



Benefits of adopting California's Heavy-Duty Vehicle Omnibus Standards and a 100% sales requirement in Washington

September 2022

In July 2020, fifteen states and the District of Columbia, who together represent roughly 35% of the U.S. medium- and heavy-duty (M/HD) market, signed a Memorandum of Understanding (MOU), committing themselves “to work together to foster a self-sustaining market for zero-emission medium- and heavy-duty vehicles.”¹ The signatories of this Multi-State MOU share a goal of 30% M/HD zero-emission vehicle (ZEV) sales by 2030 and 100% ZEV sales no later than 2050. The MOU further recognizes the importance of “low-NOx heavy-duty trucks to reduce harmful emissions of NOx, particulate matter, and toxic air contaminants that adversely impact public health.” Taken together, the combined actions of these signatories have the potential to accelerate the national transition toward the cleanest combustion engines and to rapidly expand the fleet of zero-emission M/HD vehicles.

The State of California has adopted two regulations that are cornerstones in the state's effort to reduce emissions from heavy-duty vehicles and meet the targets of the M/HD ZEV MOU. If adopted by other signatories, these regulations could assist states in achieving the goals of the M/HD ZEV MOU: the Advanced Clean Trucks (ACT) rule, which requires the sale of at least 30% zero-emission trucks by 2030, and the Heavy-Duty Vehicle Omnibus rule, which requires a 90% reduction in NOx emissions from model year 2027 engines. States could go even further and adopt a 100% ZEV sales requirement, as the New York State legislature has done, or the California Air Resources Board proposes to do under a new Advanced Clean Fleets rule.

The ICCT commissioned Sonoma Technology, Inc. (STI) in 2022 to estimate the cumulative avoided nitrogen oxides (NO_x), fine particulate matter (PM_{2.5}) and well-to-wheel carbon dioxide equivalent (WTW CO_{2e}) emission reductions expected from implementation of these rules beginning in 2026 in Washington. These results update estimates first published in 2021.² This revised analysis includes

¹ The signatories are California, Colorado, Connecticut, Hawaii, Maine, Maryland, Massachusetts, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Rhode Island, Vermont, Washington, and the District of Columbia, “Multi-State Medium- and Heavy-Duty Zero Emission Memorandum of Understanding,” (2020, July 14), <https://www.nescaum.org/documents/multistate-truck-zev-governors-mou-20200714.pdf>. Additional signatories since 2020 are Virginia, Nevada, and Quebec. STI did not model results for California or Hawaii, but did model results for non-signatories including Delaware, New Mexico, and Illinois.

² Jeff Houk, Joey Huang, Shih Ying Chang, and Doug Eisinger, “Benefits of state-level adoption of California medium- and heavy-duty vehicle regulations,” (Washington, DC: ICCT, 2021), <https://theicct.org/publications/state-level-hdv-emissions-reg-oct21>

lower estimates of vehicle electricity consumption to account for the fact that ZEVs are more efficient on a tank-to-wheel basis than conventional vehicles, updates to upstream emission factors taken from GREET2021, and adjustments to account for energy transmission losses from EVSE equipment. The full spreadsheet analysis with detailed emissions and vehicle population projections is available on the ICCT website.³ Washington has already adopted the ACT program, and it is now reflected in the business as usual (BAU) case. Regulatory scenarios evaluated include Omnibus and ACT combined, along with a new scenario reflecting 100% M/HD ZEV sales in 2040.

Table 1 presents the estimated M/HD truck and bus population in Washington by powertrain type, conventional or electric, between 2025 and 2050. These projections include all ZEVs, regardless of whether they are produced to meet the requirements of the ACT program or the GHG Phase 2 program, and assume 100% M/HD ZEV sales beginning with model year 2040. The summary spreadsheet prepared for this project includes additional projections reflecting the ACT program individually, and also provides more detailed projections by vehicle weight class.

Table 1. Effect of the Advanced Clean Trucks Program and a MY2040 100% ZEV sales requirement on M/HD vehicle population, by fuel type, 2025–2050

Year	M/HD vehicle population		
	Internal combustion engine vehicles	Zero emission vehicles	Total
2025	626,723	3,437	630,160
2030	575,761	38,479	614,240
2035	518,332	115,668	634,000
2040	435,630	222,530	658,160
2045	318,824	385,006	703,830
2050	218,024	538,296	756,320

Note: The M/HD vehicle category includes all vehicles with a Gross Vehicle Weight Rating of 8500 pounds or higher. Estimates for 2040 and later include 100% ZEV sales beginning with model year 2040. ZEV sales projections for baseline and ACT only scenarios—without a 100% requirement in 2040—can be found in the Excel report accompanying this fact sheet.

Table 2 shows the estimated cumulative emissions avoided between 2020 and 2050 in Washington compared to the Business as Usual (BAU) emissions scenario. These results reflect the benefits of all M/HD ZEVs following California’s approach to estimating in-use fleet penetration under the ACT program without adjustments to account for vehicles purchased out-of-state, ZEVs that may migrate out-of-state over time, or ZEVs that would have been produced to meet other requirements like the federal GHG Phase II standards. For estimates with these adjustments, which enable direct comparisons to California Air Resources Board ACT benefits estimates, please refer to the ‘ACT-only’ scenario results included in the accompanying spreadsheet files.

³ Available at <https://theicct.org/benefits-ca-multi-state-reg-data/>

Table 2. Cumulative M/HD emissions benefits in Washington compared to BAU, 2020–2050

Program	Cumulative emissions reduction		
	NO _x (U.S. tons)	PM _{2.5} (U.S. tons)	CO _{2e} (MMT*)
100% HD ZEV sales in 2040	30,670	354	25.57
HDV omnibus	35,640	N/A	N/A
HDV omnibus + 100% HD ZEV sales in 2040	61,030	354	25.57

*million metric tons

Figures 1–3 illustrate the emissions trends in Washington over the timeframe of the analysis.

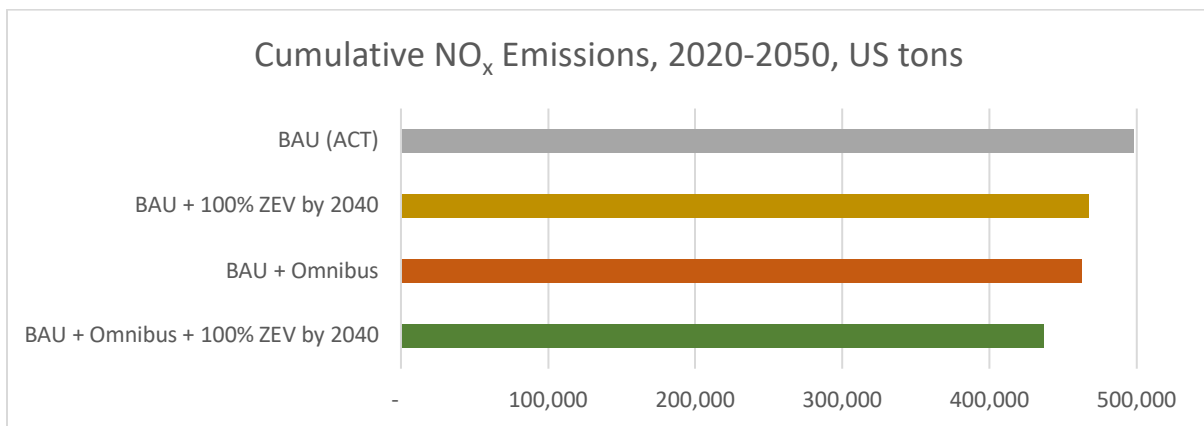


Figure 1. Tank-to-wheel HDV NO_x emissions by scenario 2020–2050

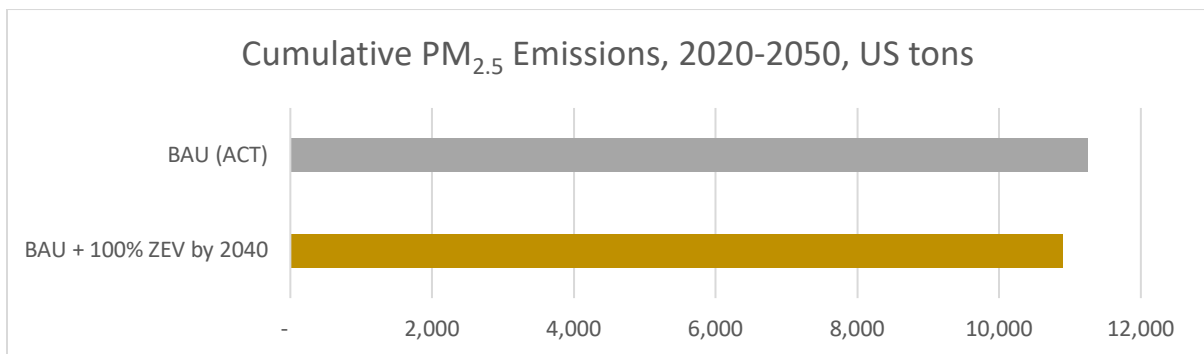


Figure 2. Tank-to-wheel HDV PM emission by scenario 2020–2050

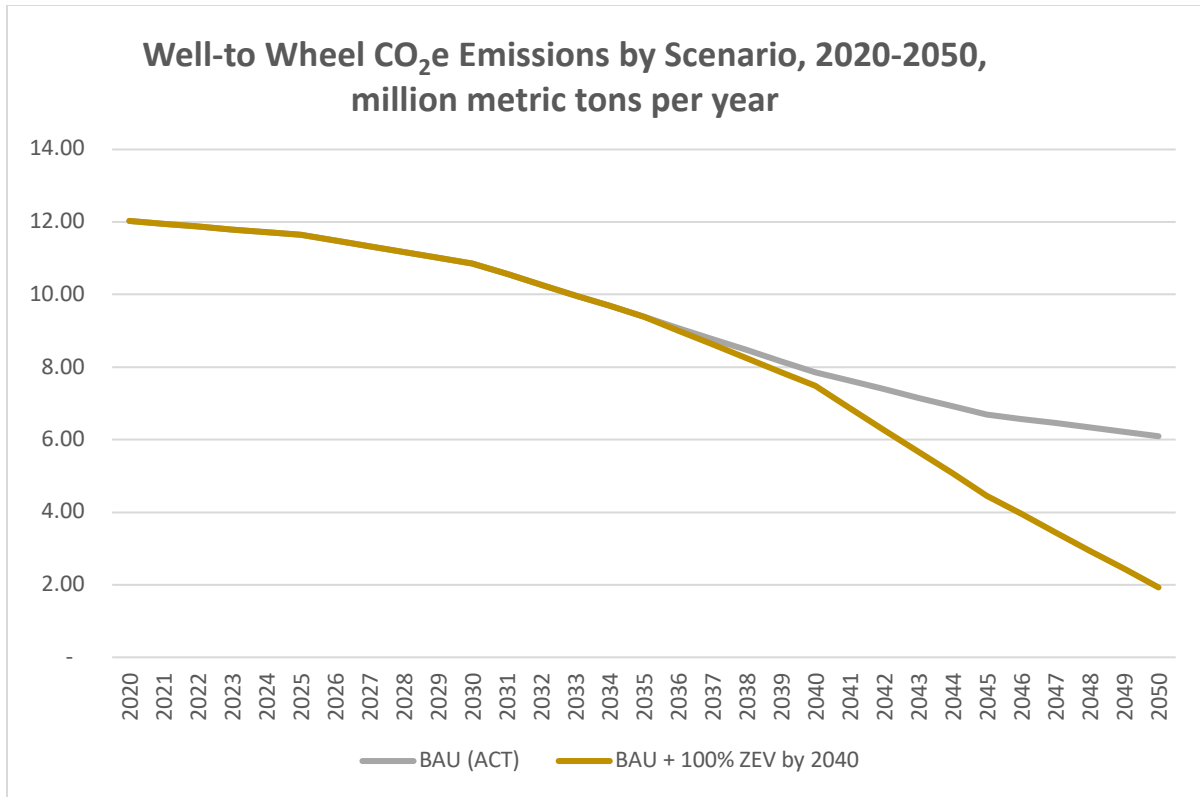


Figure 3. Well-to-wheel HDV CO₂e emissions by scenario 2020–2050

Related Publications

Title: Benefits of state-level adoption of California medium- and heavy-duty vehicle regulations

Authors: Jeff Houk, Joey Huang, Shih Ying Chang, and Doug Eisinger for Sonoma Technology

Download: <https://theicct.org/publications/state-level-hdv-emissions-reg-oct21>

Title: Update: Benefits of adopting California medium- and heavy-duty vehicle regulations under Clean Air Act Section 177

Authors: Ray Minjares

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Supporting files and detailed estimates are available, by state, year, rule, vehicle category, and pollutant are also posted here: <https://theicct.org/benefits-ca-multi-state-reg-data/>

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