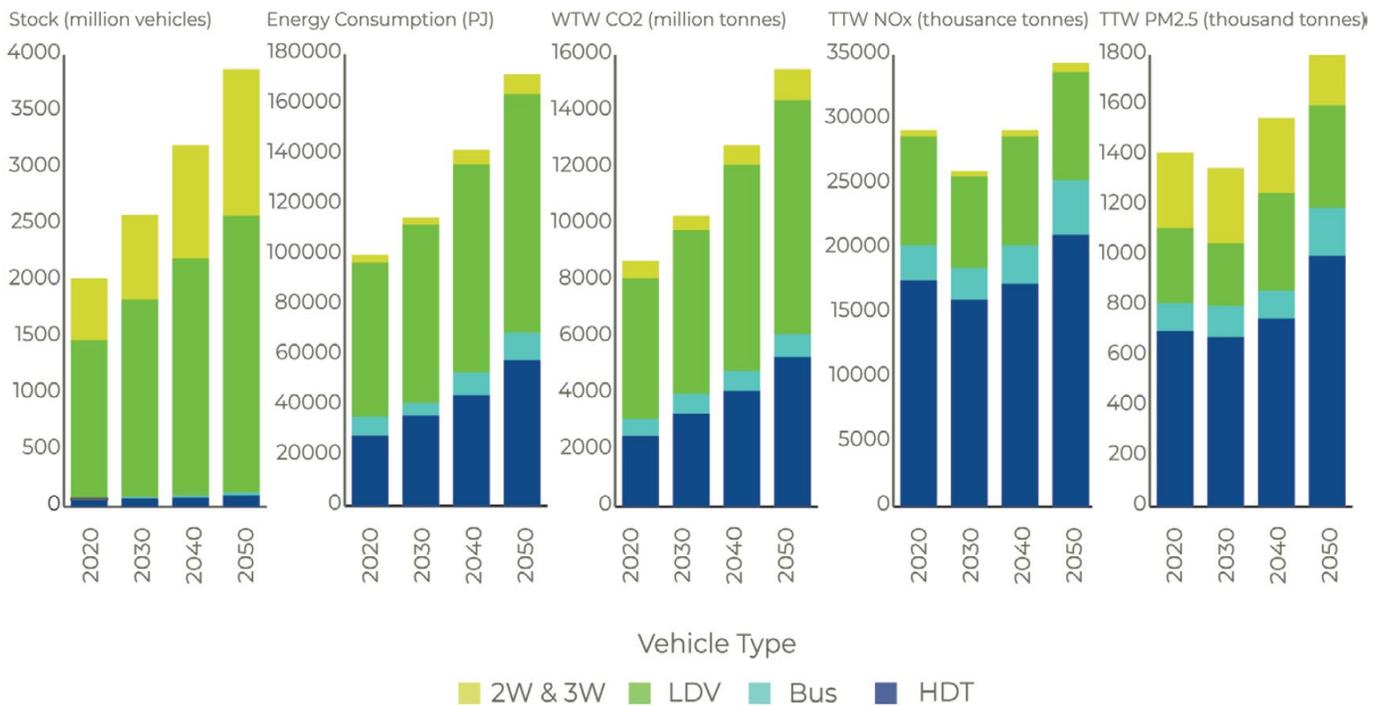
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Introduction

Global freight emissions are forecast to increase substantially, compounding their climate and health impacts. From 2020 to 2050, energy consumption and GHG emissions from trucking are expected to more than double and small particulate matter (PM2.5) emissions to grow by more than 40 percent. One of the main drivers behind the increase in trucking emissions is the increase in global domestic and international freight demand, estimated to triple between 2015 and 2050.

While the focus over the last 10 years has been on reducing air pollutant and GHG emissions from the light-duty vehicle (LDV) fleet, there is a growing urgency to address the medium- (MDV) and heavy-duty vehicle (HDV) fleets both from fleet owners and operators and governments. Figure 1 summarizes “business as usual” projections in global truck stock, energy consumption and tailpipe emissions.

Figure 1: “Business as Usual” Projections in Global Truck Stock, Energy Consumption and Tailpipe Emissions¹



Source: Welch, et. al, October 2020

¹ Dan Welch, et al., Moving Zero-Emission Freight Toward Commercialization, October 2020 at <http://www.zevalliance.org/wp-content/uploads/2020/12/Zero-Emission-Freight-Commercialization-dec2020.pdf>.

Key Points in This Report:

- Battery prices, which can account for over 50% of the cost of an EV, have decreased by an average of roughly 20% per year since 2009 and are predicted to decrease by an additional two-thirds by 2030.
- At least 12 organizations, including Walmart and UPS, have committed to purchasing HDEVs, driven primarily by ESG concerns. However, it has not been smooth sailing: there have been operational and maintenance issues with some HDEVs that is not fully transparent or understood.
- Electric bus and electric heavy-duty truck (HDT) registrations increased in 2020 in China, Europe and North America. The global electric bus stock was 600,000 in 2020 and the electric HDT stock was 31,000.
- Only California has set a mandate requiring HDV EVs, with several U.S. states following. Many countries and regions such as the EU have introduced CO2/fuel efficiency standards for HDVs. Expect the Biden Administration to do more to support the scale up of HDEVs.

As battery prices continue to decline, the case becomes more compelling for companies to consider electrification. Battery prices, which can account for over 50% of the cost of an EV, have decreased by an average of roughly 20% per year since 2009 and are predicted to decrease by an additional two-thirds by 2030.² Battery energy density is similarly expected to increase, which would have the benefit of reducing weight for medium-duty (MDEVs) and heavy-duty electric vehicles (HDEVs). The primary driver for companies interested in deploying these vehicles is meeting sustainability goals (particularly in response to ESG-related pressure) and ultimately, lowering the total cost of ownership (TCO) of their vehicle fleets.³ UPS has estimated that maintenance costs will be lower for them since EVs have fewer parts and that total operating costs will be 20% lower.⁴ Table 1 summarizes company commitments to purchase MDEV and HDEV.

Table 1: Company Commitments to Purchase MDV and HDV EVs

Company	Operating Area	Announced	Target/Actions
Amazon	Global	2020	Orders 100,000 BEV light-commercial vehicles from start-up company Rivian. Amazon aims to be net-zero emissions by 2040.
Anheuser-Busch	United States	2019	Orders up to 800 hydrogen fuel cell Nikola heavy-duty trucks.
DHL Group	Global	2019	Delivery of mail and parcels by EVs in the medium term and net-zero emissions logistics by 2050.

² ICF, Medium- and Heavy-Duty Electrification in California, December 2018 at <https://www.atlasevhub.com/resource/medium-and-heavy-duty-electrification-in-california-literature-review-final-report/>.

³ UPS, Curve Ahead: The Future of Commercial Fleet Electrification, 2018 at https://sustainability.ups.com/media/UPS_GreenBiz_Whitepaper_v2.pdf.

⁴ See e.g., Andrew Winston, UPS, Inside UPS' Electrification Strategy, Apr. 9, 2018 at <https://www.ups.com/us/es/services/knowledge-center/article.page?kid=ac91f520&articlesource=longitudes>.

Anecdotally, though, I have heard that is not the case now. There is little to no data or transparency from companies deploying MD- and HD-EVs and putting into place the infrastructure. Unstated but a natural result of electrification and less need for maintenance is less need for maintenance workers. A workforce reduction at companies deploying largescale electrification of their fleets would occur.

Company	Operating Area	Announced	Target/Actions
FedEx	Global	2018	Transition to an all zero-emission vehicle fleet and carbon neutral operations by 2040.
H2 Mobility Association	Switzerland	2019	19 of Switzerland's largest retailers invest in Hyundai hydrogen trucking services that will deploy up to 1 600 heavy-duty zero-emission trucks.
Ingka Group (IKEA)	Global	2018	Zero-emission deliveries in leading cities by 2020 and in all cities by 2025.
Japan Post	Japan	2019	Electrify 1,200 mail and parcel delivery vans by 2021 and net-zero emissions logistics by 2050.
JD	China	2017	Replace entire vehicle fleet (> 10 000) with New Energy Vehicles by 2022.
SF Express	China	2018	Launch nearly 10,000 BEV logistics vehicles.
Suning	China	2018	Independent retailer's Qingcheng Plan will deploy 5,000 new energy logistics vehicles.
UPS	North America	2019	Order 10,000 BEV light-commercial vehicles with potential for a second order.
Walmart	United States	2020	Electrify the whole vehicle fleet by 2040.

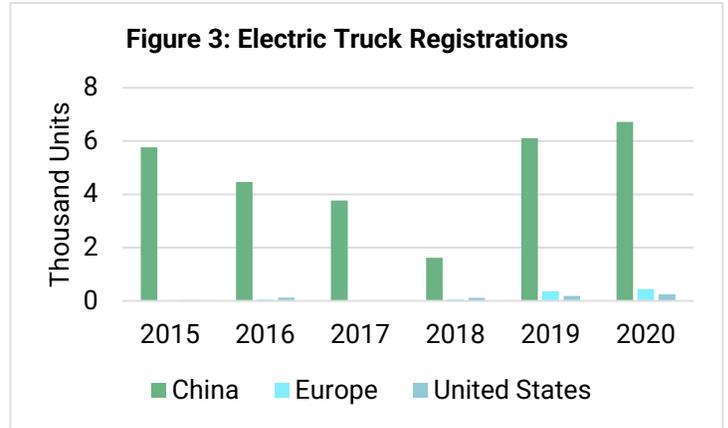
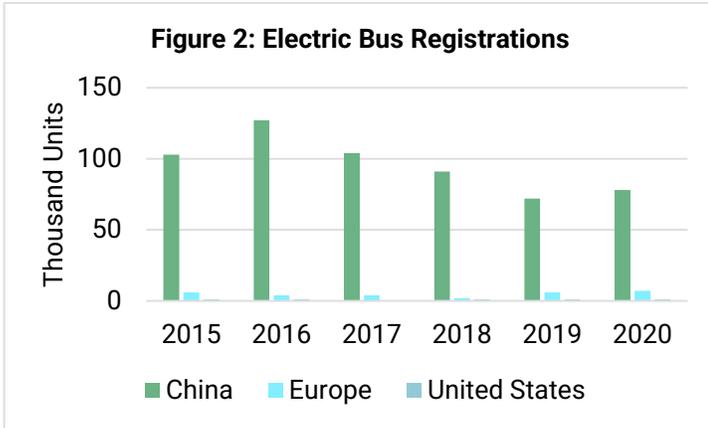
Source: Compiled by IEA citing data from the Global Drive to Zero's Zero Emission Technology Inventory (ZETI), April 2021

This report provides a status report on MDV and HDV EVs, including a review of market and policy developments. A separate report will cover infrastructure for LDEV, MDEV and HDEVs in June.

Market Developments

HDEVs and bus registrations are continuing to increase but are a small part of the global HDV fleet. According to IEA, the global electric bus stock was 600,000 in 2020 and the electric HDV stock was 31,000.⁵ Figure 2 and 3 summarizes electric bus and truck registrations, which were primarily located in China, Europe and to a lesser extent, the U.S.

⁵ International Energy Agency (IEA), Global EV Outlook 2021, April 2021 at <https://www.iea.org/reports/global-ev-outlook-2021>.



Source: Compiled by IEA citing data from the Global Drive to Zero's Zero Emission Technology Inventory (ZETI), April 2021

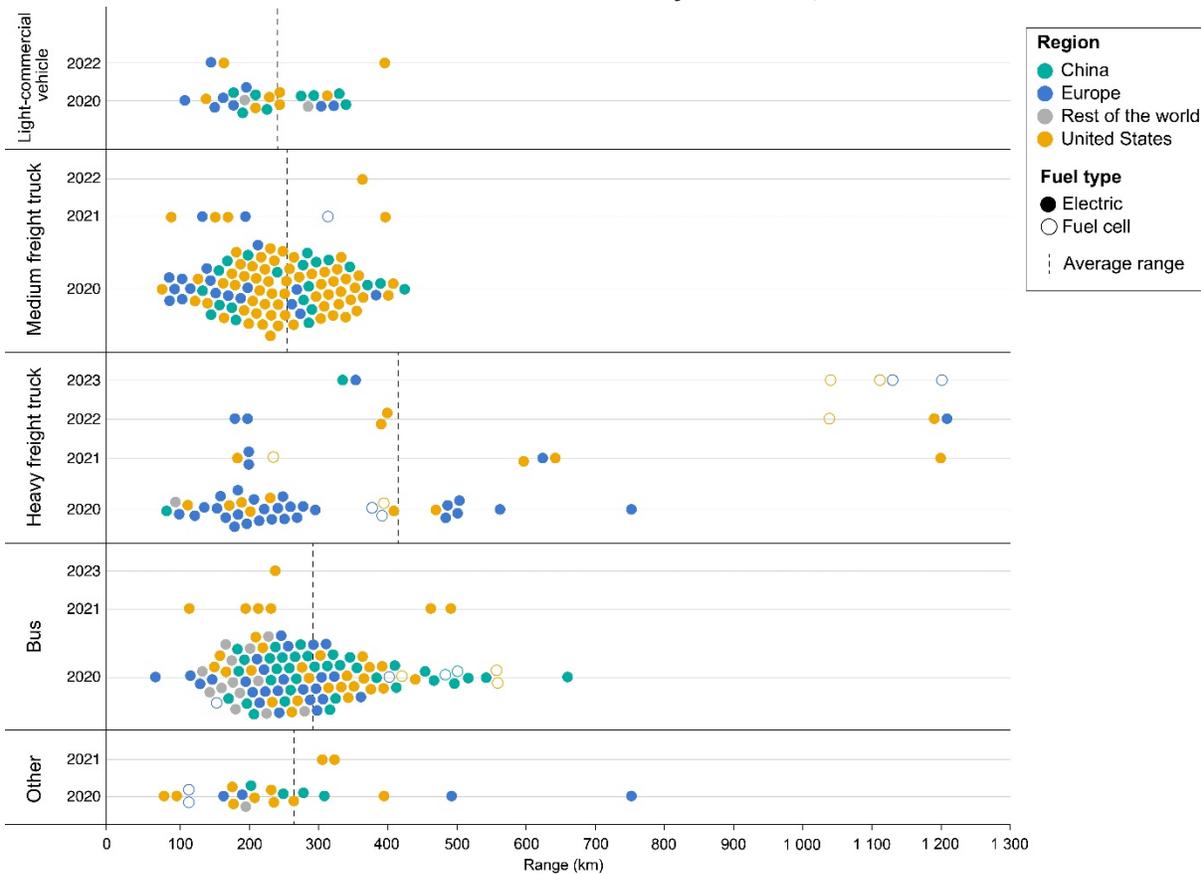
As the figure shows, China dominates the electric bus market with registration of 78,000 new vehicles in 2020, up 9% on the year to reach a sales share of 27%, while in Europe, registrations were at 2,100.⁶ That represented a 7% increase, but below the doubling of registrations seen in 2019. Electric buses make up 4% of bus registrations in Europe. In North America, there were 580 new electric bus registrations in 2020, down almost 15% from the prior year, according to IEA. Deployment in the region is highly focused in California alone. Chile registered 400 electric buses in 2020, and India increased electric bus registrations 34% to 600 in 2020.

Global HDEV registrations were 7,400 in 2020, up 10% on the previous year, according to IEA. The global stock of HDEVs numbers 31,000. China continues to dominate the category, with 6,700 new registrations in 2020, up 10% though much lower than the fourfold increase in 2019. Registrations in Europe rose 23% to about 450 vehicles and in the U.S. increased to 240 vehicles. Electric trucks are still below 1% of sales in both areas. HDEV model availability is expected to increase through 2023, especially for electric trucks and buses and in the U.S., medium-duty freight trucks. Range is expected to increase as well.⁷ Figure 4 summarizes HDEV models by release year, segment and powertrain in major markets.

⁶ Id. at 28.

⁷ Id. at 30.

Figure 4: Current and Announced HDEV Models by Segment, Release Year and Powertrain in Major Markets, 2020-2023



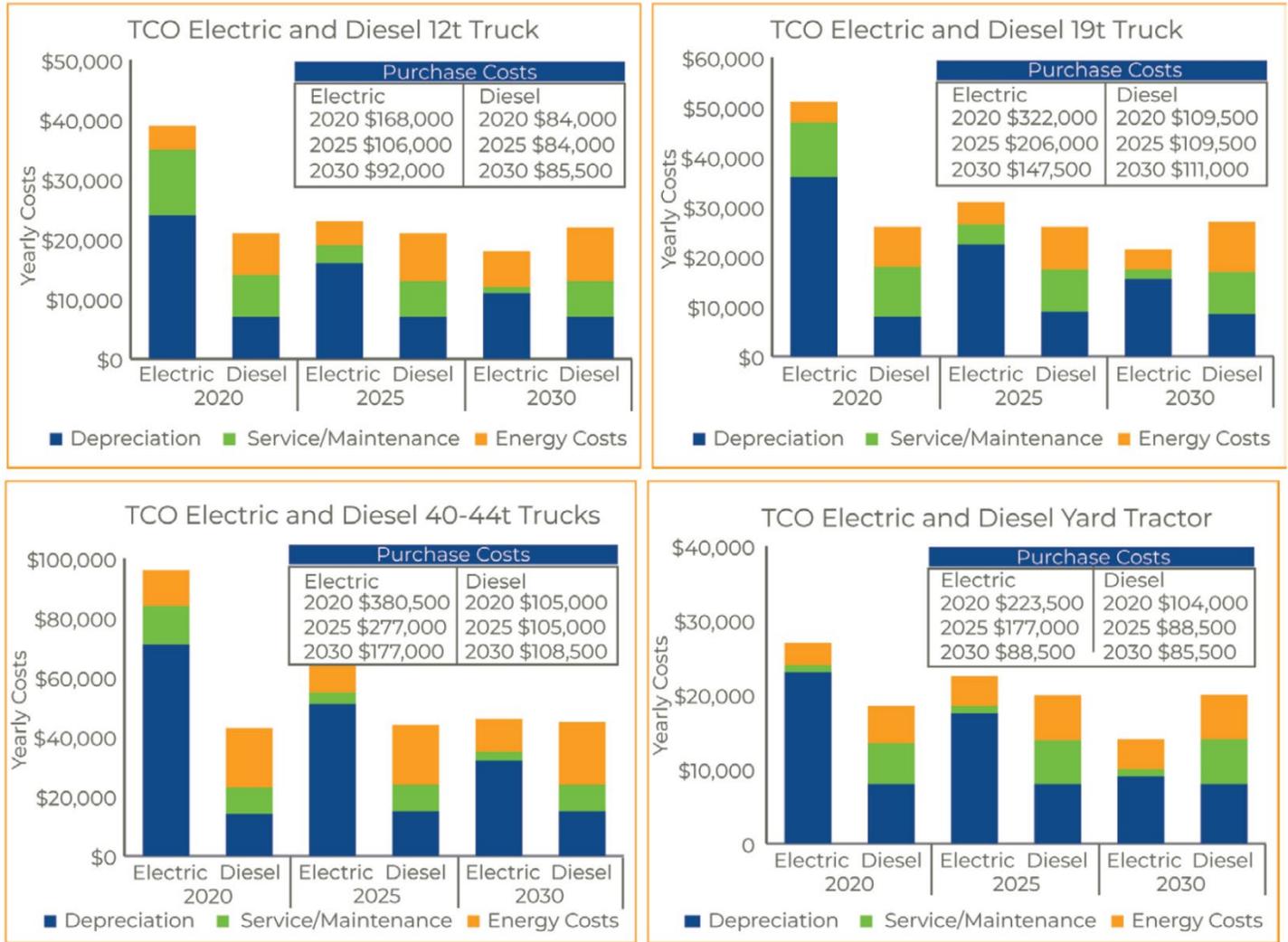
Source: Compiled by IEA citing data from the Global Drive to Zero's Zero Emission Technology Inventory (ZETI), April 2021

What about TCO? Right now, HDEVs are more expensive than conventional diesel HDVs, but that is expected to change. One estimate puts some HDEV vehicle segments at cost parity with diesel freight vehicles before 2030.⁸ Cost parity for heavier vehicles will come later in the 2030s. Parity will be driven by battery cost declines estimated at \$62/kWh by 2030 by firms such as Bloomberg New Energy Finance. However, residual value, the value for resale to other fleets or for their parts at the end of a vehicle's useful life, is not clear or certain yet because the market is undeveloped. Further, maintenance costs are expected to be lower than that of a diesel vehicle because HDEVs have fewer parts, but studies (and anecdotal information I am learning from those in the space) suggest this is not the case. However, a Dutch industry association study found that fleet inexperience with HDEVs and newly designed components that may experience heightened failure rates could increase maintenance costs through 2025.⁹ Figure 5 summarizes TCO for different HDEV types.

⁸ Welch at 27.

⁹ Id. at 28.

Figure 5: TCO Estimates by Truck Type/Weight

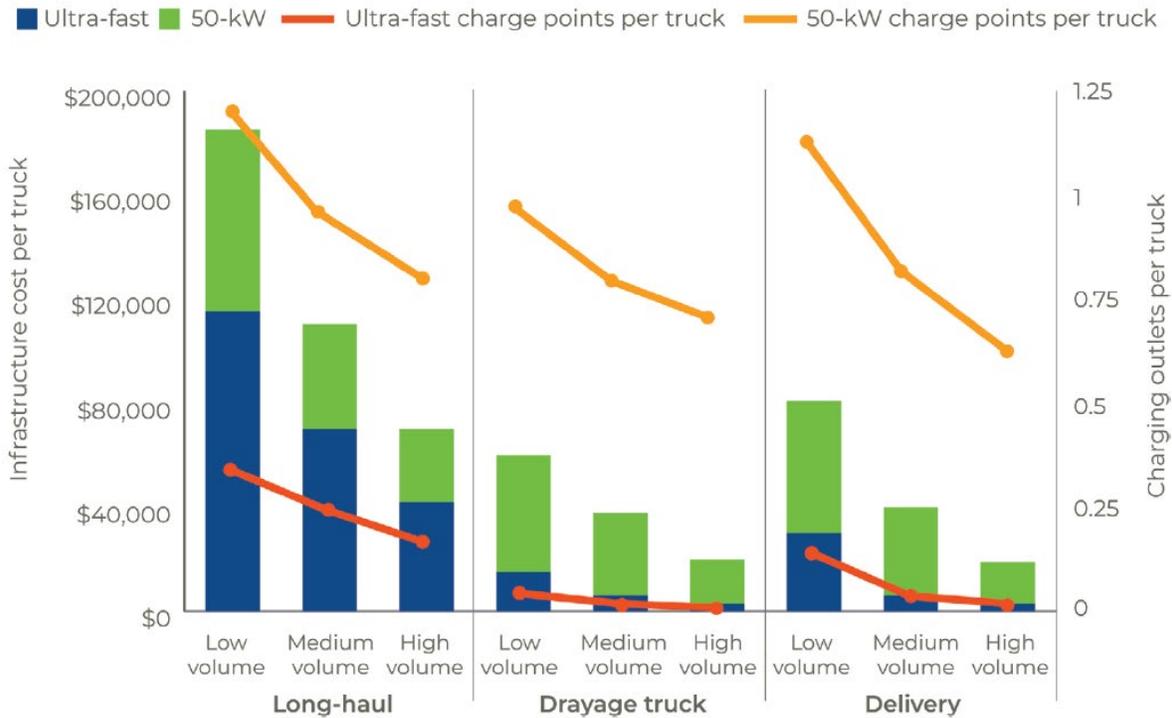


Source: Welch, et al., October 2020

Though infrastructure will be covered in a separate report, energy costs from charging are a significant cost component as the figure above shows. Figure 6 summarizes infrastructure and capital costs estimates for battery-electric trucks. It is not clear whether these estimates also include demand charges, a major issue for charging in many countries, including the U.S.¹⁰ Some utilities are beginning to address the issue by developing EV-charging specific rates that do not include demand charges, but it is not a widespread practice yet.

¹⁰ Demand charges are additional fees that utilities charge non-residential or commercial customers for maintaining constant supply of electricity. These fees usually amount to a substantial sum of money that businesses must pay on monthly electric bills.

Figure 6: Charging Infrastructure and Associated Capital Cost Required for Battery-Electric Trucks



Source: Welch, et al., October 2020

Policy Developments

Countries are beginning to set policies to encourage MDEVs and HDEVs, but they are mostly CO₂/fuel efficiency standards (see [post Mar. 8, 2021](#)). Canada, China, European Union, Japan and the U.S. have set such standards to date. California has set a zero emission vehicle (ZEV) mandate for trucks, which several other U.S. states are planning to follow. The EU has promulgated a revision to its Clean Vehicles Directive that requires public procurement for electric buses and trucks. Several countries, such as China, offer incentives and other subsidies for HDEVs. Other countries have announced targets that are generally part of their climate action plans and Nationally Determined Contributions to the Paris Agreement. These countries include Cabo Verde, Colombia, Hungary, Ireland, Japan, New Zealand, Norway and the Netherlands. Several other countries have announced ambitions or goals to encourage MDEVs and HDEVs and include Finland, France, Germany, Korea, Pakistan and Spain. Current policies are summarized in Table 2, followed by current developments in Canada, China, the EU, India and U.S.

Table 2: Summary of Global HDV and MDV Electrification Policies

Country/Region	Policy Type	Summary of Policy Measure	Year Announced
Cabo Verde	Target	Target: 50% share of urban bus sales to be EVs by 2025, 75% in 2030 and 100% by 2040.	2019
Canada	Legislation	CO2 emissions standard is aligned with the US Phase 2 standard, which reduces CO2 emissions by 5-27% in 2027 (depending on vehicle category and weight) compared to 2017.	2018
China	Legislation	Fuel economy standard: Stage III National Standard of 10.6 41 L/100 km for new type approvals (July 2019) and all sales and registrations (July 2021) for heavy commercial vehicles (depending on vehicle class and weight). Target: reduce fuel consumption by 14% 16% compared to Stage II.	2016
Colombia	Target	Target: 10% urban bus sales to be ZEVs by 2025 and 100% by 2035.	2019
European Union	Legislation	Revision of the Clean Vehicles Directive including minimum requirements for aggregate public procurement for urban buses (24-45% in 2025 and 33-65% in 2030), and for trucks (6-10% in 2025 and 7-15% in 2030) with the share varying across member states.	2019
European Union	Legislation	CO2 emissions standards for new heavy commercial vehicles to tighten by 15% by 2025 and by 30% by 2030 (reference period: 2019/2020).	2019
Finland	Ambition	Ambition: 4,600 electric HDV stock by 2030.	2021
France	Ambition	Ambition: 200 heavy commercial FCEV stock by 2023. Ambition: 800-2 000 heavy commercial FCEV stock by 2028.	2018
Germany	Ambition	Ambition: 50% of urban buses to be electric by 2030.	2020
Hungary	Target	Target: 1 290 urban bus stock by 2029. From 2022 onwards, only electric buses will be funded.	2019
Ireland	Target	Target: ban sales of diesel-only urban buses from 2019.	2018
Japan	Legislation	Fuel economy standard: 6.52 7.63 km/L (JC08) by 2025 (depending on vehicle class and weight) for heavy commercial vehicles. Target to reduce fuel consumption by 13.4-14.3% compared to 2015 standard	2019
Japan	Target	Target: 1 200 FCEV urban bus stock by 2030.	2019
Korea	Ambition	Ambition: 40 000 FCEV urban bus stock and 30 000 FCEV truck stock by 2040.	2019
New Zealand	Target	Target: 100% sales of urban buses to be ZEVs by 2025 and 100% stock by 2035.	2021
Norway	Target	Target: 100% ZEV (or biogas) urban bus sales by 2025. Target: 75% ZEV inter-city bus sales and 50% truck sales by 2030.	2016

Country/Region	Policy Type	Summary of Policy Measure	Year Announced
Pakistan	Ambition	Ambition: 50% of electric urban bus sales by 2030 and 90% by 2040. Ambition: 30% of electric truck sales by 2030 and 90% by 2040.	2019
Spain	Ambition	Ambition: 150 – 200 FCEV buses on the road by 3030.	2020
The Netherlands	Target	Target: 100% of public urban bus sales to be ZEV by 2025 and 100% ZEV stock by 2030.	2019
The Netherlands	Target	Target: 3,000 heavy-duty FCEV by 2025.	2019
Various U.S. States	Ambition	Ambition: 30% ZEV sales for all new medium- and heavy-duty commercial vehicles by 2030 and 100% by 2050 in 15 regions/states and the District of Columbia. (California, Colorado, Connecticut, Hawaii, Maine, Maryland, Massachusetts, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Rhode Island, Vermont and Washington.)	2020
United States (California)	Legislation	Advanced Clean Trucks requires 40-75% of sales by manufacturers (varied by vehicle class and weight) to be ZEV by 2035 (increasing targets from 2024).	2020
United States	Legislation	Phase 2 CO2 emission standard: 432-627 g CO2/bhp-hr (tractors, vocational vehicles and spark ignition engines) and 48.3-413 g CO2/ton-mile (all other) for various heavy commercial vehicles, which reduces CO2 emissions by 5-27% in 2027 (depending on vehicle category and weight) compared to 2017.	2016

Source: Compiled by IEA and Transport Energy Strategies citing policies from the individual countries/states, April 2021

Canada

In October 2020, the national government announced the Infrastructure Growth Plan and pledged CAD1.5 billion (US\$1.1 billion) to procure 5,000 zero-emission public buses, with an additional CAD2.75 billion (US\$2 billion) over the next five years to electrify transit and school buses across the country.¹¹ Canadian provinces also have programs to advance zero-emission HDV adoption. Québec has subsidized electric trucks since 2017 and offers commercial freight vehicle operators 50% off the incremental price of a new electric truck up to CAD 75,000 (US\$56,000). British Columbia recently increased incentives in two Clean BC programs that enable commercial ZEV purchase price reductions up to 33% with a cap of CAD 100,000 (US\$75,000).

¹¹ Canada Infrastructure Bank, \$10B Growth Plan: Investing in New Infrastructure, October 2020 at <https://cib-bic.ca/wp-content/uploads/2020/10/Summary-of-the-CIB-Growth-Plan.pdf>.

China

China does not have a mandate for HDEVs the way it does for LDVs under its New Energy Vehicle (NEV) program.¹² However, it has set fuel efficiency standards for vehicles (summarized in Table 1) and offers a purchase price reduction valued per kilowatt-hour (kWh of battery capacity and modified for bus length and truck weight, with a cap set at about CNY 200,000 (\$US30,000)).¹³ Some local governments augment the subsidy with a cap set at 50% of new vehicle costs.

European Union

The European Union has supported commercial ZEV adoption with a variety of regulations and incentives. Its 2019 HDV CO2 standards reward participating ZEV manufacturers for up to twice the credit allocation of a diesel-fueled truck through 2024.¹⁴ This “super-credit” system will be replaced in 2025 with a benchmarking system that reduces the calculation of the manufacturer’s average specific CO2 emissions once their ZEV sales share exceeds 2%. HDEV adoption is also supported by the Clean Vehicles Directive, which aggregates municipal vehicle purchases to national levels and establishes ZEV procurement targets for each member state in 2025 and 2030.¹⁵ The European Union also allows electric heavy trucks to exceed class limits by 2 tons. Table 3 summarizes incentives offered in some Member States.

Table 3: HDEV Incentives Offered in the Member States¹⁶

Geography	Description
Germany	2018: Federal subsidy scheme for electric trucks in Germany. Grants ranging from €12,000 to €40,000 depending on the trucks’ weight. 2020: Federal government doubles electric vehicle subsidies, no more diesel support. Private and municipal operators will receive €1.2 billion through a bus and truck fleet modernization program to switch to alternative.
Spain	2019: Federal government subsidizes electric mobility with €45 million, up to €15,000 subsidy for eTrucks.

¹² See International Council on Clean Transportation, Driving a Green Future a Retrospective Review of China’s Electric Vehicle Development and Outlook for the Future, January 2021 at <https://theicct.org/sites/default/files/publications/China-green-future-ev-jan2021.pdf>.

¹³ IEA at 65.

¹⁴ European Commission, Reducing CO2 Emissions from Heavy-Duty Vehicles at https://ec.europa.eu/clima/policies/transport/vehicles/heavy_en (last accessed May 13, 2021).

¹⁵ European Commission, Clean Vehicles Directive at https://ec.europa.eu/transport/themes/urban/clean-vehicles-directive_en (last accessed May 13, 2021).

¹⁶ Welch at 50.

Geography	Description
United Kingdom	2012: United Kingdom extends electric vehicle subsidies (Plug-In Van Grant). Up to 20,000 pounds sterling subsidy for large vans and trucks extended until 2023.
France	2017: Province Ile-de-France provides €9000 subsidy for electric trucks in the 3.5 – 7.5t weight range. 2020: French government subsidy up to € 7000 for the purchase of electric trucks.
Italy	2019: Ministry for Sustainable Transport approves €25 million incentives for clean trucks. Subsidies of up to €20,000 for the purchase of green trucks and semi-trailers.
Poland	2020: Subsidized purchase of alternative fuel trucks. Companies will receive a subsidy up to €45,000 for both medium- and heavy-duty trucks with alternative drivelines.

Source: Welch, et al., October 2020

India

In India, through the FAME-II program, the government is targeting electrification of buses. About 86% of the program’s budget is earmarked for direct vehicle subsidies, which is expected to generate demand for 7,000 BEV buses.¹⁷ Under the program, the national government recently approved the addition of 5,595 new electric buses in various states.

United States

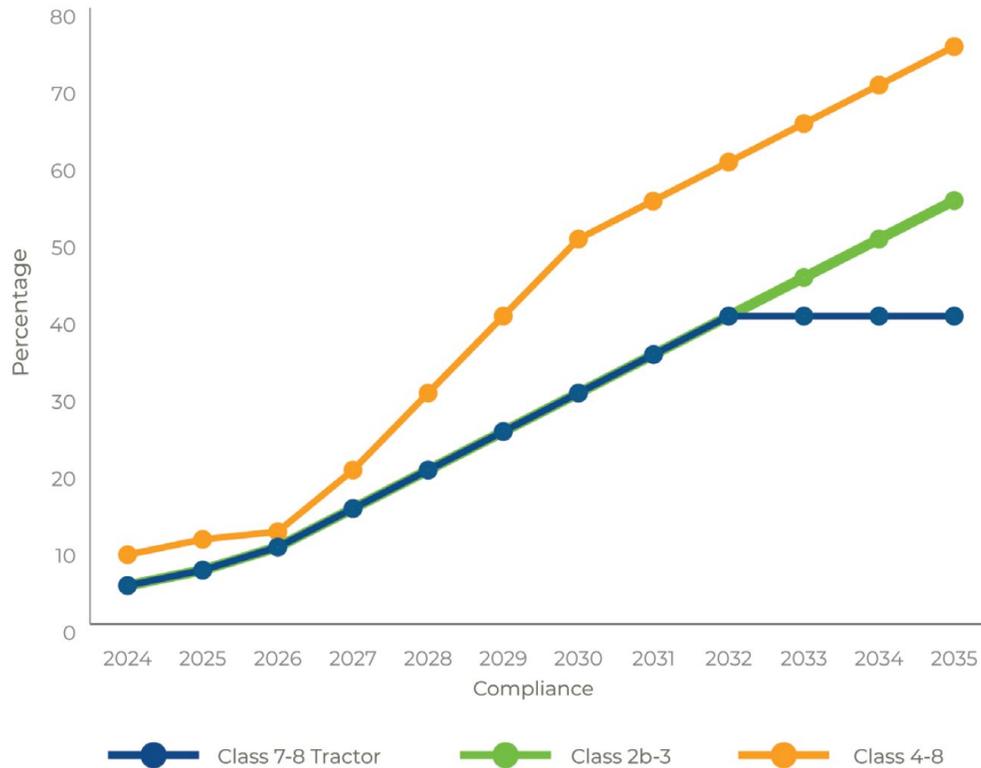
Currently, only the state of California, through its Advanced Clean Trucks (ACT) program, has set an actual ZEV mandate for HDVs.¹⁸ Under its Innovative Clean Transit regulation, all bus sales must be ZEVs by 2029.¹⁹ The ACT program will require 100% of all new MDV and HDV sales be ZEVs by 2050 with an interim target of 30% ZEV sales by 2030. 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 straight truck sales, 75% of Class 4-8 straight truck sales, and 40% of truck tractor sales. Large employers including retailers, manufacturers, brokers and others would be required to report information about shipments and shuttle services. Fleet owners, with 50 or more trucks, would be required to report about their existing fleet operations. Figure 7 summarizes truck sales requirements under the ACT program.

¹⁷ Ministry of Heavy Industries and Public Enterprises, Department of Heavy Industry, National Automotive Board, Brief at https://fame2.heavyindustry.gov.in/content/english/13_1_brief.aspx (last accessed May 13, 2021).

¹⁸ California Air Resources Board, Advanced Clean Trucks at <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks> (last accessed May 13, 2021).

¹⁹ California Air Resources Board, Innovative Clean Transit Regulation Fact Sheet at [https://ww2.arb.ca.gov/resources/fact-sheets/innovative-clean-transit-ict-regulation-fact-sheet#:~:text=Beginning%20in%202029%2C%20100%25%20of,GVWR\)%20greater%20than%2014%2C000%20lbs](https://ww2.arb.ca.gov/resources/fact-sheets/innovative-clean-transit-ict-regulation-fact-sheet#:~:text=Beginning%20in%202029%2C%20100%25%20of,GVWR)%20greater%20than%2014%2C000%20lbs) (last accessed May 13, 2021).

Figure 7: ZEV Truck Sales by Year Under the ACT Program



Source: Welch, et al., October 2020

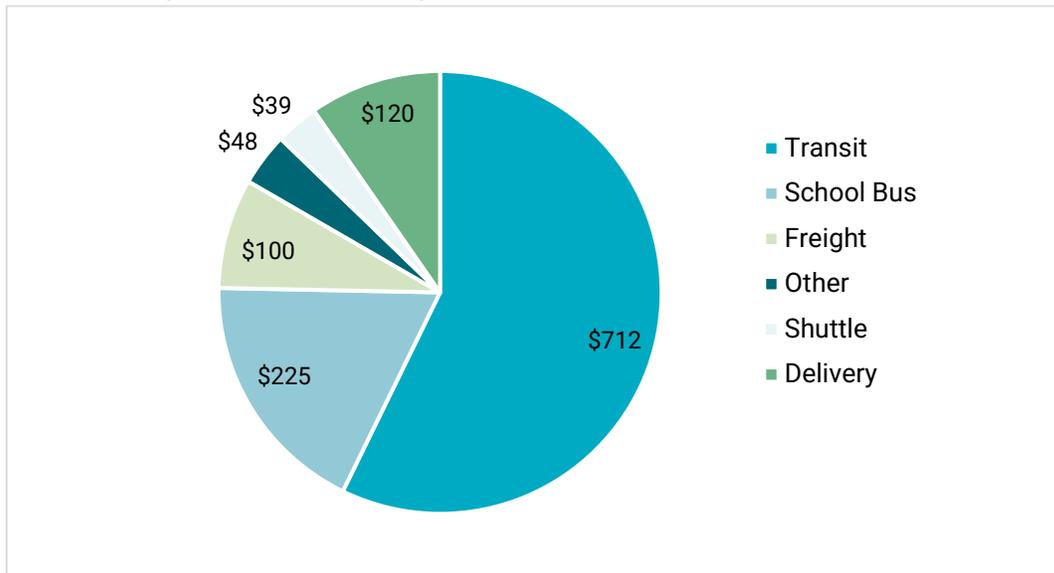
In July 2020, 15 states and the District of Columbia announced a joint memorandum of understanding (MOU), committing to work collaboratively to advance and accelerate the market for electric MDEVs and HDEVs, including large pickup trucks and vans, delivery trucks, box trucks, school and transit buses, and long-haul delivery trucks.²⁰ Effectively, these states will implement and follow the ACT program. In addition to California, participating states include Colorado, Connecticut, Massachusetts, Hawaii, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Washington and Vermont. The goal is to ensure that 100 percent of all new MD-EV and HD-EVs sales be ZEVs by 2050 with an interim target of 30 percent ZEV sales by 2030.

Several other state governments are enacting supportive legislation to help early adopters overcome financial barriers to electrification. The Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project in California and the Truck Voucher Incentive Program in New York provide vouchers that significantly reduce the

²⁰ Northeast States for Coordinated Air Use Management (NESCAUM), 15 States and the District of Columbia Join Forces to Accelerate Bus and Truck Electrification, July 14, 2020 at <file:///C:/Users/tammy/Downloads/Multistate-Truck-ZEV-MOU-Media-Release-20200714.pdf>.

incremental cost of purchasing eligible MDEVs and HDEVs. From 2009 through June 2020, California’s program has paid more than \$320 million in vouchers for MDEVs and HDEVs.²¹ New York’s program through June 2020 has paid out \$35 million in vouchers. The VW settlement alone is a huge source of HDEV funding, accounting for about 20% of all public funding of electric trucks and buses to date. Figure 8 summarizes public funding (either VW settlement or other state funding) as of August 2020.

Figure 8: Public Funding for MD and HD Electrification, Million USD



Source: Atlas Public Policy, August 2020

There is not a federal policy for MDEVs or HDEVs at this time. There is an incentive for alternative fuels infrastructure that applies to electrification infrastructure of up to 30% of the cost or \$30,000, and there is a Federal Low or No Emission Vehicle Program (Low-No) program; 60% of the funding in this program has been dedicated to electric transit buses. Another source of incentive funding for MD and HD electrification are the utilities. Three California utilities, Pacific Gas & Electric, Southern California Edison and San Diego Gas & Electric have collectively funded as of August 2020:

- Electric transit buses: \$215 million
- Electric school buses: \$60 million
- Electric trucks: \$220 million

There are a range of MD and HD electrification policies that would be considered in the Biden Administration. These are summarized in Table 4 and include policies proposed by Biden during the presidential campaign and

²¹ California Air Resources Board, California HVIP, 2019 at <https://www.californiahvip.org> [last accessed May 10, 2021].

those proposed by House and Senate Democrats, which are likely to be considered by the Administration. I believe tougher fuel efficiency standards, various tax credits and incentives for MDEVs and HDEVs and infrastructure funding are the most “sure bet” policies that stand a chance of enactment by Congress.

Table 4: MDEV and HDEV Policies That May Be Considered in a Biden Administration²²

Fuels-Vehicle Topic	Biden	House Democrats	Senate Democrats
Fuel Economy			
GHG standards for HDVs and MDVs		X	X
Cleaner Fuels-Low Carbon Fuels Standard			
Federal Low carbon fuels standard	X	X	X
Transition the RFS2 to a national LCFS		X	
Increase R&D funding for next generation biofuels		X	X
Clean fleets	X		
Zero Emission Vehicle (ZEV) Policies			
Fleet ZEV mandate		X	X
Expand EV infrastructure	X	X	X
Battery research	X		
R&D to EVs to support ZEV mandate		X	X
Incentivize state transportation planning for EVs		X	
Require states to consider EV charging in their electricity ratemaking		X	
Increase grant funding to cities, states and tribes for ZEV buses		X	
Tax credit for American-made ZEV buses		X	
ZEV HDV buses	X	X	X
HDV and MDV ZEV mandate		X	
Incentives for ZEV HDVs		X	
Incentives for ZEV MDVs		X	
Increase funding under the Diesel Emissions Reduction Act for ZEVs		X	X
Expand the Advanced Technology Vehicles Manufacturing Loan Program to include MDVs and HDVs		X	

Source: Compiled by Transport Energy Strategies, September 2020

²² Biden Campaign, The Biden Plan to Build A Modern, Sustainable Infrastructure and an Equitable Clean Energy Future at <https://joebiden.com/clean-energy/#>; House Select Committee on the Climate Crisis, “Solving the Climate Crisis” at <https://climatecrisis.house.gov/report>; Chuck Schumer, et al., “The Case for Climate Action: Building a Clean Economy for the American People” at <https://www.democrats.senate.gov/climate-report>.