Proposed Medium- and Heavy-Duty Vehicle Rules in Vermont

Vermont Agency of Natural Resources
September 2022
Today’s Meeting Logistics

• Meeting is being recorded
• Slides and recording will be made available following the meeting: https://dec.vermont.gov/air-quality/laws/recent-regs
• Hold questions until after the presentation
• Type your name in the chat to be called on to ask a question or make a comment following the presentation
Agenda

• Welcome – Vermont Clean Cities Coalition
• Introduction & background on the proposed rules – Agency of Natural Resources (ANR)
• A closer look at the proposed rules – Northeast States for Coordinated Air Use Management (NESCAUM)
• Impacts & benefits of the proposed rules - ANR
• Questions and Discussion
What is the rule about?

• These rules are requirements for vehicle manufacturers to sell MHD zero emission vehicles as an increasing percentage of their annual sales.
• These rules are requirements for manufacturers to deliver for sale new MHD vehicles and emit less particulate matter, ozone-forming contaminants, and greenhouse gases.
• These rules allow for continued sale of fossil fueled vehicles beyond 2035.
• This is NOT an electric vehicle purchase mandate.
Medium- and Heavy-Duty Vehicles Disproportionately Contribute to Emissions

2019 U.S. On-Road GHGs: 30% Heavy-Duty Vehicles, 70% Other
2017 U.S. On-Road NOx: 42% Heavy-Duty Vehicles, 58% Light-Duty Vehicles
2017 U.S. On-Road PM2.5: 51% Heavy-Duty Vehicles, 49% Light-Duty Vehicles

Why is reducing vehicle emissions important?

Pollutants and Health Impacts:

• Volatile organic compounds (VOCs) and nitrogen oxides (NOx) combine to form ground level ozone (also known as smog) that triggers asthma attacks and damages lung tissue.

• Fine particulate matter (PM2.5) causes respiratory and cardiovascular damage.

• These health impacts tend to have a greater impact on disadvantaged communities and frontline workers in Vermont.
Why are cleaner vehicles important?
Why do we need to transition to cleaner vehicles?

Climate Change in Vermont: More rain and flooding, changes to agriculture, different forests.
Vermont’s Commitment to Cleaner Vehicles

1996: Vermont first adopts California Motor Vehicle Emission Standards for cars & light-duty trucks


2012: Vermont adopts Advanced Clean Cars Program

2013: Gov. Shumlin signs Multi-state light-duty ZEV MOU

2020: Gov. Scott signs Medium- and Heavy-Duty ZEV MOU

2022: Vermont proposes to adopt updates to the Advanced Clean Cars and to adopt new rules for medium- and heavy-duty vehicles

To date, 18 states have adopted California’s motor vehicle emissions rules
Governor Scott signed on to the Multi-State Medium- and Heavy-Duty (MHD) ZEV Initiative

• 17 states, D.C. and Quebec
• MOU Sets ZEV sales targets
  – 30% sales by 2030
  – 100% sales by 2050
• Directs development of a Multi-State MHD ZEV Action Plan
Multi-State MHD ZEV Action Plan

- Includes 65+ recommendations for state policymakers to promote rapid and equitable MHD ZEV deployment
- Highlights disproportionate impacts on overburdened communities; offers principles for a just and equitable transition
- Vermont MHD ZEV Action Plan will be developed with stakeholder input
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
- Pride Group Enterprises Orders 6,320 Workhorse C-Series Delivery EVs
- Charging Ahead: FedEx Receives First All-Electric, Zero-Tailpipe Emissions Delivery Vehicles from BrightDrop
- Fluid Truck Orders 600 Lightning Electric Vehicles
- VT: New electric buses servicing Rutland area
Overview of the ACT, HD Low NOx Omnibus, and Phase 2 GHG Regulations

VERMONT STAKEHOLDER MEETING

PRESENTED BY:

Jeremy Hunt
Clean Transportation Policy Advisor & Analyst

September 6, 2022
### 2019 Snapshot of Class 2b-8 Vehicles in Vermont

<table>
<thead>
<tr>
<th>Class by GVWR</th>
<th># of Vehicles</th>
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<tbody>
<tr>
<td>2b</td>
<td>29,444</td>
</tr>
<tr>
<td>3</td>
<td>13,279</td>
</tr>
<tr>
<td>4</td>
<td>1,443</td>
</tr>
<tr>
<td>5</td>
<td>2,879</td>
</tr>
<tr>
<td>6</td>
<td>3,074</td>
</tr>
<tr>
<td>7</td>
<td>4,934</td>
</tr>
<tr>
<td>8</td>
<td>8,535</td>
</tr>
<tr>
<td><strong>All Classes</strong></td>
<td><strong>63,588</strong></td>
</tr>
</tbody>
</table>

125+ ZEV/NZEV models today
240+ ZEV/NZEV models coming
Total Cost of Ownership Comparisons: Class 6 Delivery Trucks
Total Cost of Ownership Comparisons: Class 8 Short-Haul Trucks
Advanced Clean Trucks (ACT) Regulation
What is the ACT Rule?

- Manufacturer sales requirement – not a purchase requirement
- Guarantees a minimum supply of ZEVs in Vermont
- Credit/deficit system for compliance flexibility
Vehicle Groupings Used in ACT

<table>
<thead>
<tr>
<th>Class 2b-3</th>
<th>Class 4-8</th>
<th>Class 7-8 Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Class 2b-3" /></td>
<td><img src="image2" alt="Class 4-8" /></td>
<td><img src="image3" alt="Class 7-8 Tractors" /></td>
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<td><img src="image4" alt="Class 2b-3" /></td>
<td><img src="image5" alt="Class 4-8" /></td>
<td><img src="image6" alt="Class 7-8 Tractors" /></td>
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<td><img src="image8" alt="Class 4-8" /></td>
<td><img src="image9" alt="Class 7-8 Tractors" /></td>
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<td><img src="image11" alt="Class 4-8" /></td>
<td><img src="image12" alt="Class 7-8 Tractors" /></td>
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<tr>
<td><img src="image13" alt="Class 2b-3" /></td>
<td><img src="image14" alt="Class 4-8" /></td>
<td><img src="image15" alt="Class 7-8 Tractors" /></td>
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<tr>
<td><img src="image16" alt="Class 2b-3" /></td>
<td><img src="image17" alt="Class 4-8" /></td>
<td><img src="image18" alt="Class 7-8 Tractors" /></td>
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<td><img src="image19" alt="Class 2b-3" /></td>
<td><img src="image20" alt="Class 4-8" /></td>
<td><img src="image21" alt="Class 7-8 Tractors" /></td>
</tr>
</tbody>
</table>
ACT ZEV Sales Requirements for OEMs

- Advanced Clean Trucks (ACT) uses a credit and deficit system
  - OEMs generate deficits for ICE vehicles sold in Vermont
  - OEMs generate credits for ZEVs or NZEVs sold in Vermont
- OEM sales numbers are based on vehicles sold and delivered to an ultimate purchaser in Vermont
- OEMs may bank and trade credits
- OEMs have one model year to make up a deficit, failure results in a penalty per deficit
- OEMs must report all vehicles delivered for sale/purchased in Vermont and credit transfers 90 days after the end of each model year

<table>
<thead>
<tr>
<th>Model Year (MY)</th>
<th>Class 2b-3</th>
<th>Class 4-8</th>
<th>Class 7-8 Tractors</th>
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</thead>
<tbody>
<tr>
<td>2026</td>
<td>10%</td>
<td>13%</td>
<td>10%</td>
</tr>
<tr>
<td>2027</td>
<td>15%</td>
<td>20%</td>
<td>15%</td>
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<tr>
<td>2028</td>
<td>20%</td>
<td>30%</td>
<td>20%</td>
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<tr>
<td>2029</td>
<td>25%</td>
<td>40%</td>
<td>25%</td>
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<td>2030</td>
<td>30%</td>
<td>50%</td>
<td>30%</td>
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<td>2031</td>
<td>35%</td>
<td>55%</td>
<td>35%</td>
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<td>2032</td>
<td>40%</td>
<td>60%</td>
<td>40%</td>
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<tr>
<td>2033</td>
<td>45%</td>
<td>65%</td>
<td>40%</td>
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<tr>
<td>2034</td>
<td>50%</td>
<td>70%</td>
<td>40%</td>
</tr>
<tr>
<td>2035+</td>
<td>55%</td>
<td>75%</td>
<td>40%</td>
</tr>
</tbody>
</table>

ICE = internal combustion engine, ZEV = zero-emission vehicle, NZEV = near zero emission vehicle
Vermont ZEV ACT Projections by Year

ACT Credit Requirements by Model Year

Projected ZEV Sales (2026, 2030, 2035)

Heavy-Duty Low NOx Omnibus Regulation
Major Program Elements

- Emission Standards
- Credits
- Hybrid Powertrain Certification
- Warranty
- Recall
- Durability Demonstration
- Useful Life
- In-Use Testing

More information: https://ww2.arb.ca.gov/our-work/programs/heavy-duty-low-nox
HD Omnibus Regulation

• Lowers NOx standards
  o 75% in 2024 model year
  o 90% in 2027 model year

• New low-load cycle testing
  o Verify low emissions in all modes of operation

• Lengthened useful life and warranty

• Improved in-use testing and warranty reporting

• Credits available for early action and ZEVs
Phase 2 GHG Regulation
Phase 2 GHG Regulation

• Harmonize with structure, timing, and stringency of federal Phase 2 GHG emission standards for MHD engines, vocational vehicles, and HD pick-up trucks and vans, and applicable tractors and trailers

• Applicable to 2026 model year and newer Class 2b-8 MHD vehicles and engines
  o For vocational vehicles, requirement based on grams of CO₂ carrying a ton of cargo over distance of one mile (g/ton-mile)
  o For HD pick-up trucks and vans, requirement based on work factor attribute (payload and towing capacity) with an added adjustment for 4-wheel drive vehicles
  o For Class 7-8 tractors, requirement applies to 10 subcategories of tractors
  o For trailers, separate standards apply to full aero box vans, partial aero box vans, non-aero box vans, and non-box trailers

What is the Status of MHD Regulatory Adoption in the MHD ZEV MOU States?

- Colorado: considering ACT in 2023
- Connecticut: considering ACT and HD Omnibus in 2023
- Maine: considering ACT in 2023
- New York: considering HD Omnibus in 2022
- Rhode Island: considering ACT, HD Omnibus, and Phase 2 GHG in 2022
- Vermont considering: ACT, HD Omnibus, and Phase 2 GHG in 2022
- Washington: considering HD Omnibus in 2022

MHD ZEV MOU states represent 43% of the U.S. population, 49% of the U.S. economy, and 36% of MHD vehicles in the U.S.
Impacts to individuals and fleet owners

• Upfront cost - currently higher, on average, than a conventional fossil fuel vehicle
• New fueling infrastructure costs
• Enhanced warranty requirement lowers repair costs
• Lengthened vehicle’s useful life
Impacts to individuals and fleet owners

Lower and more stable fuel costs +

Vehicles with fewer moving parts requiring less maintenance =

Significant operational savings
Owner of twenty Class 4-5 trucks saves more than $300K over vehicles’ lifetime

<table>
<thead>
<tr>
<th>Cost line items</th>
<th>Diesel</th>
<th>Battery-Electric</th>
<th>Difference</th>
</tr>
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<tbody>
<tr>
<td>Amortized Vehicle Price</td>
<td>$ 1,270,361.00</td>
<td>$ 1,747,840.00</td>
<td>$ 477,479.00</td>
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<tr>
<td>Sales Tax</td>
<td>$ 93,280.00</td>
<td>$ 135,896.00</td>
<td>$ 42,616.00</td>
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<tr>
<td>Amortized EVSE Cost</td>
<td>-</td>
<td>$ 104,315.00</td>
<td>$ 104,315.00</td>
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<tr>
<td>Amortized Infrastructure Upgrades</td>
<td>-</td>
<td>$ 417,261.00</td>
<td>$ 417,261.00</td>
</tr>
<tr>
<td>Charger Maintenance</td>
<td>-</td>
<td>$ 120,000.00</td>
<td>$ 120,000.00</td>
</tr>
<tr>
<td>Fuel Costs</td>
<td>$ 2,220,329.00</td>
<td>$ 947,961.00</td>
<td>$(1,272,368.00)</td>
</tr>
<tr>
<td>Maintenance costs</td>
<td>$ 1,914,913.00</td>
<td>$ 1,436,185.00</td>
<td>$(478,728.00)</td>
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<tr>
<td>Midlife Costs</td>
<td>-</td>
<td>$ 259,200.00</td>
<td>$ 259,200.00</td>
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<tr>
<td>Maintenance Bay Upgrades</td>
<td>-</td>
<td>$ 20,000.00</td>
<td>$ 20,000.00</td>
</tr>
<tr>
<td>Transitional Costs and Workforce development</td>
<td>-</td>
<td>$ 12,564.00</td>
<td>$ 12,564.00</td>
</tr>
<tr>
<td>Registration Fees</td>
<td>$ 245,823.00</td>
<td>$ 232,840.00</td>
<td>$(12,983.00)</td>
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<tr>
<td>Total</td>
<td>$ 5,744,706.00</td>
<td>$ 5,434,062.00</td>
<td>$(310,644.00)</td>
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</tbody>
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Benefits for All Vermonters

Estimated costs avoided from proposed MHD rules 2025-2050:

Avoided impacts from lower carbon emissions (cumulative)
Medium and Heavy-duty Trucks: $638 million

Avoided health costs from lower particulate emissions (cumulative)
Medium and Heavy-duty Trucks: Up to $24 million
Financial and workforce support to fleets

• Funds are available to assist fleet owners in purchasing EVs and EV charging infrastructure
  – Diesel Emission Reduction Act funding – State & federal opportunities
  – Medium- and Heavy-duty electrification grants – VW Mitigation Funds
  – EPA’s Clean School Bus program

• Inflation Reduction Act
  – MHD purchase tax credits to cover difference in purchase cost
  – EV refueling infrastructure tax credits
  – Workforce development support rebate
Public Comment

• ANR is accepting public comments on the proposed rules through September 30, 2022.
• Please email comments to anr.dec.levzev@vermont.gov
Questions and comments

• Please use the chat to sign up to ask a question or make a comment.

• To submit written comments, please email anr.dec.levzev@vermont.gov.

Thank you for your participation!