MULTI-STATE MEDIUM- AND HEAVY-DUTY ZERO-EMISSION VEHICLE ACTION PLAN:

A Policy Framework to Eliminate Harmful Truck and Bus Emissions

NEW YORK STATE | Department of Environmental Conservation

MULTI-STATE ZEV TASK FORCE

NESCAUM

Jamie Flynn
Senior Policy Advisor

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Presentation Outline

- Northeast States for Coordinated Air Use Management
- Key policy drivers of transportation electrification
- MHD vehicles and their impacts
- Positive MHD ZEV market developments
- Multi-State MHD ZEV initiative and *MHD ZEV Action Plan*
- *MHD ZEV Action Plan* development process
- *MHD ZEV Action Plan* policy recommendations
- Request for public input
- New York State's MHD vehicle electrification legislation, regulation, goals, and programs
- Questions and discussion

KEY TERMS

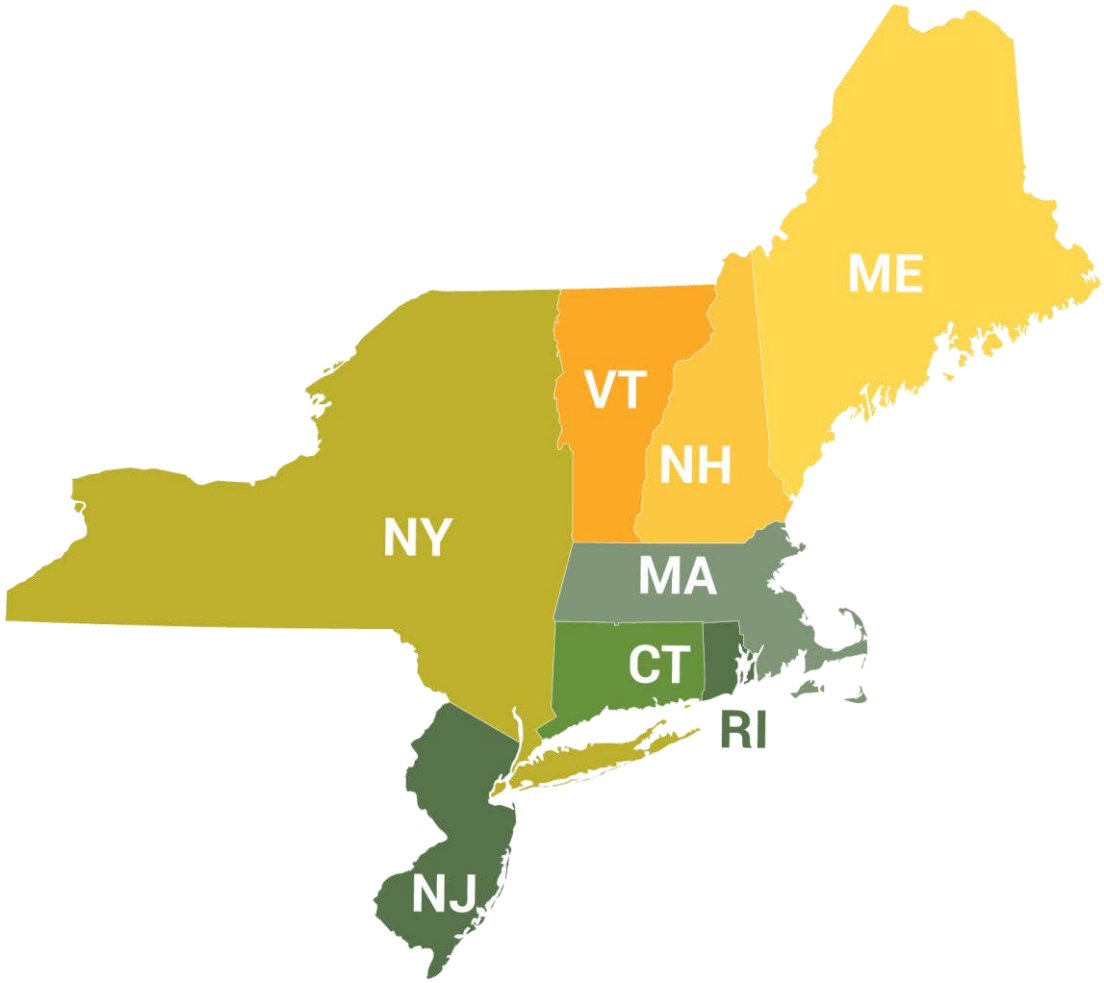
Medium and heavy duty (MHD) refers to vehicles with a gross vehicle weight rating (GVWR) greater than or equal to 8,500 pounds (3,860 kilograms) regardless of how they are powered.

Zero emission vehicles (ZEVs) include:

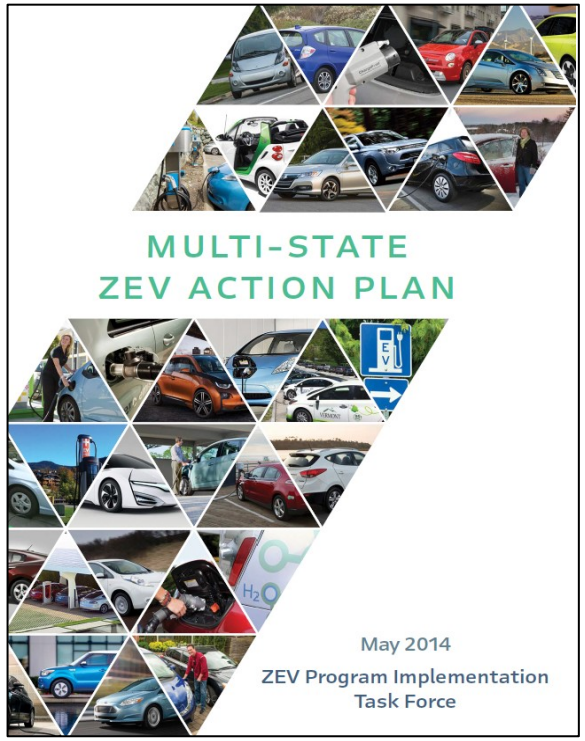
- *Battery electric vehicles* (BEVs) powered solely by an electric motor and battery
- *Plug in hybrid electric vehicles* (PHEVs) powered by a combination of an electric motor and a fossil fueled internal combustion engine
- *Fuel cell electric vehicles* (FCEVs) powered by an electric motor fueled by hydrogen

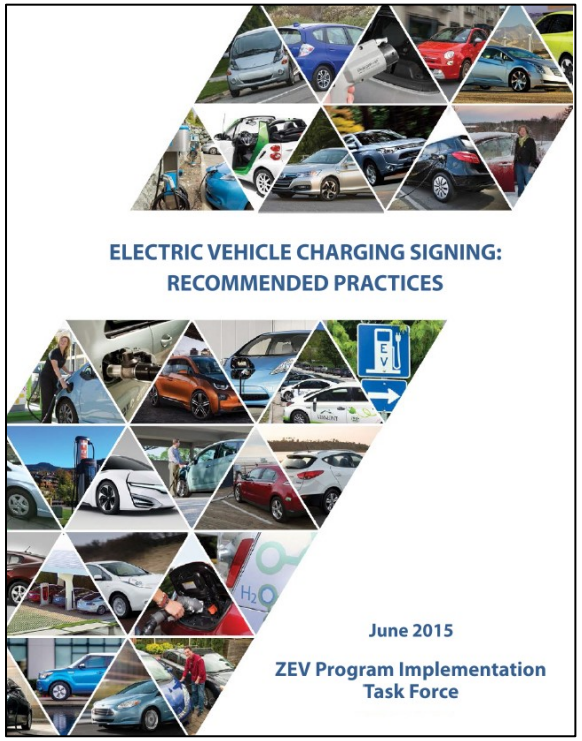
Northeast States for Coordinated Air Use Management (NESCAUM)

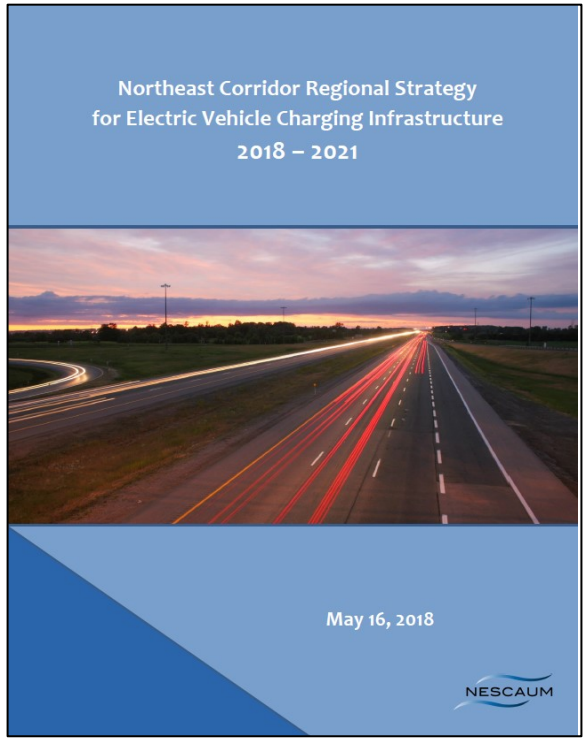
- Non-profit regional association of state air quality agencies in the Northeast U.S. (est. 1967)
- Provides scientific, technical, and policy support on wide range of air quality and climate issues
- Significant focus on transportation electrification
- Long history of collaborating with other states, federal agencies, and the automobile industry to promote low- and zero-emission vehicles
- Develops and leads multi-state initiatives, e.g.,
  - 2013 Multi-State ZEV MOU
  - Multi-State ZEV Task Force
  - The “Section 177 States”
  - 2020 Multi-State MHD ZEV MOU

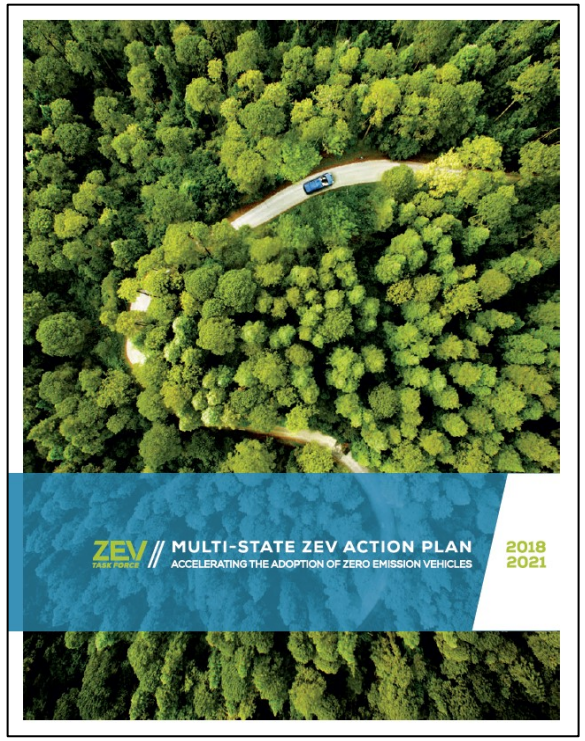


ZEV Task Force – Light-Duty Vehicles









DRIVE CHANGE
DRIVE ELECTRIC

Key Policy Drivers of Transportation Electrification

Mitigate climate change

- Transportation is the largest source of greenhouse gas (GHG) emissions in the U.S.

Improve air quality

- Major source of smog-forming pollutants, particulate matter, and hazardous air pollutants that harm public health

Promote equity and justice

- Develop policies that address historical and current public health, economic, and social inequities

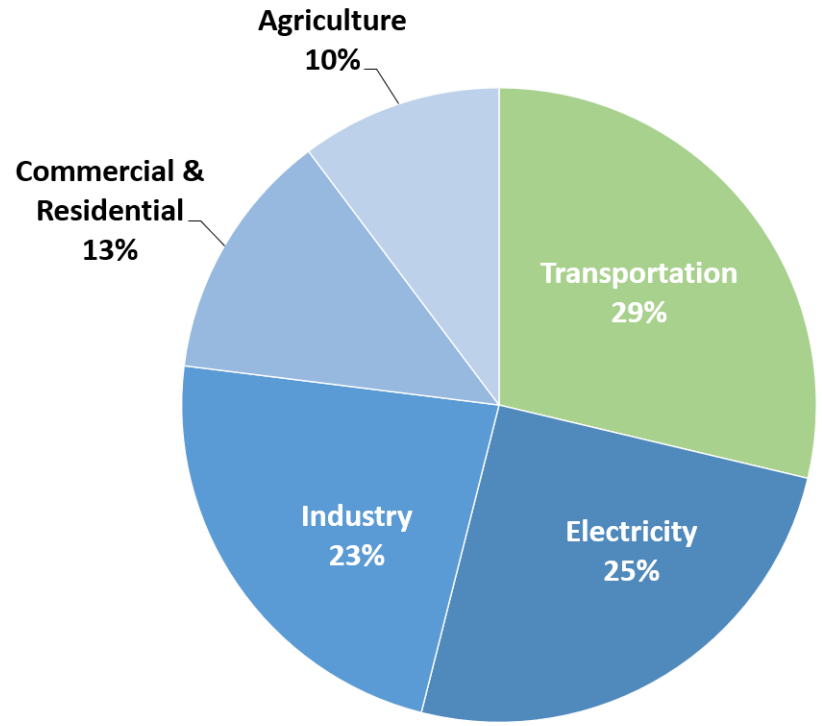
Generate economic growth

- Policies that advance ZEV market development incentivize vehicle deployment, attract investments, and create jobs

Enhance energy security and resilience

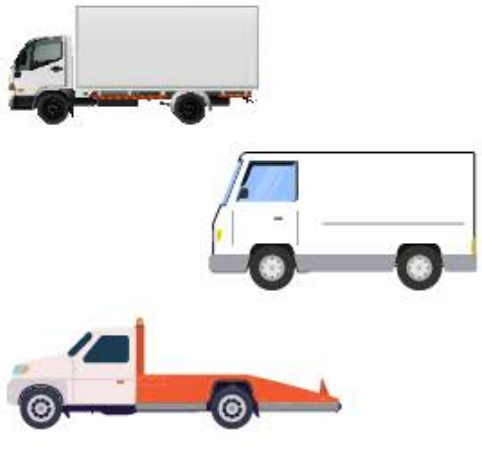
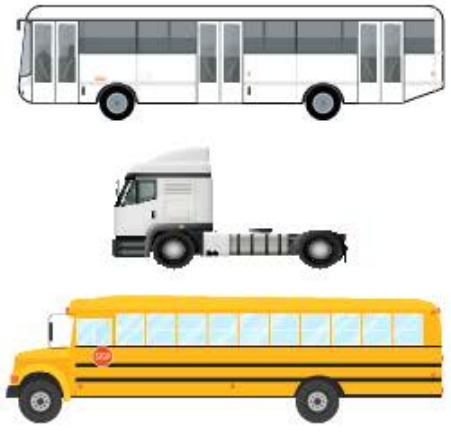
- Transitioning to ZEVs reduces reliance on foreign oil and insulates consumers from global market fluctuations

2019 U.S. GHG Emissions by Economic Sector



Source: U.S. EPA, Sources of Greenhouse Gas Emissions, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#transportation

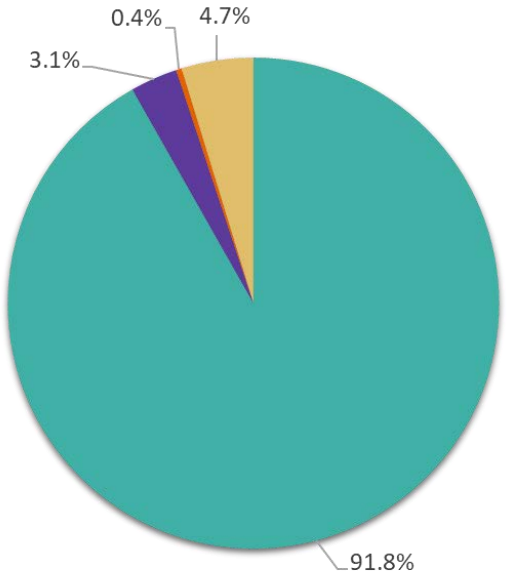
Medium- and Heavy-Duty Vehicles

Weight Class	Class 2b	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
Example Vehicles							
GVWR	8,500 – 10,000 lb 3,856 – 4,536 kg	10,001 – 14,000 lb 4,536 – 6,350 kg	14,001 – 16,000 lb 6,351 – 7,257 kg	16,001 – 19,500 lb 7,258 – 8,845 kg	19,501 – 26,000 lb 8,846 – 11,793 kg	26,001 – 33,000 lb 11,794 – 14,969 kg	> 33,000 lb > 14,969 kg

Medium- and heavy-duty (MHD) refers to vehicles with a gross vehicle weight rating (GVWR) greater than or equal to 8,500 pounds (3,860 kilograms)

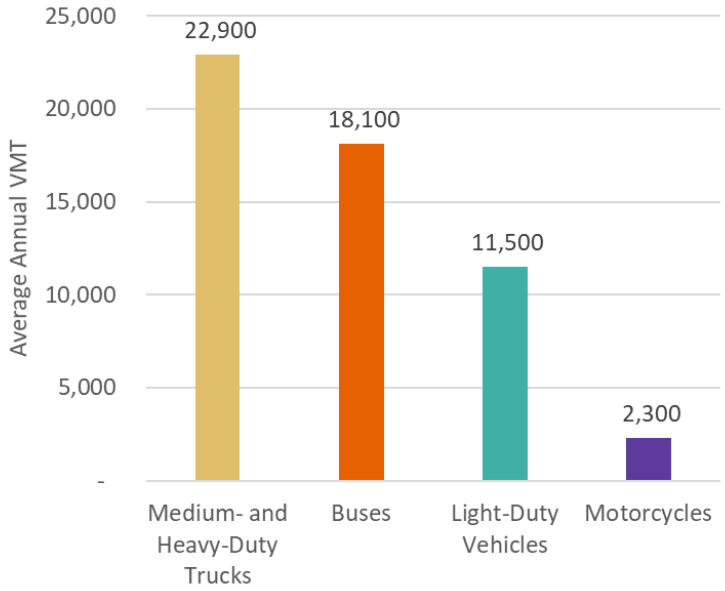
MHD Vehicles – Vehicle Stocks, VMT, and GHG Emissions

2019 U.S. On-road Vehicle Stocks by Vehicle Type



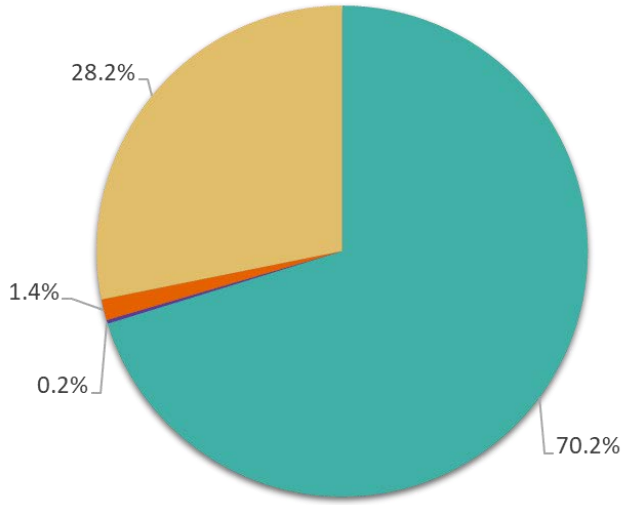
While MHD vehicles account for less than 5% of total on-road vehicles . . .

2019 U.S. Annual Vehicle Miles Traveled by Vehicle Type



Their annual vehicle miles traveled (VMT) is far greater than other classes

2019 U.S. On-road GHG Emissions by Vehicle Type

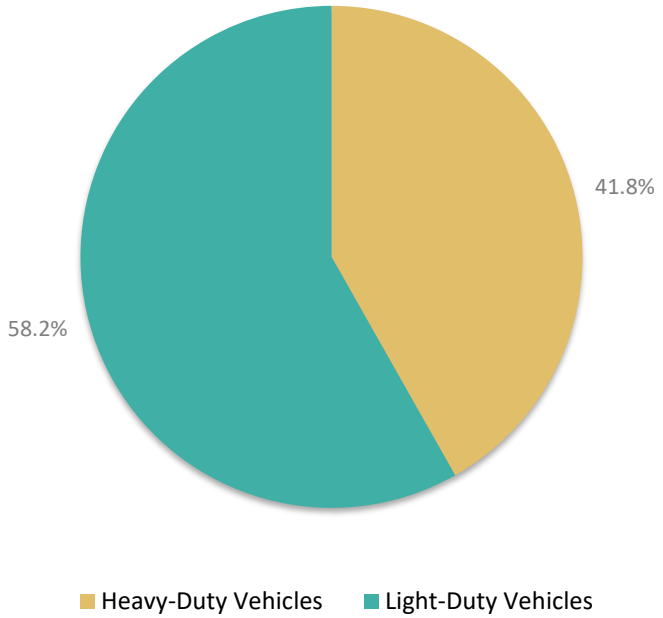


MHD vehicles account for 28% of GHGs from on-road transportation

Source: U.S. EPA, U.S. Greenhouse Gas Emissions and Sinks 1990-2019 (Apr. 2021), https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2019.

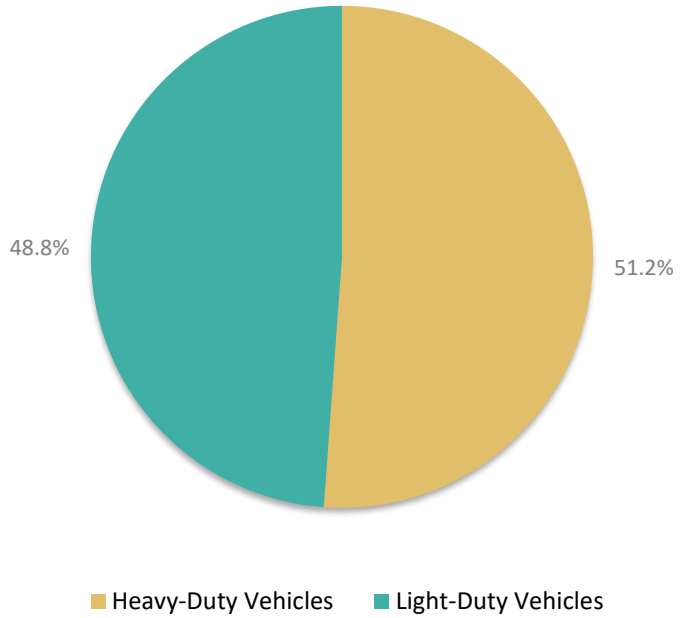
MHD Vehicles – NOx and $PM_{2.5}$ Emissions

2017 U.S On-Road NOx Emissions by Vehicle Type



42% of smog-forming NOx emissions (a precursor to ground-level ozone)

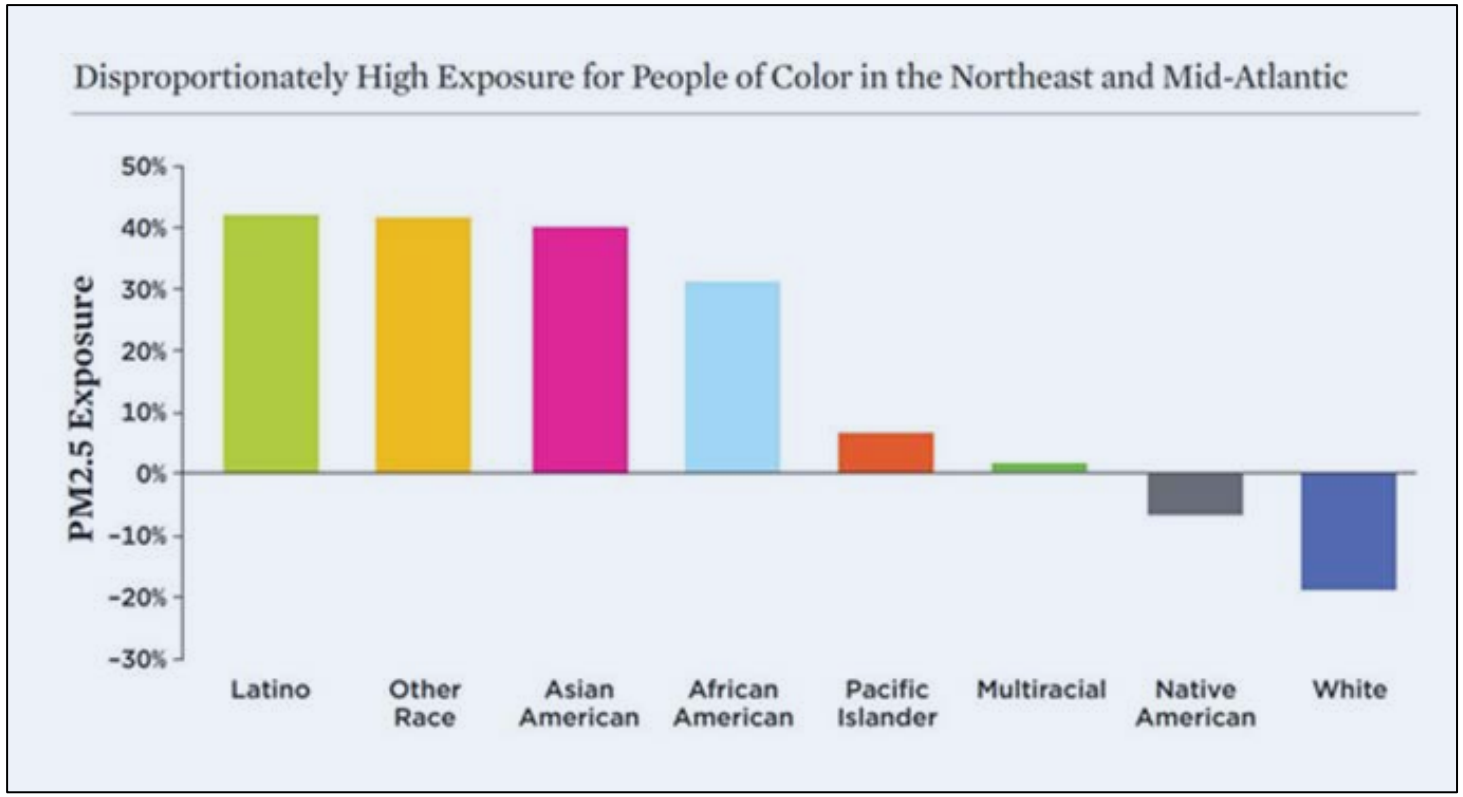
2017 U.S. On-Road $PM_{2.5}$ Emissions by Vehicle Type



51% of $PM_{2.5}$ emissions (particulate matter < 2.5 micrometers in diameter)

Source: U.S. EPA, 2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document (Jan. 2021), https://www.epa.gov/sites/default/files/2021-02/documents/nei2017_tsd_full_jan2021.pdf

Disproportionate Impacts on Frontline and Overburdened Communities



Source: Union of Concerned Scientists, Inequitable Exposure to Air Pollution from Vehicles in the Northeast and Mid-Atlantic: Who Bears the Burden? (June 2019), https://www.ucsusa.org/sites/default/files/attach/2019/06/ Inequitable-Exposure-to-Vehicle-Pollution-Northeast-Mid-Atlantic-Region.pdf.

- Research shows a direct correlation between exposure to near-road air pollution and increased health risk
- Air pollution worsens asthma and other cardio-respiratory illnesses and increases risk of premature death
- Many low-income communities and communities of color are located near trucking corridors, ports, warehouses, and other emissions sources . . .
- And are directly and disproportionately exposed to harmful pollutants and more vulnerable to the effects of climate change

Positive Market Developments

State adoption of Advanced Clean Trucks regulation

- Sales requirements adopted in CA, MA, NJ, NY, OR, and WA
- Many states considering adoption
- Reduces emissions and provides market certainty needed to drive investment in zero-emission technologies and infrastructure

Infusion of federal funding

- Infrastructure Investment and Jobs Act provides $15 billion in funding for MHD vehicle electrification:
  - $250 million for projects that reduce truck emissions at port facilities
  - $5 billion for clean school bus purchases
  - $10 billion for clean transit buses, refueling infrastructure, and bus facility upgrades

Source: Proterra

Source: Volvo

Positive Market Developments

Continuously improving economics

- Rapid advances in battery technologies are driving sharp cost reductions; forecasted through 2030
- Lifetime operation and maintenance cost savings
- Favorable total cost of ownership for applications in many classes by 2025 and all classes by 2030

Growing model availability and vehicle deployments

- > 125 MHD ZEV models (Class 2b-8) currently available; > 240 models expected by 2023
- > 3,500 zero-emission buses and 1,700 electric school buses in operation or on order in the U.S.
- > 100,000 electric MHD vehicles pre-ordered by commercial fleets; deployments have begun

Source: Volvo

Source: Volvo

Positive Market Developments

UPS invests in Arrival and orders 10,000 Generation 2 Electric Vehicles

Amazon Will Buy 100,000 Rivian Electric Delivery Trucks

Lion Electric Receives Conditional Purchase Order from Student Transportation of Canada for 1,000 Electric School Buses

Maersk to add 300 electric trucks to North America network

Walmart orders 5,000 electric delivery vans from GM's BrightDrop

Charging Ahead: FedEx Receives First All-Electric, Zero-Tailpipe Emissions Delivery Vehicles from BrightDrop

Pride Group Enterprises Orders 6,320 Workhorse C-Series Delivery EVs

Fluid Truck Orders 600 Lightning Electric Vehicles

King County Metro to purchase up to 120 battery-electric buses from New Flyer of America, Inc.

MULTI-STATE MEDIUM- AND HEAVY-DUTY ZERO EMISSION VEHICLE

MEMORANDUM OF UNDERSTANDING

WHEREAS, the Signatory States and the District of Columbia[1] recognize the importance of state leadership and coordinated state action to ensure national progress in the effort to reduce greenhouse gas (GHG) emissions and stabilize global warming;

WHEREAS, the Signatory States have statutory obligations or otherwise seek to significantly reduce statewide GHG emissions by 2050, consistent with science-based targets;

WHEREAS, transportation is now the nation's largest source of GHG emissions, and, after light-duty vehicles, medium- and heavy-duty trucks are the next largest source of transportation sector GHG emissions;

WHEREAS, the Signatory States have a statutory obligation to provide their citizens with air quality that complies with national health-based air quality standards, which are required to be protective of health and the environment with an adequate margin of safety;

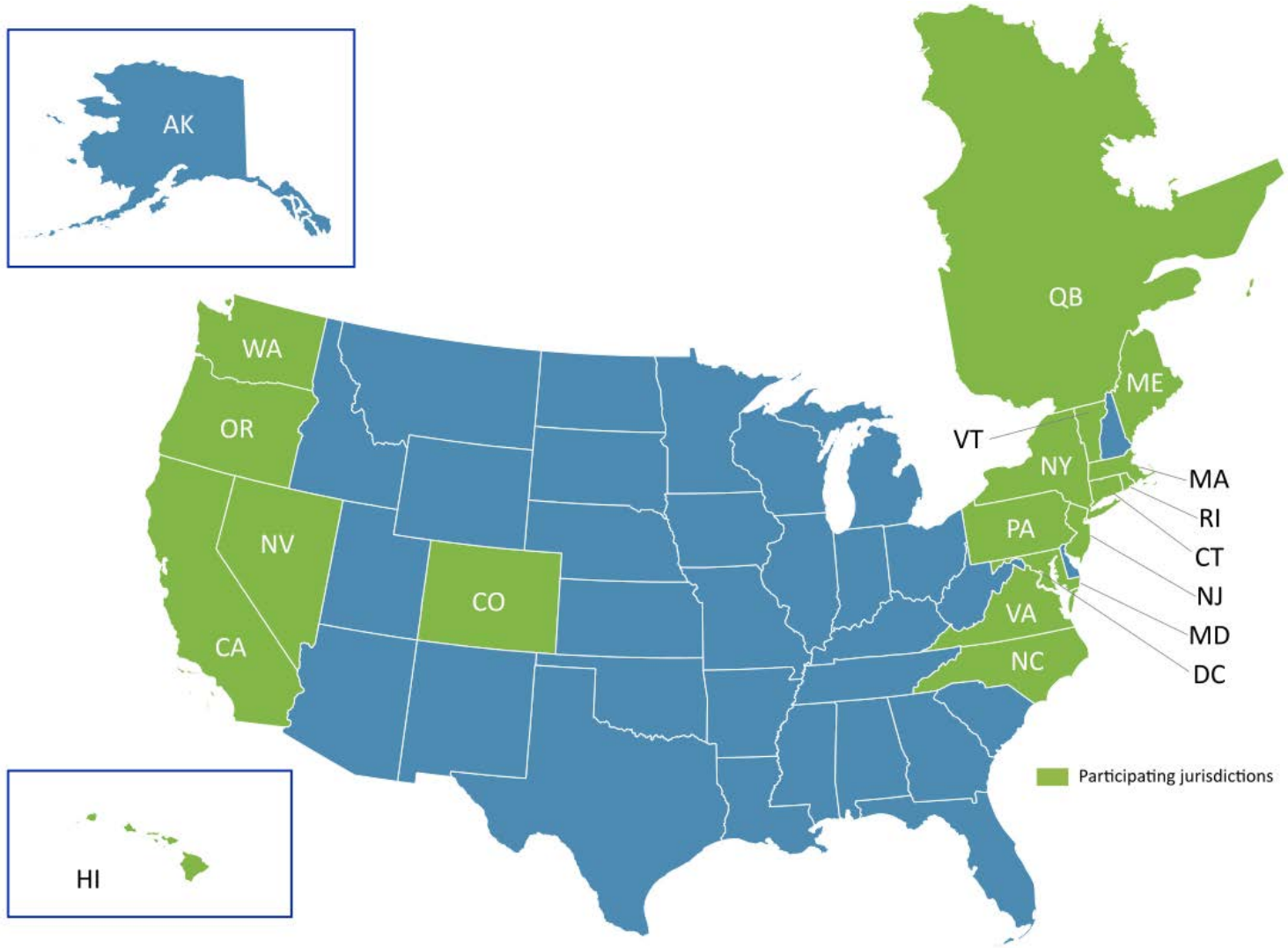
WHEREAS, fossil fuel related emissions from medium- and heavy-duty vehicles (MHDVs) are a major source of nitrogen oxides (NOx), particulate matter, and toxic air emissions, which are preventing many densely populated areas from achieving compliance with federal ambient air quality standards;

WHEREAS, emissions from MHDVs are a widely acknowledged, but unaddressed, environmental justice problem that directly and disproportionately impacts disadvantaged communities located near freight corridors, ports and distribution centers;

Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Initiative

- Governors' Multi-State MHD ZEV Memorandum of Understanding (MOU) announced in July 2020
- Commits 17 states, D.C., and Quebec to work to promote rapid and equitable electrification of trucks and buses
- Sets goal for at least 30% of new truck, van, and bus sales to be zero-emission by 2030, and 100% of sales by 2050
- Prioritizes deployment of electric trucks and buses in and near frontline and overburdened communities
- Directs ZEV Task Force to develop a *Multi-State MHD ZEV Action Plan* to identify barriers and recommend policies to support widespread MHD vehicle electrification

MHD ZEV Initiative Participating Jurisdictions



- 43% of the U.S. population
- Nearly half of the U.S. economy
- Over 35% of Class 2b-8 vehicles
- Over 40% of goods (by value) moved by truck in the U.S.

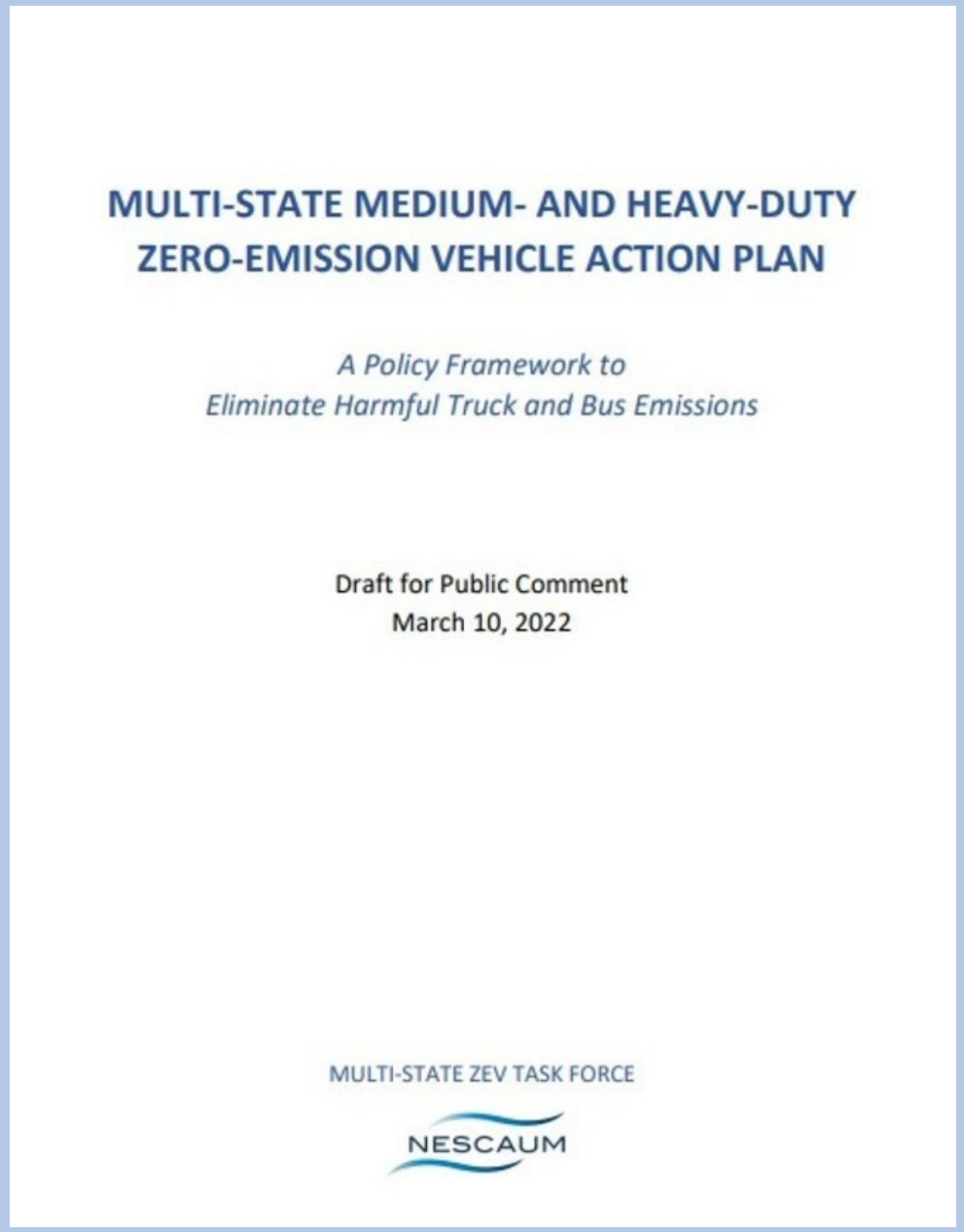
*Not including Quebec.

Census Bureau, *2020 Population and Housing State Data* (2020), https://www.census.gov/library/visualizations/interactive/2020-population-and-housing-state-data.html

Bureau of Economic Analysis, *GDP and Personal Income*, https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=1&isuri=1 (2021 Real GDP)

Atlas Public Policy, *EV Hub* (2020) (IHS market data), https://www.atlasevhub.com/materials/medium-and-heavy-duty-vehicle-registrations-dashboard/#06f2a5dfc39daf9cc;

National Transportation Research Center, *Freight Analysis Framework 5* (2020), https://faf.ornl.gov/faf5/SummaryTable.aspx



Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Action Plan

- Identifies the environmental, economic, and social policy drivers of MHD vehicle electrification
- Offers principles to support a just and equitable transition to electric trucks and buses and emphasizes the need for a "whole-of-government" approach to equity
- Describes the state of the MHD ZEV market today
- Discusses the barriers and opportunities associated with widespread MHD vehicle electrification
- Includes 60+ recommendations for state policymakers to promote rapid and equitable MHD ZEV deployment
- Features innovative MHD ZEV policies and programs
- Includes local and federal government recommendations

Source: California Department of Transportation

Action Plan Development Process – Prioritizing Equity

- Goals: center equity, reflect frontline and overburdened community voices and expertise, and deliver direct benefits to communities and workers
- Prioritized engagement with national equity and environmental justice organizations to learn about issues facing communities and workers and their priorities
- Developed principles for the design and implementation of just and equitable state MHD ZEV programs and robust community engagement practices
- Collaborated on the development of equitable electrification strategies and received feedback on preliminary draft recommendations

Action Plan Development Process – Informational Webinar Series

Date	Webinar
October 1, 2020	Regulatory Tools to Accelerate MHDV Adoption
October 29, 2020	Understanding the Truck Market
November 24, 2020	Early Experiences in Truck Electrification: A Panel Discussion with Commercial and Public Sector Fleets
December 17, 2020	Transit and School Bus Electrification: Getting to Scale
January 7, 2021	Role of Utilities in Accelerating Electrification of MHD Vehicles – Part 1 (overview)
January 21, 2021	Role of Utilities in Accelerating Electrification of MHD Vehicles – Part 2 (utility panel)
April 1, 2021	Innovative Financing to Accelerate Truck and Bus Electrification
December 9, 2021	Prioritizing Transportation Policy for Health and Equity

See NESCAUM, Medium- and Heavy-Duty Zero-Emission Vehicles: Action Plan Development Process, https://www.nescaum.org/documents/medium-and-heavy-duty-zero-emission-vehicles-action-plan-development-process.

NY Outreach

- M/HD ZEV MOU - DEC Informational Meeting, October 21, 2020
- NYS Community Group Webinar, December 7, 2021
- M/HD ZEV Action Plan - April 11, 2022

Source: Lion Electric

MHD ZEV Action Plan Recommendations

- **Equity Principles**
  - Develop inclusive, accessible, and transparent community engagement processes
  - Ensure that MHD ZEV programs deliver direct benefits and just and equitable outcomes for frontline and overburdened communities
- **Vehicle Sales and Purchase Requirements** (e.g., Advanced Clean Trucks (ACT) + HD NOx, Advanced Clean Fleets, Innovative Clean Transit)
  - Require manufacturers to sell and fleets to purchase MHD ZEVs
  - Establish state fleet, school bus fleet, and public transit fleet electrification targets
- **Vehicle and Infrastructure Purchase Incentives**
  - Establish incentive programs, e.g., point-of-sale (most effective), tax credits/waivers, toll exemptions, parking fees, registration fees
  - Reserve funding to benefit frontline/overburdened communities and small/minority-owned fleets and independent owner/operators

Source: Volvo

MHD ZEV Action Plan Recommendations

- **Electric Utility and Utility Regulator Actions**
  - Adopt targets for infrastructure deployment that align with state air quality, climate, and transportation electrification goals
  - Adopt rate structures, infrastructure incentives, and fleet support programs tailored to meet fleet planning and operational needs
  - Prioritize utility investments in frontline/overburdened communities
- **Mobilizing Private Capital to Finance Fleet Conversions**
  - Work with transit agencies, school districts, utilities, green banks, and others to explore and adopt policies and financing approaches to generate private investment in fleets and infrastructure
- **Outreach and Education**
  - Work with utilities, manufacturers, charging/fueling providers, fleets, independent owner/operators, and other partners to develop outreach and education programs tailored for all fleet types

MHD ZEV Action Plan Recommendations

- **Economic Equity for Workers**
  - Adopt a “whole-of-government” approach and mobilize interagency coordination to address important labor issues
  - Partner with workers, schools, industry, and others to develop training and apprenticeship programs for vehicles and infrastructure
- **Community Air Monitoring**
  - Partner with communities and sensitive populations to design and deploy community air monitoring programs to identify “hot spots”
  - Develop appropriate indicators and geographic mapping systems to define and identify frontline/overburdened communities
- **Planning for and Deploying Public Charging and Fueling Infrastructure**
  - Coordinate with other agencies and partners to plan for highway and community public infrastructure, charging and parking needs
  - Support development of a standardized, interoperable, reliable, and accessible fast-charging network for MHD ZEVs

Source: Lion Electric

MHD ZEV Action Plan Recommendations

- **Ongoing Multi-State Research and Policy Evaluation**
  - Collect data to evaluate effectiveness of MHD ZEV policies
  - Support research to inform the development of sustainable battery manufacturing and supply chains and approaches to battery reuse
  - Evaluate potential state actions to support port electrification
- **Local Government Recommendations** (Appendix A)
  - Engage in planning for charging/fueling infrastructure deployment
  - Incentivize MHD ZEV adoption with monetary (e.g., tax credits) and non-monetary (e.g., zero-emission zones) approaches
  - Amend local codes/rules to minimize administrative burdens for infrastructure planning, permitting, and construction
- **Federal Government Recommendations** (Appendix A)
  - Adopt increasingly stringent emissions standards for MHD vehicles
  - Statutory and policy changes to allow ZEV charging/fueling along interstate rights-of-way and streamline federal funding processes

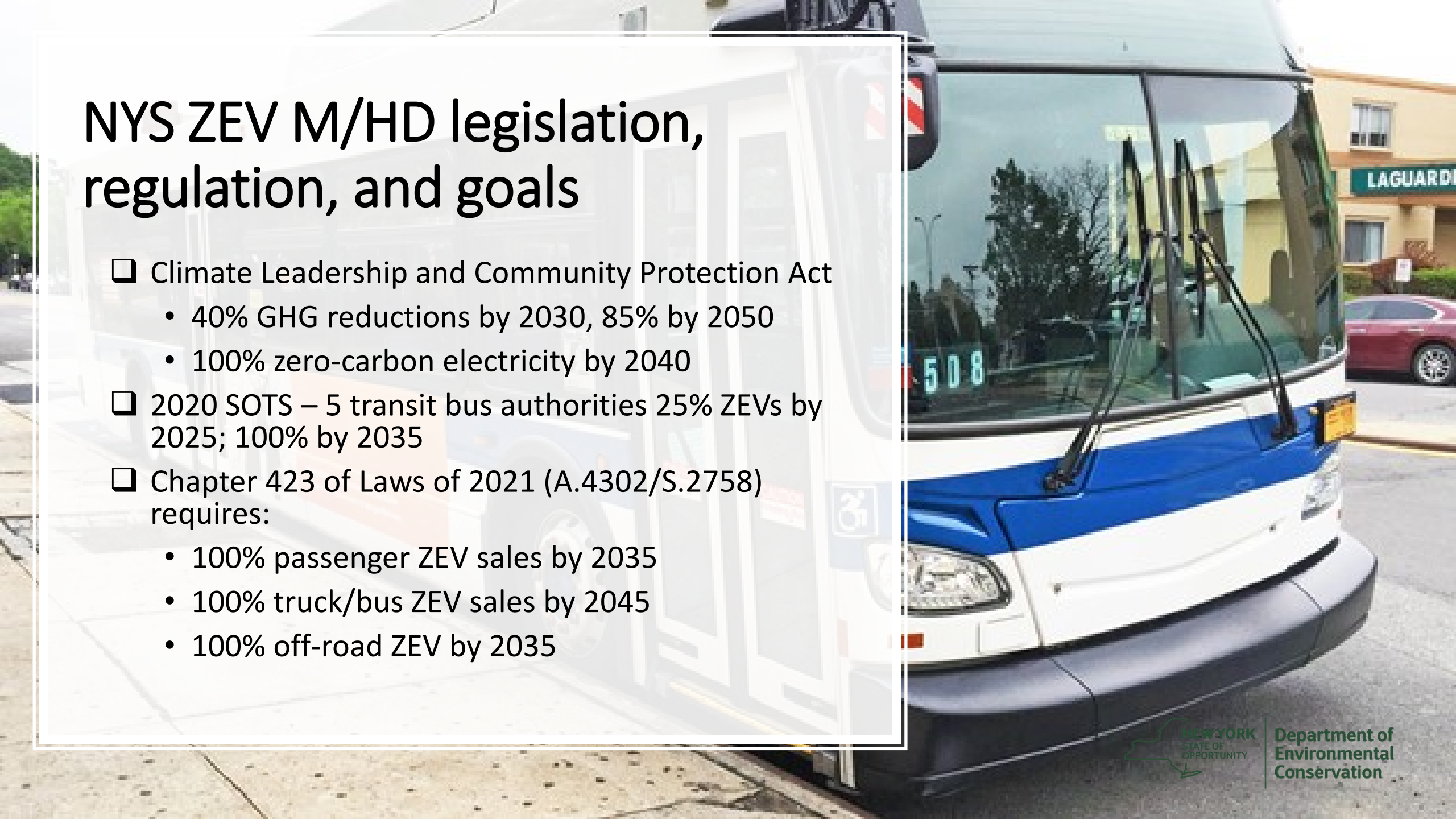
Source: California Air Resources Board

Request for Public Input

NESCAUM and the participating jurisdictions have released a draft MHD ZEV Action Plan for public input. Comments can be submitted through NESCAUM's Public Input Portal by April 25, 2022. Previously submitted comments are available here.

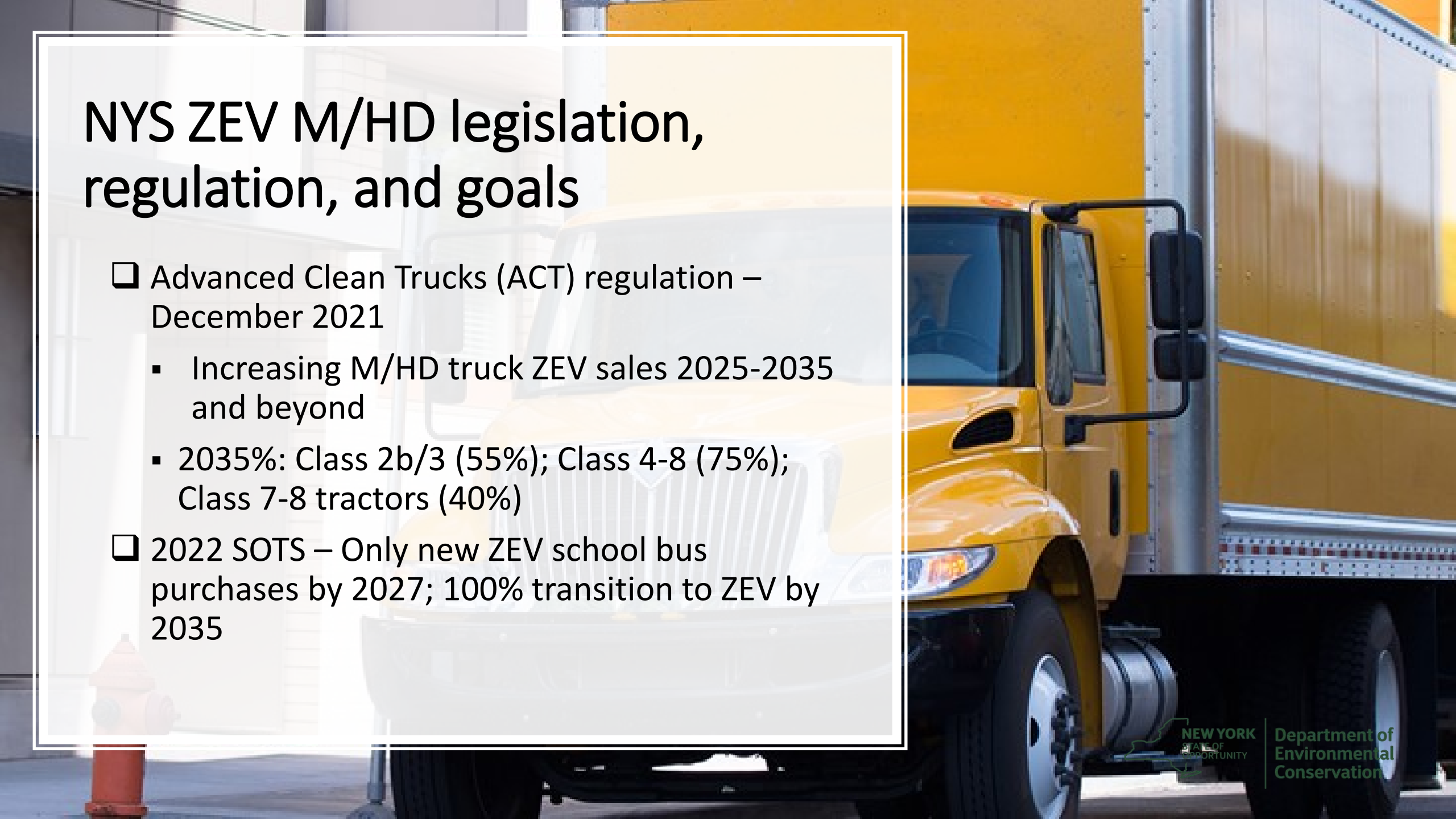
NYS ZEV M/HD legislation, regulation, and goals

- ❑ Climate Leadership and Community Protection Act
  - 40% GHG reductions by 2030, 85% by 2050
  - 100% zero-carbon electricity by 2040
- ❑ 2020 SOTS – 5 transit bus authorities 25% ZEVs by 2025; 100% by 2035
- ❑ Chapter 423 of Laws of 2021 (A.4302/S.2758) requires:
  - 100% passenger ZEV sales by 2035
  - 100% truck/bus ZEV sales by 2045
  - 100% off-road ZEV by 2035



NYS ZEV M/HD legislation, regulation, and goals

- Advanced Clean Trucks (ACT) regulation – December 2021
  - Increasing M/HD truck ZEV sales 2025-2035 and beyond
  - 2035%: Class 2b/3 (55%); Class 4-8 (75%); Class 7-8 tractors (40%)
- 2022 SOTS – Only new ZEV school bus purchases by 2027; 100% transition to ZEV by 2035



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New York State M/HD ZEV Programs

- **Clean Transportation NY**
  - $70M in VW funds committed to date for zero emission M/HD projects (trucks, school buses, transit buses, cargo handling equipment, transit charging infrastructure)
- **New York Truck Voucher Incentive Program**
  VW and CMAQ
- **New York City Clean Trucks Program**
  M/HD Trucks in NYC EJ IBZs

New York State M/HD ZEV Programs (continued)

- **PSC Make Ready Order July 2020**
  - $15M MHD Fleet Make Ready Pilot
  - $10M Upstate Transit Authorities
  - Mid Point review Fall 2022
- **NYSERDA Clean Transportation Prize Competition**
  - $85M for transportation electrification demonstrations in underserved communities, including $24M specifically for Electric Truck & Bus Challenge
  - Phase 1 - Seventeen projects awarded grants to further develop project plans for Phase 2 competition.