Public Stakeholders Meeting on Medium- and Heavy-Duty (MHD) On-Road Vehicle Actions

Massachusetts Department of Environmental Protection
April 28 & 29, 2021
Agenda

• Background / Statutory Authority
• Multi-State MHD Zero Emission Vehicle (ZEV) Memorandum of Understanding (MOU)
• California MHD Regulations including:
  • Advanced Clean Trucks (ACT)
  • One-Time Large Entity Fleets Reporting
  • Heavy-Duty Greenhouse Gas (GHG) Phases 1 & 2
  • Low Nitrogen Oxides (NOx) Heavy-Duty Omnibus
• MassDEP Rulemaking Timeline
• Questions
Greenhouse Gas Emissions in the Northeast

Source: State Inventory Tool (2015 emissions)
2017 NOx Emissions (Tons) in Mid-Atlantic/Northeast

Source: EPA 2017 National Emissions Inventory
Diesel Exhaust Health Impacts

• Diesel trucks are significant source of particulate matter emissions, which can lead to adverse health effects
• Diesel exhaust can result in highly-localized air pollution that disproportionately affects Environmental Justice (EJ) neighborhoods
• Reducing diesel emissions through electrification can lead to better health outcomes in EJ neighborhoods
Massachusetts Laws and Plans

- MA General Law c.111 § 142K requires MA to adopt CA emissions standards as long as those standards achieve greater motor vehicle emissions reductions than the federal standards
  - 310 CMR 7.40 Low Emission Vehicles incorporates CA standards

- MA Climate Plans and Laws
  - Interim Clean Energy and Climate Plan for 2030
  - 2050 Decarbonization Roadmap
  - 2021 Next-Generation Roadmap for MA Climate Policy
Federal Clean Air Act Provisions

- § 202(a): Requires United States Environmental Protection Agency (EPA) to establish motor vehicle emissions standards
- § 209(b): Provides California with ability to set stricter motor vehicle emission standards than EPA; authorizes California to apply for a “waiver of preemption” from EPA
- § 177: Authorizes states to adopt California’s motor vehicle emission standards in lieu of defaulting to EPA’s standards: no state shall adopt a different set of standards, which would create a so-called "third vehicle"
Multi-State MHD ZEV MOU

• Builds off success of 2013 Governors’ light-duty MOU and subsequent Action Plans
• Commits signatories* to work together to foster a self-sustaining market for zero emission MHD vehicles
• Calls for 30% of new truck and bus sales to be zero-emission by 2030 and 100% by 2050
• Emphasizes need to accelerate deployment of zero-emission trucks and buses in disadvantaged communities
• Directs development and implementation of an Action Plan

*CA, CO, CT, DC, HI, ME, MD, MA, NJ, NY, NC, OR, PA, RI, VT, and WA
1. CA Advanced Clean Trucks

- Effective March 15, 2021
- ZEVs must be a minimum percentage of annual sales
- Starts model year (MY) 2025, can earn credits earlier
- Applies to vehicles greater than 8,500 lbs. gross vehicle weight rating (classes 2b-8)
- Manufacturers with less than 500 annual sales are exempt, but may opt-in to earn credits for selling ZEVs
- Report annually to demonstrate compliance
## 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 Vehicle" /></td>
<td><img src="image2" alt="Class 4-8 Vehicle" /></td>
<td><img src="image3" alt="Class 7-8 Tractor" /></td>
</tr>
<tr>
<td><img src="image4" alt="Class 2b-3 Vehicle" /></td>
<td><img src="image5" alt="Class 4-8 Vehicle" /></td>
<td><img src="image6" alt="Class 7-8 Tractor" /></td>
</tr>
<tr>
<td><img src="image7" alt="Class 2b-3 Vehicle" /></td>
<td><img src="image8" alt="Class 4-8 Vehicle" /></td>
<td><img src="image9" alt="Class 7-8 Tractor" /></td>
</tr>
</tbody>
</table>
ACT Deficit Generation

- Deficit generation will begin in 2025 MY in MA (to provide required two 2 MY lead time)
- More deficits generated over time due to increasing percentage requirements

<table>
<thead>
<tr>
<th>Model Year (MY)</th>
<th>Class 2b-3</th>
<th>Class 4-8</th>
<th>Class 7-8 Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2024</td>
<td>5%</td>
<td>9%</td>
<td>5%</td>
</tr>
<tr>
<td>2025</td>
<td>7%</td>
<td>11%</td>
<td>7%</td>
</tr>
<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>
</tr>
<tr>
<td>2028</td>
<td>20%</td>
<td>30%</td>
<td>20%</td>
</tr>
<tr>
<td>2029</td>
<td>25%</td>
<td>40%</td>
<td>25%</td>
</tr>
<tr>
<td>2030</td>
<td>30%</td>
<td>50%</td>
<td>30%</td>
</tr>
<tr>
<td>2031</td>
<td>35%</td>
<td>55%</td>
<td>35%</td>
</tr>
<tr>
<td>2032</td>
<td>40%</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>2033</td>
<td>45%</td>
<td>65%</td>
<td>40%</td>
</tr>
<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>
ACT Deficit Generation

- Deficits = Number of CA sales x % Requirement x WCM*
- Deficits calculated on a per vehicle basis, grouped into two categories – “tractor” deficits and “other truck” deficits
- Tractor deficits treated differently, must be met with tractor credits

* WCM: Weight Class Modifier; “Other truck” means Class 2b-3 and Class 4-8
  Heavier vehicles generate more emissions (more deficits and credits generated)

<table>
<thead>
<tr>
<th>Class</th>
<th>2b-3</th>
<th>4-5</th>
<th>6-7</th>
<th>8</th>
<th>7-8 Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modifiers</td>
<td>0.8x</td>
<td>1x</td>
<td>1.5x</td>
<td>2x</td>
<td>2.5x</td>
</tr>
</tbody>
</table>
ACT ZEV Credit Generation

- Zero-emission means a vehicle which produces zero criteria or GHG emissions under any mode of operation

  ZEV Credits = Number of ZEV sales x WCM

- Credits calculated on a per vehicle basis, grouped into two categories – “tractor” credits and “other truck” credits

- Zero-Emission Powertrain (ZEP) Certification required starting in 2025 MY for Class 4-8 ZEVs
ACT NZEV Credit Generation

- Near-zero-emission means a hybrid electric vehicle that can achieve a minimum all-electric range (AER)
  - NZEV Credits = Number of NZEV sales x NZEV Factor x WCM
    - NZEV Factor = 0.01 x all-electric range, cannot exceed 0.75
- NZEV can generate at most 75% of the credit as a ZEV
- Minimum AER increases over time:

<table>
<thead>
<tr>
<th>Model Year</th>
<th>2021-2023</th>
<th>2024-2026</th>
<th>2027-2029</th>
<th>2030-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum AER</td>
<td>10 mi.</td>
<td>20 mi.</td>
<td>35 mi.</td>
<td>75 mi.</td>
</tr>
</tbody>
</table>
A manufacturer sells 100 Class 4 trucks, 100 Class 8 trucks, and 100 Class 7-8 tractors in 2024 MY. The manufacturer generates 12.5 tractor deficits and 27 other truck deficits.
Manufacturers can achieve compliance in numerous ways:

1) Manufacturer meets percentage requirement in all categories

<table>
<thead>
<tr>
<th></th>
<th>Class 4</th>
<th>Class 8</th>
<th>Class 7-8 Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZEV Sales</td>
<td>9</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Credit Calculation</td>
<td>9 x 1.0</td>
<td>9 x 2.0</td>
<td>5 x 2.5</td>
</tr>
<tr>
<td>Total Credits</td>
<td>9</td>
<td>18</td>
<td>12.5</td>
</tr>
</tbody>
</table>
2) Manufacturer focuses on Class 8 straight trucks and tractors

<table>
<thead>
<tr>
<th></th>
<th>Class 4</th>
<th>Class 8</th>
<th>Class 7-8 Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZEV Sales</td>
<td>0</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Credit Calculation</td>
<td>0 x 1.0</td>
<td>9 x 2.0</td>
<td>5 x 2.5</td>
</tr>
<tr>
<td>Total Credits</td>
<td>0</td>
<td>28</td>
<td>12.5</td>
</tr>
</tbody>
</table>

3) Manufacturer focuses on Class 7-8 tractors

<table>
<thead>
<tr>
<th></th>
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<th>Class 8</th>
<th>Class 7-8 Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZEV Sales</td>
<td>0</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Credit Calculation</td>
<td>0 x 1.0</td>
<td>9 x 2.0</td>
<td>5 x 2.5</td>
</tr>
<tr>
<td>Total Credits</td>
<td>0</td>
<td>0</td>
<td>40</td>
</tr>
</tbody>
</table>
ACT Other Credit / Deficit Provisions

- Vehicles must be produced and delivered to the ultimate purchaser to generate credits/deficits
- Credits/deficits are rounded to nearest tenth
- Early action – credits can be generated (starting with 2021 MY in CA)
- Five-year credit lifetime
  - Early action credits last until 2030 MY
- Credits may be banked and traded/sold between manufacturers
ACT Compliance

- Manufacturers achieve compliance when total credits retired equals total deficits
  - If a manufacturer does not have sufficient credits, they have one year to make up the deficit
- NZEV credits may fulfill up to 50% of deficits
- Class 7-8 Tractor deficits generally met with Class 7-8 tractor credits
  - For manufacturers who have a small number of tractor deficits (<25), they can use 25 other truck credits for their tractor deficits
ACT Credit Retirement Order

Regulation specifies credit retirement order

- Credits that expire first used first
- NZEV credits used before ZEV credits up to 50% limit
- Tractor credits to meet tractor deficits
- Other truck credits to meet other truck deficits
- Tractor credits to meet other truck deficits
ACT Reporting

90 days after the end of the model year, manufacturers report vehicles produced and delivered for sale in California:

- Weight Class
- Fuel and drivetrain type
- Whether it is a tractor or yard tractor
- All-electric range of NZEV, if applicable
- Volume sold in California for vehicle type
ACT Reporting (Cont.)

- Manufacturers must either submit all VINs or make available on request
- Credit transfers must be reported within 90 days of the end of the model year
  - Must include names of companies, number of ZEV/NZEV credits transferred, and if the credits are tractor credits
- Manufacturers selling Class 2b-3 ZEVs must state whether credits will be used for ACT or the light duty ZEV program, not both
ACT Recordkeeping

Records must be kept for 8 years from end of model year, including:

- Information submitted to the state
- Documentation showing delivery to ultimate purchaser in California
- Records for grouped information submitted must also retain individual VINs
2. Large Entity Reporting (LER)

• One-time reporting for large public and private entities that operate a facility in state
• Collect vehicles’ usage and location data
• Collect vehicle usage information to:
  • Understand types of fleet vehicles and how they are used
  • Support future ZEV purchases and Fleet rules
  • Provide information needed to address issues around siting and rate design for EV charging infrastructure
  • Help accelerate the State’s transition to ZEVs
LER Reporting to CA

- Fleets with 50+ trucks with a facility in CA
- Brokers direct 50+ trucks with a facility in CA
- State, local, and government agencies who own 1+ truck
- Any business with >$50 million annual revenue who owns 1+ truck with a facility in CA
- Exemptions include school districts, transit agencies, emergency vehicles, vehicles awaiting sale, military tactical vehicles
LER Reporting Information

- Company information – name, contact person, identification and permit numbers
- Contracted trucks – how many subhaulers and trucks under contract, how many companies contracted
- Facility information – address of each location with trucks, what fueling infrastructure is present
LER Vehicle Information

- Number of vehicles
  - Grouped by fuel type, body type, weight class
- Information to determine suitability for electrification
  - Typical daily miles, returns to base, predictable usage pattern, remains near base, remains parked for 8+ hours, whether it is used to support emergencies, annual mileage, typical replacement cycle
3. CA MHD Phase 1 & 2 GHG Standards

- Most recent amendments: April 1, 2019
- GHG emission standards for MHD with GVWR over 8,500 lbs.
- Amended the existing CA Tractor-Trailer GHG Regulation to provide trailer fleet owners options to comply with the regulation
- Amended the Heavy-Duty Hybrid-Electric Vehicles Certification Procedures
4. Draft CA Low NOx MHD Omnibus

- Lowers NOx Exhaust Emission standards: 75% in MY 2024, 90% in MY 2027 from current standard of 0.2 g/bhp-hr (grams per brake horsepower-hour) in place since 2007

- Includes optional standards to incentivize manufacturers to develop and certify engines that are even cleaner

<table>
<thead>
<tr>
<th>NOx g/bhp-hr</th>
<th>Mandatory</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>MY2024-2026</td>
<td>0.05</td>
<td>0.02 (60% lower)</td>
</tr>
<tr>
<td>MY 2027 and beyond</td>
<td>0.02</td>
<td>0.01 (50% lower)</td>
</tr>
</tbody>
</table>

- Particulate Matter (PM) anti-backsliding: 0.005 g/bhp-hr starting in MY2024, to ensure PM does not increase as NOx decreases
Draft CA Low NOx MHD Omnibus

- Heavy-Duty In-Use Testing Program
- Moving Average Window (MAW) test procedures
- New low-load cycle testing for diesel engines
- Lengthened useful life and warranty
- Durability Demonstration Program
- Emissions Averaging, Banking, and Trading Program
- Powertrain Certification Test Procedures
- Optional 50-State-Directed Engine Standards for MYs 2024 to 2026
MassDEP Rulemaking Timeline

- File proposed regulations with Secretary of State: July 2021
- Public Hearings and comment: September 2021
- File final regulations: December 2021
Additional Resources and Information

• MassDEP Regulations & Policies Webpage
  • www.mass.gov/service-details/massdep-public-hearings-comment-opportunities

• CA Air Resources Board Regulations Webpage
  • ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks
  • ww2.arb.ca.gov/our-work/programs/ghg-std-md-hd-eng-veh
  • https://ww2.arb.ca.gov/rulemaking/2020/hdomnibuslownox

• NESCAUM MHD ZEV Action Plan development

• Contact information
  • Ngoc Hoang, ngoc.hoang@mass.gov
Questions?

Please type your name in the “chat box” and send to Jenny Outman if you want to be called on to ask a question or make a comment. We will also ask if anyone calling in would like to speak.