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BACKGROUND DOCUMENT

ON EMERGENCY REGULATION AMENDMENTS TO

310 CMR 7.40

Low Emission Vehicle Program

REGULATORY AUTHORITY:
M.G.L. c. 111 §§142A–142M; M.G.L. c. 21N

December 30, 2021

TABLE OF CONTENTS

I. SUMMARY

On December 30, 2021, the Massachusetts Department of Environmental Protection (MassDEP) filed emergency regulations with the Massachusetts Secretary of the Commonwealth for amendments to 310 CMR 7.40, *Low Emission Vehicle Program*. These amendments were effective upon filing and are on MassDEP's website at the links indicated in this document and the public hearing notice. The public hearing notice will be published in the Massachusetts Register on January 21, 2022. To make the regulations permanent, MassDEP is now soliciting public comment on the amendments to comply with the public review process requirements under Massachusetts General Laws (M.G.L.) Chapter 30A, Section 2. MassDEP will hold a public hearing on the amendments to 310 CMR 7.40 on February 1, 2022, and the deadline to submit public comments is February 11, 2022.

To comply with the Massachusetts Clean Air Act,[1] MassDEP amended 310 CMR 7.40 *Low Emission Vehicle Program* to adopt California's Phase 2 Greenhouse Gas (GHG) regulation for medium- and heavy-duty (MHD) engines and vehicles (Phase 2 GHG), Heavy-duty Omnibus regulation for heavy-duty (HD) engines and vehicles (Heavy-duty Omnibus), and Advanced Clean Trucks regulation for MHD vehicles (ACT). The regulations will reduce emissions of criteria pollutants and GHGs from on-road MHD engines and vehicles, improving air quality and reducing the contribution to climate change.

II. BACKGROUND

In 1967, the federal Clean Air Act (CAA) established the framework for controlling mobile source emissions in the United States. Although most states were preempted by Section 209 of the CAA from adopting state emissions standards, California was granted a special exemption to the federal preemption due to the state's unique air quality problems. This exemption gave California the authority to set its own vehicle emission standards as long as such standards are at least as protective as the federal standards.[2] A subsequent amendment to the CAA added Section 177 that allows other states to adopt the California standards if they are identical to California's standards.[3]

In 1991, MassDEP adopted the California Low Emission Vehicle (LEV) program by promulgating 310 CMR 7.40 *Low Emission Vehicle Program*. MassDEP submitted the

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[1] The Massachusetts Clean Air Act, M.G.L. c.111, §142K, provides in relevant part:

> "…the department, shall adopt motor vehicle emissions standards based on the California's duly promulgated motor vehicle emissions standards of the state of California unless, after a public hearing, the department establishes, based on substantial evidence, that said emissions standards and a compliance program similar to the state of California's will not achieve, in the aggregate, greater motor vehicle pollution reductions than the federal standards and compliance program for any such model year."

Massachusetts General Laws, Chapter 111: Section 142K. Motor vehicle emissions standards. http://www.malegislature.gov/Laws/GeneralLaws/PartI/TitleXVI/Chapter111/Section142k

[2] U.S. EPA, Title II – Emission Standards for Moving Sources, Part A – Section 209, 42 U.S.C. §7543, https://www.govinfo.gov/content/pkg/USCODE-2010-title42/pdf/USCODE-2010-title42-chap85-subchapII-partA-sec7543.pdf

[3] U.S. EPA, Title I – Air Pollution Prevention and Control, Part D – Section 177, 42 U.S.C. §7507, https://www.govinfo.gov/content/pkg/USCODE-2010-title42/pdf/USCODE-2010-title42-chap85-subchapI-partD-subpart1-sec7507.pdf

Massachusetts LEV Program to the United States Environmental Protection Agency (EPA) as part of the Massachusetts State Implementation Plan (SIP) as one of a number of air pollution strategies and programs designed to meet the CAA Amendments of 1990 and to attain and maintain the national ambient air quality standards (NAAQS) for ozone. Under Massachusetts law, M.G.L. c. 111, section 142K:[4]

> …the department, shall adopt motor vehicle emissions standards based on the California's duly promulgated motor vehicle emissions standards of the state of California unless, after a public hearing, the department establishes, based on substantial evidence, that said emissions standards and a compliance program similar to the state of California's will not achieve, in the aggregate, greater motor vehicle pollution reductions than the federal standards and compliance program for any such model year.

Recognizing that emissions from MHD vehicles and engines pose significant threats to public health and climate changes, California has adopted regulations for these vehicles that are more stringent than federal regulations to protect public health and address climate change. Based on M.G.L. c 111, section 142K, and Section 177 of the federal CAA and the analysis conducted by MassDEP as set forth in more detail herein, Massachusetts must adopt identical standards.[5]

On-road MHD vehicles that operate throughout Massachusetts are an essential part of the state's economy. However, trucks are a significant source of nitrogen oxides (NOx) that lead to ozone formation, particulate matter (PM), and greenhouse gas (GHG) emissions in Massachusetts. Reducing emissions from trucks is an important part of Massachusetts' programs to meet and maintain the heath-based NAAQS, reduce the risk from exposure to toxic diesel PM, and reduce the GHG emissions that contribute to climate change.

In response to the threat of climate change, in 2008 Massachusetts enacted the Global Warming Solutions Act (GWSA), containing M.G.L. Chapter 21N which set goals to achieve GHG reductions of 10-25% below 1990 levels by 2020 and 80% by 2050 from all sources. In 2021, Governor Baker signed An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy that amended the GWSA to require specified emissions reduction limits in 2030 and 2040 and net zero GHG emissions in 2050. The amendments to M.G.L. c. 21N also require the Secretary of Energy and Environmental Affairs (EEA) to establish statewide limits for 2025, 2035 and 2045 and sector sublimits for specified sectors, as well as roadmap plans to achieve the statewide limits and sector sublimits. The transportation sector is one of the sectors for which the EEA will be setting sublimits, which will be set for 2025 and 2030 by July 1, 2022. Currently, GHG emissions for the transportation sector are the largest for any sector. Pursuant to work done under the Massachusetts' GWSA, Massachusetts' 2018 GHG emissions for the transportation

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[4] Massachusetts General Laws, Chapter 111: Section 142K. Motor vehicle emissions standards. http://www.malegislature.gov/Laws/GeneralLaws/PartI/TitleXVI/Chapter111/Section142k

[5] CARB is developing updated standards applicable to passenger cars, light-duty trucks, and medium-duty passenger vehicles. MassDEP is following CARB's progress, and, as indicated on page 21 of the *Interim Clean Energy and Climate Plan for 2030* (available at https://www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2030#interim-clean-energy-and-climate-report-for-2030-) "MassDEP will adopt and implement the California Advanced Clean Cars II Standard (all new LDV sales must be 100% ZEV by 2035) by the end of the year in which the standard is finalized by California."

sector are estimated at 30.8 million metric tons of carbon dioxide equivalents ($MMTCO_2e$), which is 42% of the total GHG statewide emissions in the 2018 inventory.[6]

New engines and vehicles in compliance with the California standards will emit less pollution than the average new engines and vehicles sold today under the current federal program. Phase 2 GHG requires manufacturers to improve existing technologies or develop new technologies to meet the requirements, Heavy-duty Omnibus requires NOx emissions reductions from new on-road heavy-duty engines and ensures emission reductions are maintained as those engines and vehicles are operated, and ACT accelerates the introduction of Zero Emission Vehicles (ZEV) in the MHD truck sector. GHG reductions from Phase 2 GHG and ACT will help the Commonwealth achieve its goals of decreasing GHG emissions from 1990 levels by 50% in 2030, 75% in 2040, and reaching net zero GHG emissions in 2050 under Massachusetts GWSA.

MassDEP has analyzed the emission benefits of California's MHD regulations in Massachusetts and has determined that California's Phase 2 GHG, Heavy-duty Omnibus and ACT regulations are clearly more stringent and provide, in the aggregate, greater emission reductions than the current federal program, and therefore must be adopted by MassDEP. See section III.5 for a description of emission benefits.

In addition to reducing criteria pollutant emissions and GHG, the regulations will lead to reduced fuel consumption and fuel costs due to more fuel-efficient engines and vehicles, and next generation zero emission trucks, which will positively affect consumers, most businesses and fleet owners.

M.G.L. c. 21N

M.G.L. c. 21N, Section 2, as amended, requires that:

> The department shall establish programs to monitor and reduce emissions of greenhouse gases and shall promulgate regulations regarding sources or categories of sources that emit greenhouse gases in order to achieve greenhouse gas emissions limits and sublimits and implement the roadmap plans established by this chapter.

MassDEP adoption of California's MHD engines and vehicles regulations, in combination with other programs and regulations, will reduce Massachusetts GHG emissions, which will contribute to achieving the statewide greenhouse gas emissions limits of 50% reduction in emissions in 2030, 75% in 2040 and net zero in 2050, as well as any additional interim statewide limits or sector sublimits that are established by EEA.

Section 177 of the Federal Clean Air Act

Section 177 of the CAA requires that if a state adopts the California motor vehicle emission standards, the standards must be "identical to the California standards" for which California received a waiver of preemption from implementing the federal motor vehicle emission

[6] See https://www.mass.gov/doc/statewide-greenhouse-gas-emissions-level-proposed-1990-baseline-update-appendix-c/download.

standards from EPA. *American Auto. Mfrs Assoc., et al. v. Commissioner, Massachusetts Dep't of Envtl Protection,* 31 F.3d 18, 21 (1st. Cir. 1994). MassDEP's amendments to 310 CMR 7.40 directly cite and/or incorporate by reference applicable standards within sections of Titles 13 and 17 of the California Code of Regulations, ensuring that the Massachusetts standards are identical to California's standards.

Section 177 also requires that states adopting the California motor vehicle emission standards provide vehicle manufacturers with at least two model years' (MY) lead time before the standards may be enforced. *Id*. MassDEP has adopted the California standards in 310 CMR 7.40 starting with the following MYs:

1) Phase 2 GHG, starting with MY 2025;
2) Heavy-duty Omnibus starting with MY 2025 (note that NOx credits may be earned starting with MY 2022); and
3) ACT starting with MY 2025 (note that early action credits under ACT may be earned starting with MY 2021).

MY 2025 begins on January 1, 2024. Since the amendments to 310 CMR 7.40 were filed with the Secretary of the Commonwealth and effective as of December 30, 2021 through the Emergency Regulation procedure in M.G.L. c. 30A, Section 2, MassDEP has provided vehicle manufacturers with at least two MYs' lead time before the standards will be enforced.

Moreover, in accordance with section 177, MassDEP has not adopted any standards or requirements that would create an undue burden on vehicle manufacturers by either preventing the sale of a vehicle certified to California standards or by requiring the creation of a "third vehicle."

III. DESCRIPTION OF AMENDMENTS

1. Phase 2 GHG

California adopted MHD Phase 2 GHG regulations on April 1, 2019 by amending 13 CCR 1956.8, 1961.2, 1965, 2036, 2037, 2065, 2112, and 2141 and 17 CCR 95662 and 95663.[7] MassDEP adopted all of these sections either previously or in these amendments.[8] In addition, MassDEP adopted 17 CCR 95660 (Purpose) and 95661 (Applicability), which is part of California's Phase 2 GHG Standards, but which were pre-existing sections California did not need to amend. MassDEP previously adopted 13 CCR 2139, 2140, and 2147, which are also part of California's Phase 2 GHG Standards, but which were pre-existing sections California did not need to amend. MassDEP did not adopt 17 CCR 95664 (Severability), which is part of California's Phase 2 GHG Standards, because 310 CMR 7.40(16) already contains severability provisions. Phase 2 GHG established GHG emission standards for trailers and amended existing regulations to establish more stringent GHG standards applicable for tractors, vocational vehicles, pick-ups and vans (PUVs), and MHD engines. It also amended requirements for glider vehicles, glider engines, and glider kits.

[7] See 310 CMR 7.40(1)(c): *Table 1* and *Table 2* for the title of each California section.
[8] MassDEP only adopted subsections (a)(2)-(4) and (b)-(h) of 13 CCR 1956.8.

MassDEP adopted Phase 2 GHG to comply with M.G.L. c. 111, section 142K and to avoid creating a "third vehicle," as mentioned above.

For more information on Phase 2 GHG, see CARB's Final Statement of Reasons.[9]

2. Heavy-duty Omnibus

California adopted Heavy-duty Omnibus regulations on December 22, 2021 by amending 13 CCR 1900, 1956.8, 1961.2, 1965, 1968.2, 1971.1, 1971.5, 2035, 2036, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2121, 2123, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2133, 2137, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2423, and 2485 and 17 CCR 95662 and 95663 and adopting new 13 CCR 2139.5, 2166, 2166.1, 2167, 2168, 2169, 2169.1, 2169.2, 2169.3, 2169.4, 2169.5, 2169.6, 2169.7, 2169.8, and 2170. MassDEP adopted, previously or in these amendments, all of these sections except 13 CCR 1971.5 (Enforcement of Malfunction and Diagnostic System Requirements for 2010 and Subsequent Model-Year Heavy-Duty Engines), 2139.5 (CARB Authority to Test for Heavy-Duty In-Use Compliance), 2170 (Penalties), 2423 (Exhaust Emission Standards and Test Procedures - Off-Road Compression-Ignition Engines), and 2485 (Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling) because MassDEP has separate idling regulations, enforcement and penalty authorities, and only adopted on-road, not off-road, provisions. In addition, MassDEP adopted 17 CCR 95661 (Applicability), which is part of California's Heavy-duty Omnibus, but which was a pre-existing section California did not need to amend. Please note that some of the regulations adopted by California for Heavy-duty Omnibus also are part of the Phase 2 GHG regulations.

In October 2013, California initiated a Low NOx Demonstration Program with Southwest Research Institute (SwRI) to evaluate the feasibility of a 0.02 gram per brake horsepower-hour (g/bhp-hr) tailpipe oxides of nitrogen (NOx) emission standard on modern heavy-duty engines. Relying in part on the SwRI work, CARB developed a comprehensive set of emission standards and other emission-related requirements for heavy-duty engines and vehicles, known as Heavy-duty Omnibus or Low-NOx Heavy-duty Omnibus. Heavy-duty Omnibus is designed to ensure that NOx emissions from heavy-duty engines are significantly reduced from the time the vehicle/engine is first sold, until the end of its useful life. Heavy-duty Omnibus contains the following primary elements:

a) NOx and PM Exhaust Emission Standards that apply to heavy-duty Otto-cycle (HDO) and heavy-duty diesel engines intended for use in vehicle service classes with gross vehicle weight ratings (GVWR) greater than 10,000 pounds. The MY 2024 through 2026 engine standards are shown in Table 1 below. Note that to meet the two MY lead time requirement discussed above, the Table 1 standards take effect in Massachusetts with MY 2025.

[9] State of California, Air Resources Board, Final Statement of Reasons for Rulemaking, Including Summary of Comments and Agency Response on California Greenhouse Gas Emissions Standards for Medium- and Heavy-Duty Engines and Vehicles and Amendments to the Tractor-Trailer GHG Regulation, December 2018 at https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2018/phase2/fsor.pdf.

Table 1. Heavy-duty Diesel- and Otto-Cycle Engine NOx Standards (MY 2024 to 2026)

MYs	MDDE/LHDD/MHDD/HHDD[a]				MDOE/HDO[a]
	FTP Cycle (g/bhp-hr)	RMC-SET Cycle (g/bhp-hr)	Low-load Cycle (g/bhp-hr)	Idling (g/hr)	FTP Cycle (g/bhp-hr)
2024 - 2026	0.050	0.050	0.200	10	0.050

[a] MDDE: Medium-duty diesel engines 10,001-14,000 lbs. GVWR,
LHDD: Light heavy-duty diesel engines 14,001-19,500 lbs. GVWR,
MHDD: Medium heavy-duty diesel engines 19,501-33,000 lbs. GVWR,
HHDD: Heavy heavy-duty diesel engines >33,000 lbs. GVWR,
MDOE: Medium-duty Otto-cycle engines 10,001-14,000 lbs. GVWR, and
HDO: Heavy-duty Otto-cycle engines >10,000 lbs. GVWR.
RMC-SET: Ramped Modal Cycle Version of the Supplemental Emission Test
FTP: Federal Test Procedure

The standards for MY 2027 and subsequent engines are shown in Table 2.

Table 2. Heavy-duty Diesel- and Otto-Cycle Engine NOx Standards (MY 2027 and Subsequent)

Test Procedure	MDDE/LHDD /MHDD	MDOE/ HDO	HHDD			
	MY 2027 and subsequent		MY 2027 - 2030		MY 2031 and Subsequent	
	(at Useful Life)	(at Useful Life)	(≤435,000 miles)	(>435,000 miles)	(≤435,000 miles)	(>435,000 miles)
FTP cycle (g/bhp-hr)	0.020	0.020	0.020	0.035	0.020	0.040
RMC-SET cycle (g/bhp-hr)	0.020	------	0.020	0.035	0.020	0.040
Low-load cycle (g/bhp-hr)	0.050	------	0.050	0.090	0.050	0.100
Idling (g/hr)	5 at Useful Life	------	5 at Useful Life	5 at Useful Life	5 at Useful Life	5 at Useful Life

b) Heavy-duty In-Use Testing (HDIUT) Program replaced the Not-to-Exceed (NTE)-based methodology with a new Moving Average Window (MAW)-based methodology for MY 2024 and subsequent engines. These amendments to the HDIUT program improve the coverage of engine operations and emissions, ensure that adequate data is obtained to verify the condition of the test vehicle, provide clear criteria for engine family pass or fail compliance determinations, and ensure that corrective action is taken in a timely manner.

c) Warranty and Useful Life Periods, and Emissions Warranty Information and Reporting (EWIR) and Corrective Action Procedures ensure that emission controls

are sufficiently durable to control emissions over applicable useful life periods. California lengthened the criteria pollutant emissions warranty and useful life period requirements for heavy-duty vehicles and engines, phased-in beginning with MY 2027 engines and fully implemented for MY 2031 and subsequent engines. The warranty and useful life periods are shown in Table 3. Note that to meet the two MY lead-time requirement discussed above, the Table 3 requirements take effect in Massachusetts with MY 2025.

Table 3. Warranty and Useful Life Periods

MY	LHDD	MHDD	HHDD	HDO
Warranty				
2025-2026	110,000 miles 5 years	150,000 miles 5 years	350,000 miles 5 years	50,000 miles 5 years
2027-2030	150,000 miles 7 years/ 7,000 hours	220,000 miles 7 years/ 11,000 hours	450,000 miles 7 years/ 22,000 hours	110,000 miles 7 years/ 6,000 hours
2031 and Subsequent	210,000 miles 10 years/ 10,000 hours	280,000 miles 10 years/ 14,000 hours	600,000 miles 10 years/ 30,000 hours	160,000 miles 10 years/ 8,000 hours
Useful Life				
2025-2026	110,000 miles 10 years	185,000 miles 10 years	435,000 miles 10 years/ 22,000 hours	110,000 miles 10 years
2027-2030	190,000 miles 12 years	270,000 miles 11 years	600,000 miles 11 years/ 30,000 hours	155,000 miles 12 years
2031 and Subsequent	270,000 miles 15 years	350,000 miles 12 years	800,000 miles 12 years/ 40,000 hours	200,000 miles 15 years

d) Heavy-duty Durability Demonstration Program established more stringent heavy-duty engine durability requirements that increased the default break-in period for heavy-duty diesel engines from 125 hours to 300 hours.

e) Emissions Averaging, Banking, and Trading Program. Because the California heavy-duty engine emission standards and other emission-related requirements are more stringent than the federal heavy-duty emission standards and other emission-related requirements, Massachusetts, like California, established a Massachusetts-only averaging, banking, and trading (MA-ABT) program starting with MY 2022 engines by adopting the California standards. The MA-ABT program allows manufacturers to transfer a portion of any existing MY 2010 to 2021 credits from federal averaging, banking, and trading (ABT) accounts for MY 2010 to 2021 as adjusted by the fraction of Massachusetts to 50-state sales volumes for 2019 to 2021 MY sales. Like California, Massachusetts allows manufacturers that elect to produce and certify heavy-duty ZEVs to generate NOx credits starting with MY 2022, as a way to incentivize the sales of heavy-duty ZEVs earlier than would be required by ACT.

f) Powertrain Certification Test Procedures for Heavy-duty Hybrid Vehicles provide manufacturers an option to certify hybrid powertrains to criteria pollutant emission

standards using specified hybrid-powertrain testing procedures. The hybrid-powertrain testing procedures are aligned with federal powertrain testing procedures.

For more information on Heavy-duty Omnibus, see CARB's Final Statement of Reasons.[10]

3. Advanced Clean Trucks

California adopted the Advanced Clean Trucks (ACT) regulation on March 15, 2021 at 13 CCR 1963 through 1963.5 and 2012 through 2012.2. MassDEP adopted 13 CCR 1963, 1963.1, 1963.2, 1963.3, 1963.4 and 1963.5(a)(1) through (3) into 310 CMR 7.40. Because MassDEP's enforcement authority is based on Massachusetts, not California, law, MassDEP added 310 CMR 7.40(7)(g) detailing how the regulation will be enforced, rather than adopting 13 CCR 1963.5(a)(4). Note that 13 CCR 2012 through 2012.2 contain reporting requirements that are not motor vehicle emissions standards, which Massachusetts is considering in a separate action, and has not adopted in the emergency regulations. ACT will help Massachusetts achieve criteria pollutant and GHG reduction goals and accelerate the sale of ZEVs in the MHD truck sector. In addition, ACT will improve access to clean transportation and mobility options for Massachusetts communities, especially in disadvantaged and low-income communities that are often most affected by harmful emissions generated from on-road MHD vehicles. The primary elements of ACT include:

a) ZEV sales requirements apply to manufacturers that certify vehicles for sale in Massachusetts in weight Classes 2b through 8 (GVWR greater than 8,500 lbs.) starting with MY 2025.
b) Small manufacturers with less than 500 annual sales of on-road vehicles in California are exempt from the requirement of this regulation but can opt-in to earn credits for selling ZEVs.
c) Manufacturers can earn credits starting with MY 2021 by selling MHD ZEVs in Massachusetts.
d) Starting with MY 2025, Zero-emission Powertrain (ZEP) Certification is required for manufacturers to earn credits.
e) Near-zero-emission vehicle (NZEV) plug-in hybrids with some all-electric range can earn partial credits that can be used to offset up to half of the manufacturer's annual deficits through MY 2030.
f) Manufacturers are required to report annually to demonstrate compliance to earn credits.

Affected manufacturers incur deficits for each non-ZEV vehicle sold into Massachusetts starting with MY 2025, and these deficits must be met with credits generated from producing and selling ZEVs or NZEVs into Massachusetts starting with MY 2021. Table 4 shows the ZEV Sales Percentage requirements:

[10] State of California, California Air Resources Board, Heavy-duty Engine and Vehicle Omnibus Regulation, *Final Statement of Reasons for Rulemaking* at https://ww3.arb.ca.gov/board/rulemaking/hdomnibuslownox/fsor.pdf.

Table 4. ZEV Sales Percentage Requirements

MY	Class 2b-3	Class 4-8	Class 7-8 Tractors
2025	7%	11%	7%
2026	10%	13%	10%
2027	15%	20%	15%
2028	20%	30%	20%
2029	25%	40%	25%
2030	30%	50%	30%
2031	35%	55%	35%
2032	40%	60%	40%
2033	45%	65%	40%
2034	50%	70%	40%
2035+	55%	75%	40%

For more information on ACT, see CARB's Final Statement of Reasons.[11]

4. Emissions Impacts

Air quality in Massachusetts currently meets all National Ambient Air Quality Standards (NAAQS). Although significant progress has been made in addressing air pollution, Massachusetts is required to maintain attainment with the NAAQS. The 310 CMR 7.40 amendments will help further reduce pollutant emissions.

Implementation of Phase 2 GHG, Heavy-duty Omnibus, and ACT for MHD engines and vehicles will result in a substantial reduction in air pollution and CO_2 emissions in Massachusetts and will help the Commonwealth meet its air quality and GWSA goals. The regulations are expected to result in significant NOx, $PM_{2.5}$, and GHG emission reductions due to replacing older internal combustion powered vehicles with cleaner and zero-emission technology. In support of MassDEP's amendments, the International Council on Clean Transportation (ICCT) developed estimates of emissions benefits from the Massachusetts regulations using the Motor Vehicle Emission Simulator (MOVES3) with requirements beginning in MY 2025.[12] These include significant NOx emissions reductions resulting from Heavy-duty Omnibus and ACT, and $PM_{2.5}$ and GHG emissions reductions resulting from ACT.

Tables 5, 6 and 7 and Figures 1, 2 and 3 summarize the projected emission benefits for adopting California MHD regulations as compared to business as usual (BAU). The "All EVs" columns in Tables 5, 6 and 7 include out-of-state benefits from vehicles that are eventually sold to owners in other states.

[11] State of California, California Air Resources Board, Advanced Clean Trucks Regulation, Final Statement of Reasons, March 2021 at http://ww2.arb.ca.gov/sites/default/files/barcu/regact/2019/act2019/fsor.pdf.
[12] See "Benefits of State-Level Adoption of California Medium- and Heavy-Duty Vehicle Regulations" at https://theicct.org/publications/state-level-hdv-emissions-reg-oct21, "Benefits of adopting California medium- and heavy-duty vehicle regulations under Clean Air Act Section 177" at https://theicct.org/publications/state-level-hdv-emissions-reg-FS-oct21, and data at https://theicct.org/benefits-ca-multi-state-reg-data.

Table 5. Projected Tank-to-Wheel NOx Emission Benefits

Year	ACT & Heavy-duty Omnibus (ACT EVs only)	ACT & Heavy-duty Omnibus (All EVs)	ACT only (ACT EVs only)	ACT only (All EVs)	Heavy-duty Omnibus only
2020	0%	0%	0%	0%	0%
2025	0%	-1%	0%	0%	0%
2030	-6%	-9%	-1%	-5%	-5%
2035	-14%	-23%	-5%	-14%	-12%
2040	-22%	-36%	-9%	-26%	-18%
2045	-28%	-46%	-12%	-35%	-21%
2050	-31%	-51%	-15%	-40%	-23%

Table 6. Projected Tank-to-Wheel $PM_{2.5}$ Emission Benefits

Year	ACT (ACT EVs only)	ACT (All EVs)
2020	0%	0%
2025	0%	0%
2030	-1%	-3%
2035	-3%	-9%
2040	-6%	-15%
2045	-9%	-20%
2050	-11%	-23%

Table 7. Projected Well-to-Wheel CO_2e Emission Benefits

Year	ACT (ACT EVs only)	ACT (All EVs)
2020	0%	0%
2025	0%	0%
2030	-1%	-5%
2035	-6%	-17%
2040	-13%	-32%
2045	-19%	-44%
2050	-24%	-53%

Figure 1. Medium- and heavy-duty vehicle tank-to-wheel all EVs NOx emissions by scenario (short tons per year), 2020–2050

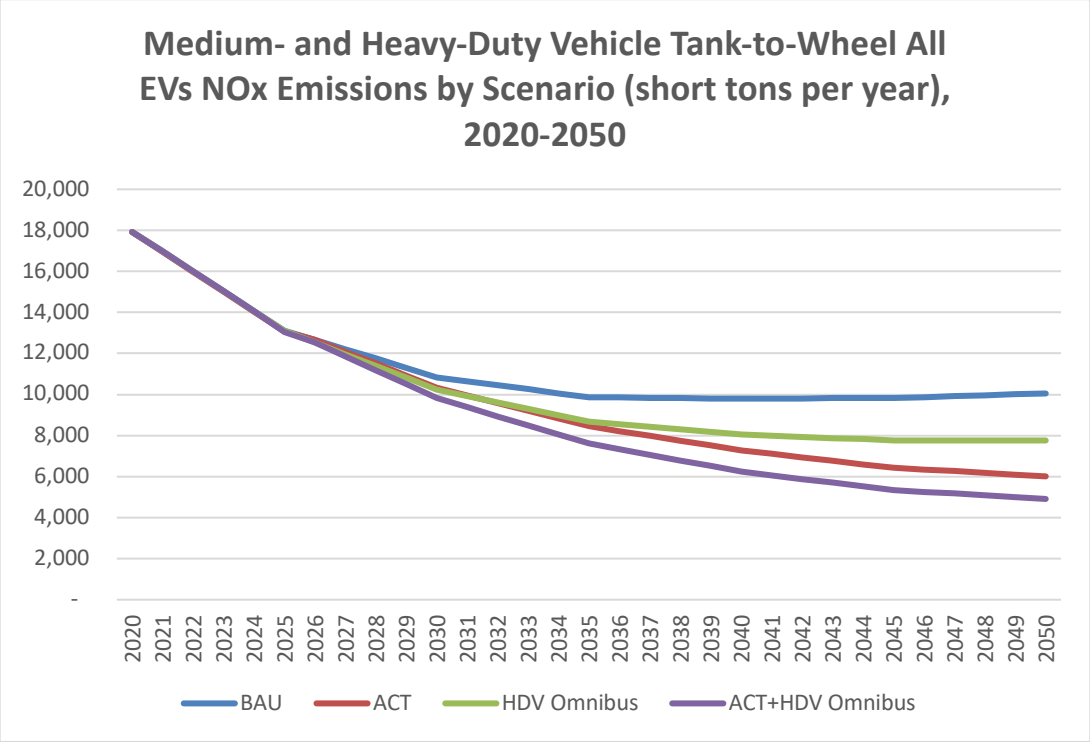


Figure 2. Medium- and heavy-duty vehicle tank-to-wheel all EVs $PM_{2.5}$ emissions by scenario (short tons per year), 2020–2050

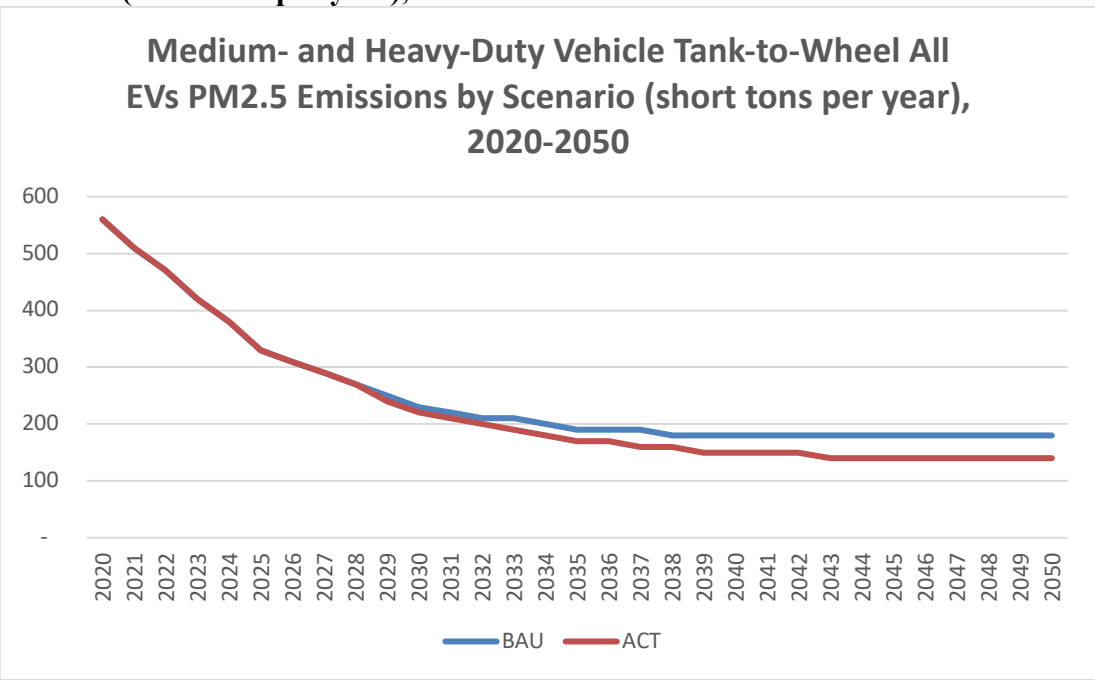
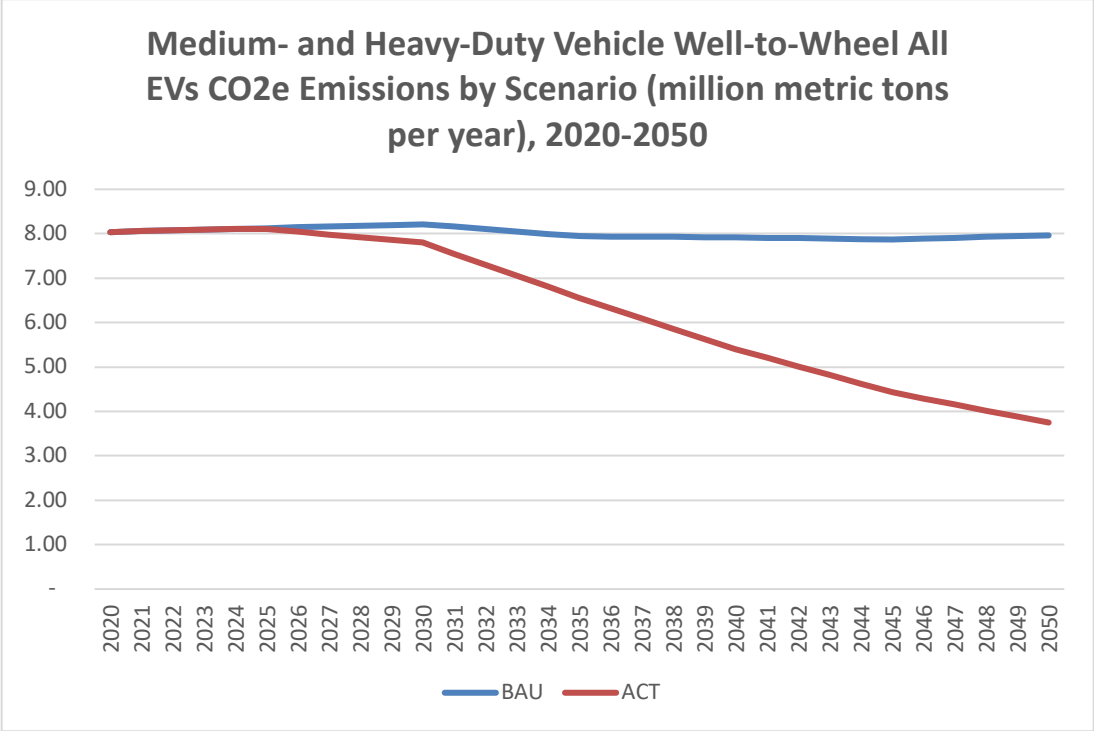


Figure 3. Medium- and heavy-duty vehicle well-to-wheel all EVs CO_2-equivalent emissions by scenario (million metric ton per year), 2020–2050



5. Harmonizing Edits

In addition to adopting the California MHD vehicle requirements described above, MassDEP made several other miscellaneous amendments to 310 CMR 7.40 to update and clarify the regulation as described below.

- 310 CMR 7.00 Definitions that duplicated definitions in 310 CMR 7.40 were deleted.

- 310 CMR 7.40(1) Definitions were updated to use the current Massachusetts Secretary of the Commonwealth format and to directly reference California definitions, where available, to ensure consistency with California's regulations. Definitions of terms not used in 310 CMR 7.40 were deleted, while definitions were added to define terms that are used in 310 CMR 7.40.

- 310 CMR 7.40(1)(c): *Table 2* was added to list newly incorporated sections of Title 17 CCR to 310 CMR 7.40. The parallel existing 310 CMR 7.40(1)(c): *Table 1* lists incorporated sections of Title 13 CCR.

- 310 CMR 7.40(1)(c): *Table 1* and *Table 2* operative or effective dates of California regulation sections incorporated by reference were updated to reflect current California dates, and section titles were edited to match California's titles to ensure consistency with California's regulations.

- 310 CMR 7.40(1)(d) and (4)(b)2. text was added to clearly lay out the current model years and California programs included in 310 CMR 7.40, replacing outdated model year and section references throughout 310 CMR 7.40.

- 310 CMR 7.40(1)(g) was added to clarify the use of the word "California" when incorporated sections of the California Code of Regulations are applied in Massachusetts.

- 310 CMR 7.40(5)(e) and (f) were amended to require warranty and recall reporting to be submitted electronically.

- 310 CMR 7.40(5)(k) was added to list reporting requirements for the new MHD programs.

- 310 CMR 7.40(6) removed reference to a regional emissions testing facility since this is no longer contemplated.

- Obsolete subsections 310 CMR 7.40(10) and (11) were deleted.

- Throughout 310 CMR 7.40, citations to California Code of Regulations Title 17 were added; clarifications of applicability to passenger cars, light-duty trucks or medium-duty passenger vehicles vs. MHD engines and vehicles were added; edits to align to California regulatory text were made; and references to vehicle registration were deleted since M.G.L. c.111, §142K does not give MassDEP authority to oversee vehicle registration.

IV. IMPACTS OF AMENDMENTS

1. Economic Impacts

In support of MassDEP's amendments, the Northeast States for Coordinated Air Use Management (NESCAUM) developed estimates of health benefits of reduced emissions from the amendments using EPA's CO-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool with requirements beginning in MY 2025. The Massachusetts cost savings from the total statewide health benefits from Phase 2 GHG, Heavy-duty Omnibus, and ACT are estimated to be in the range of $363 million to $818 million from 2025 through 2050, with the majority of benefits due to avoided premature deaths, avoided hospitalizations for cardiovascular illness and avoided emergency room (ER) visits, as detailed in Table 8. The "All EVs" values in Table 8 include out-of-state benefits from vehicles that are eventually sold to owners in other states.

Table 8. Statewide Estimated Cumulative Health Impacts (number of incidents and million $2018)

ACT EVs, 2025-2050

Phase 2 GHG/ACT/Heavy-duty Omnibus

Item	Avoided Premature Deaths	Avoided Hospitalizations for Cardiovascular Illness	Avoided Hospitalizations for Respiratory Illness	Avoided ER Visits	Total
# Incidents	29-66	7	8	21	-
Valuation	$357-808	$0.37	$0.27	$0.012	**$363-818**

ACT/Phase 2 GHG

Item	Avoided Premature Deaths	Avoided Hospitalizations for Cardiovascular Illness	Avoided Hospitalizations for Respiratory Illness	Avoided ER Visits	Total
# Incidents	14-31	3	4	10	-
Valuation	$171-386	$0.17	$0.13	$0.006	**$174-391**

Heavy-duty Omnibus Only

Item	Avoided Premature Deaths	Avoided Hospitalizations for Cardiovascular Illness	Avoided Hospitalizations for Respiratory Illness	Avoided ER Visits	Total
# Incidents	20-45	5	5	14	-
Valuation	$243-550	$0.25	$0.19	$0.008	**$247-557**

All EVs, 2025-2050

Phase 2 GHG/ACT/ Heavy-duty Omnibus

Item	Avoided Premature Deaths	Avoided Hospitalizations for Cardiovascular Illness	Avoided Hospitalizations for Respiratory Illness	Avoided ER Visits	Total
# Incidents	51-115	13	13	36	-
Valuation	$622-1407	$0.64	$0.47	$0.021	**$632-1424**

ACT/Phase 2 GHG

Item	Avoided Premature Deaths	Avoided Hospitalizations for Cardiovascular Illness	Avoided Hospitalizations for Respiratory Illness	Avoided ER Visits	Total
# Incidents	39-88	10	10	28	-
Valuation	$478-1080	$0.49	$0.36	$0.016	**$485-1094**

Phase 2 GHG and ACT are expected to result in estimated total costs of $596 million to truck transportation in Massachusetts compared to Business as Usual from 2020 through 2050. This estimate includes infrastructure cost, higher cost of the vehicles, and maintenance and fuel savings. Through 2050 in Massachusetts, Heavy-duty Omnibus is expected to have approximately $544 million in costs and $86 million in repair savings due to improved warranties. Combined estimated Phase 2 GHG, ACT and Heavy-duty Omnibus net costs of $1,054 million compared to health benefits in the range of $363 million to $818 million.

While the amendments will increase the upfront cost of new MHD vehicles, they also will provide savings to vehicle owners:

- ZEV MHD vehicles will result in lower fuel and maintenance costs, which over the lifetime of the vehicle will make up for higher purchase prices.
- Consumers and fleet owners will benefit from fuel cost savings from the use of ZEV MHD vehicles.

- The emissions warranty period would be significantly lengthened, reducing out-of-pocket expenses for vehicle repairs.
- Longer useful life provisions will encourage manufacturers to produce more durable components, resulting in fewer failures and less downtime for truck and bus owners.
- Extended warranties could lead to longer lasting vehicles.

2. Impacts on Massachusetts Municipalities

Pursuant to Executive Order 145, state agencies must assess the fiscal impact of new regulations on the Commonwealth's municipalities. Since the LEV program is primarily directed toward manufacturers, municipal facilities will be affected by the changes to 310 CMR 7.40 in the same manner as other consumers. While municipalities will see increased costs for vehicles they purchase, those costs will be offset by savings in fuel costs and lower maintenance costs.

3. Massachusetts Environmental Policy Act (MEPA)

Pursuant to 301 CMR 11.03(12) (Massachusetts Environmental Policy Act Regulations), MassDEP is not required to file an Environmental Notification Form (ENF) regarding the proposed amendments because the proposed amendments do not reduce standards for environmental protection, nor do they reduce opportunities for public participation in review processes or public access to information generated or provided in accordance with the regulations.

V. PUBLIC HEARING AND COMMENT

After an emergency regulation is filed with the Massachusetts Secretary of the Commonwealth, in order for that regulation to remain in effect, M.G.L. c. 30A, § 2 requires MassDEP to complete the public process (i.e., the opportunity to review background and technical information for at least 21 days prior to a public hearing) be completed within three months, including filing the permanent regulation if the public comment and hearing process result in changes to the emergency regulation. MassDEP has provided notice at least 30 days in advance of the public hearing as required under federal regulations. The public hearing will be held on February 1, 2022. MassDEP will accept written comments until February 11, 2022. The public hearing notice and amendments are available on MassDEP's website at: https://www.mass.gov/service-details/massdep-public-hearings-comment-opportunities. For further information, please contact Ngoc Hoang at ngoc.hoang@mass.gov.