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Environmental Protection Agency

Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3	**)** **)**	**Docket I.D. No.:** **EPA-HQ-OAR-2022-0985**

COMMENTS OF THE VOLVO GROUP

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The Volvo Group respectfully submits the following comments on the Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3,
88 FR 25926 (April 27, 2023).

Introduction

The Volvo Group drives prosperity through transport and infrastructure solutions, offering trucks, buses, construction equipment, power solutions for marine and industrial applications, financing and services that increase our customers' uptime and productivity. Founded in 1927, the Volvo Group is committed to shaping the future landscape of sustainable transport and infrastructure solutions. The Volvo Group is headquartered in Gothenburg, Sweden, employs some 100,000 people worldwide, and serves customers in more than 190 markets. Volvo Group North America, with headquarters in Greensboro, NC, employs more than 14,000 people in the United States and operates 11 manufacturing and remanufacturing facilities in seven states. In 2022, the Volvo Group's global net sales amounted to about $47 billion.

The Volvo Group has had a long-standing commitment to environmental sustainability. In 2020, the Volvo Group announced its global ambition to have 100% of product sales be fossil free by 2040, including a nearer term goal of 35% of product sales being electric by 2030. The Volvo Group has also committed to the Science Based Targets Initiative and a roadmap of product development in alignment with achieving the goals of the Paris Climate Accord.

The Volvo Group has invested billions of dollars in our product lines to help achieve a CO2 neutral future. We have more than 6,000 electric transit buses in service throughout the world and have been selling heavy-duty battery electric trucks in Europe since 2019. Volvo Trucks is the leading manufacturer of heavy-duty electric vehicles in Europe and North America, having sold almost 5,000 electric trucks around the world, with a 50% market share in Europe and a leading share close to 50% in North America. Mack Trucks launched its LRe electric refuse truck in 2020 and just this year announced the production of an electric medium duty truck (MDe). In the United States, we also have seven models of electric construction equipment available for purchase and Volvo Penta provides electric powertrains for both TICO yard trucks and Rosenbauer fire trucks. Penta is also piloting an electric battery storage system for use in varied applications. Despite the longer distances traveled by Prevost's buses, we are actively pursuing both fuel cell electric motorcoaches, as well as trucks, with an expectation of hydrogen powered vehicles and equipment available in the U.S. later this decade, or early next.

We have made major capital investments to equip our factories for growing electric truck production volumes, yet we cannot ensure the realization of these goals alone. The necessary supply chain, infrastructure, and customer demand are all required for the Volvo Group to shift sales from our core diesel product to zero-emission vehicles (ZEVs). In addition, we are navigating battery supply chain limitations and rising battery-related raw material costs, which is putting pressure on battery costs and challenging the diesel cost parity timeframes outlined in the regulation. We are committed to doing everything we can to achieve the ambitious goals we've set, yet we must do so while maintaining a laser focus on safety, costs, and other core customer demands if the transition to zero emission vehicles is to be sustainable.

Summary

The Volvo Group supports the comments of the Truck and Engine Manufacturers' Association (EMA), and we refer to EMA's submission in support of this document. Additionally, we would like to provide comment on issues not addressed by EMA, or areas where the Volvo Group is either strongly supportive or opposed to specific issues or methods in the EPA's Phase 3 Heavy Duty Greenhouse Gas Notice of Proposed Rule Making (NPRM, "proposed rule", or "proposal").

The following is a summary of the Volvo Group's positions in response to the EPA's proposed rule, some of which will be further discussed in detail in the following sections of this document.

Timing

- The Volvo Group strongly believes that the agency should maintain the previously finalized Phase 2 stringencies and promulgate a Phase 3 rule that commences with the 2030 model year.
- In response to an agency request for comment, the Volvo Group does not support extending the Phase 3 regulatory period to include model years 2033 through 2035.

Structure

- The Volvo Group does not support EPA's assertion that the Clean Air Act lead time and stability requirements do not apply to heavy-duty engine and vehicle greenhouse gas regulations. Please refer to EMA's comments for detail.
- Notwithstanding the legal question of the applicability of stability requirements, we foresee potential advantages and disadvantages from both year-over-year and 3-year stringency steps. We would therefore like to continue to engage with the agency throughout the rule-making period as we further investigate both approaches.
- The Volvo Group supports EPA's proposed structure of performance-based standards predicated solely on zero-emission Battery Electric and Fuel Cell Electric vehicle adoption ("BEV" and "FCEV" respectively).
- We do not believe that EPA has the authority to mandate useful life and warranty requirements for zero-emission vehicles, since there is no situation in which the failure of any system on a ZEV would cause *that ZEV* to produce increased emissions.

Stringency and Overall Feasibility

- The Volvo Group strongly supports EPA's proposal not to increase engine stringencies beyond the previously finalized 2027 model year standards, and to exclude additional vehicle improvements beyond the inclusion of zero-emission battery electric and fuel cell electric vehicle technologies.
- The Volvo Group's internal experience and confidential data differs significantly from many of the agency's key assumptions and inputs related to adoption rate estimates. As a result, we believe the agency's year-over-year Phase 3 electric vehicle (EV) adoption rates are overestimated, and the stringencies likely infeasible.
- The agency should revise its method for setting Urban and Regional Vocational Vehicle standards to avoid unintended consequences.
- The agency should not finalize the proposed revision to 40 CFR 1037.705(b) requiring all ZEVs to meet the Compression Ignition Multi-Purpose Vocational Vehicle standard in their respect service classes.

- The agency must build stringency and/or compliance “safety-valves” into the regulation to account for the many factors that are outside of both the EPA’s ability to mandate, and the original equipment manufacturers‘ (OEMs’) ability to control.

Infrastructure

- The Volvo Group believes there is a very high probability that electric charging and hydrogen (H2) fueling infrastructure will continue to lag behind vehicle availability and customer demand, thus being of insufficient capacity to support the EPA’s highly aggressive adoption rates.

Flexibilities

- We support EPA’s proposed allowance to correct errors in credit calculations; however, we believe this allowance should be extended indefinitely, and without penalty.
- We support full fungibility of credits across vehicle averaging sets without scaling or limitations. We also support one-way movement of vehicle credits into engine averaging sets throughout the entire Phase 3 regulatory period, regardless of the vehicle technology which generated the credits, and without a cap on the number of credits that may be transferred.

Comments

Timing

Given the uncertainty and volatility of the Heavy-Duty (HD) ZEV market, the Volvo Group strongly believes the agency should maintain the previously finalized Phase 2 stringencies and promulgate a Phase 3 rule that commences with the 2030 model year. This position is based not only on the bad precedent it sets for trust between the agency and its regulated industry, but also on the adoption of the EPA's Clean Trucks Plan (Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards) which has impacted product plans to meet tougher Phase 2 stringencies and indirectly undercut our anticipated four year lead time because of the inherent inverse relationship between NOx and CO2 emissions from a diesel engine.

With respect to the agency's request for comment on whether to extend the Phase 3 regulatory period to include model years 2033 through 2035, we do not support setting stringencies that far in advance in light of the uncertainty of the ZEV market. We have already faced marketplace and supply chain complications that force us to significantly reduce projected sales as little as six months before commencement of production for the following model year. As such, it is extremely difficult to anticipate how the zero-emission transportation ecosystem will develop, let alone predict the penetration of new technology products across a diversity of applications and industries which have zero experience with these technologies today. Holding OEMs subject to penalty for lack of compliance when there are so many factors outside our control is unprecedented and unreasonable.

Structure

Year-Over-Year versus 3-Year Stringency Steps

Currently we remain undecided on our preferred stringency cycle in light of perceived risks and benefits to each approach.

In the transition to HD EVs, we can expect the annual EV sales share to rise on a year-over-year basis. If the energy distribution systems and charging/fueling infrastructure develop in line with the demand, and supply chain constraints improve (though we have significant doubts either will occur), we could expect these year-over-year increases to generate annual greenhouse gas reductions that would likely be significantly higher than the Phase 2 three-year stringency increases at each step.

Consider a case where EPA expects the year-over-year stringencies in an averaging set to be 10%, 20%, and 30% over baseline for model years (MYs) 2027, 2028, and 2029 respectively. The resultant 3-year stringency step would be the average of the three stringency increases, requiring a 20% improvement each of the three years (this does assume total vehicle sales are the same each of the three model years).

If an OEM started the 2027 model year with a zero credit balance, and met the year-over-year stringency increases of 10%, 20%, and 30%, they would be negative overall for the first two years if the 3-year stringency were used. In this scenario, the OEM would be at a 50% deficit for model year 2027. The OEM would meet the average for model year 2028 but would need to take 50% of those credits to cover the previous year's deficit, leaving an overall deficit of 50% in 2028. The 2029 model year would produce a 50% positive credit balance that could offset the 2028 deficit, and result in this OEM meeting the 20% stringency over the 3-year stringency period, but with several concerns.

First, the OEM would have a negative credit position for at least two years, which could give the impression to customers that its vehicles are not as fuel- or energy-efficient as its' competitors that may have had positive balances. Second, the OEM would need to expend more resources and be at significantly higher risk of noncompliance if unforeseen market impacts were to decrease EV sales, such as a severe economic downturn for multiple years.

Conversely, product development timelines have increased significantly in the past years. The complexity of solutions required to meet the stringent standards increases development effort and time to simulate, test and verify components and systems. In addition to long development cycles, certification tests have increased in length, requiring all hardware and software development to be frozen 18 months in advance of targeted receipt of certification. If incremental yearly improvements are required, manufacturers would be running four development projects synchronously. Resources such as manpower, engine dynamometer test facilities, chassis dynamometer test chambers and other critical areas do not exist to manage such a demand. Yearly incremental improvements to product are not feasible in the context of traditional vehicle technologies. In order to allow manufacturers to deliver robust products with high quality, three-year cycle minimums would be needed.

Volvo Group would like to continue to engage with the agency throughout the rule making period as we further investigate potential unintended consequences of each approach.

Infrastructure

In 2007 and 2010, new Particulate Matter (PM) and NOx regulations required fueling related changes to meet new regulatory standards (availability of Ultra Low Sulfur Diesel and Diesel Exhaust Fluid respectively); however, these cases were far less onerous than requiring the development and adoption of an entirely unfamiliar new fuel with unknown operational implications.

In the case of EPA's Phase 3 proposal, the availability of fuel (and its requisite infrastructure) is the most significant factor influencing the speed of ZEV penetration in the marketplace and thus, OEMs' ability to comply with the regulation. Many factors including supply chain delays, workforce training and high costs will all affect heavy-duty ZEV adoption; but fleets can't use their vehicles if they can't fuel them, and if they can't use them, they won't buy them. Through our Volvo LIGHTS project (Low Impact Green Heavy Transport Solutions) and experience deploying BEVs across 12 different states and provinces, we've experienced a mix of factors contributing to infrastructure delays ranging from permitting delays, incongruence between infrastructure and vehicle funding programs, energization delays, and supply chain challenges for charger and electrical components. These issues must be addressed if OEMs are to be held responsible for meeting ZEV penetration levels on a national level.

Of all states, California is by far the best positioned to achieve its Heavy-Duty (HD) ZEV penetration goals because of its financial and policy inducements. Yet several Volvo fleet customers have had to wait over 18 months to have chargers built and energized at their sites. This experience makes the California Energy Commission's AB2127 report estimate that "an additional 157,000 chargers are needed to support 180,000 medium- and heavy-duty vehicles anticipated for 2030" seem unrealistic.

It is important to note that these challenges can and will be addressed over time. Involvement in the Volvo LIGHTS project and other ZEV deployments in the state have helped California utilities better understand how to service this new market. Likewise, the California Air Resources Board (CARB) and the California Energy Commission (CEC) began working in 2018 to develop a joint project solicitation that packaged incentives for vehicles and infrastructure together to help fleets coordinate public funding needs.

Nevertheless, governance of the electricity industry is exceedingly fractured in terms of geography, purview, and governing entities, with more than 3,000 separate power/electric utilities across the United States. California stakeholders have had years to gain experience and prepare for this transition. Other states with much less experience and more resistant stakeholders will make it virtually impossible to successfully extend the ZEV penetration rates of the Advanced Clean Truck Regulation to a national level.

In addition to these governing and sectoral challenges, infrastructure development will also be strained by the lack of sufficient domestic production of minerals and materials including copper, aluminum, and electrical steel, the last of which currently has only one domestic supplier. The demand for these materials has surged, driven by the growth in renewable energy projects, the electrification of transportation, and the increasing use of digital technologies. At the same time, utilities and contractors are finding it difficult to secure these materials to complete projects on time and on budget due to supply chain disruptions[1], trade tensions, and production limitations. This has led to shortages and price spikes[2], thereby undermining the confidence of fleet customers in this new technology.

For example, customers are routinely quoted 40 to 50-week lead times for transformers if site upgrades are needed to support fleet electrification. In addition, lead times for electric vehicle supply equipment (EVSEs, or "chargers") are often 30-50 weeks and ensuring everything shows up at the same time is nearly impossible in today's environment.[3] Many of the internal components of an EVSE are common with photovoltaic (PV, or solar) inverters, which means that component supplies are further stressed from industries even outside of vehicle and charger manufacturing.

The cost of charging infrastructure for fleets is another issue influencing ZEV penetration. California has established an infrastructure incentive program and several utilities in the state have established make-ready programs to help offset fleet concerns about long term profitability/viability. While most early adopters have installed chargers at their own facilities, many smaller fleets and independent owner-operators will need to rely on the availability of public charging. Over the last two years, a handful of public chargers have been developed; however, their number will likely remain low for some time since

[1] Onstad, E. (2022, March 25). European steel prices to extend rally as Ukraine conflict cuts supply. Reuters. Accessed on 14 June 2023 at https://www.reuters.com/world/europe/european-steel-prices-extend-rally-ukraine-conflict-cuts-supply-2022-03-25/

[2] Spiller, B. (2023, May 3). Why Are Electric Truck Prices So High? Resources For the Future blogpost. Accessed on 14 June 2023 at https://www.resources.org/common-resources/why-are-electric-truck-prices-so-high/

[3] Smith, G. (2023, May 8). Charging infrastructure delays temper rollouts of battery-electric trucks. Trucknews.com. Accessed on 14 June 2023 at https://www.trucknews.com/sustainability/charging-infrastructure-delays-temper-rollouts-of-battery-electric-trucks/1003174982/?utm_medium=email&utm_source=newcom&utm_campaign=TruckNewsDaily&utm_content=2023050902809&hash=b8dc1bbe8cbdd5dc1fa8f2d3d3026004.

concern over long term viability of the business model will continue as long as the utilization level needed to be profitable remains unknown.

Even other seemingly unrelated issues could influence the availability of charging, such as parking concerns. Parking for Class 8 vehicles is a significant problem today and many truck stop operators are understandably nervous about converting existing parking stalls for EV charging for fear of having those spaces blocked by internal combustion engine (ICE) trucks. This parking problem has been exacerbated by state decisions to close existing, and limit future development of interstate rest stop parking. More state and federal dollars for parking along with amendments to the Federal-Aid Highway Act currently restricting EV charging at rest areas will help.

Finally, utilization of medium and heavy-duty ZEVs, together with the continued growth in electric passenger vehicles will place unprecedented demand on the grid, particularly during peak hours. While all ZEV owners will be sensitive to charging prices, the elasticity of demand for commercial ZEVs is much more sensitive to electricity price and reliability than for light-duty vehicles. Significant expansion of transmission lines and distribution infrastructure (circuits/feeders) will require utility investment; however current industry norms enable utilities to build additional capacity only after increased demand is assured. This process, while logical for meeting residential and commercial building needs, undermines the assurance fleets will demand before ordering more than a couple of pilot trucks.

An American Transportation Research Institute report from 2022 estimated that full national electrification of light-duty and medium/heavy-duty vehicles would require a 26% and 14% increase in power supply respectively.[4] For a more regional perspective, a National Grid Report co-authored by Calstart, RMI and others looked at charging needs along major highways in Massachusetts and New York.[5] Based on current truck traffic and the goal of having all light-duty and medium/heavy-duty vehicles be electric by 2035 and 2045 respectively, the report stated that "in 10 years more than a quarter of sites studied will require the same amount of power as an outdoor sports stadium to meet charging demand, with some requiring the same power as a small town within the next two decades."

Infrastructure Implications

Because of these complications customers have been reluctant to take truck deliveries, leading to extension requests for many of our Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) vouchers in California. While supply chain challenges have contributed to some delivery delays, 70% of the extension requests are due to problems with infrastructure projects and site planning.

Commercial vehicle owners engaged in freight hauling for profit are very different from passenger car owners. Uptime is critical to maximize miles traveled and minimize Total Cost of Ownership (TCO). Commercial trucks are capital assets that customers buy or lease to do a certain job and provide a return on investment. Fleet owners need flexibility in their operations and stability in the availability and cost of electricity to keep their customers satisfied. Fleets can face significant variability in the cost of charging based on the season and the time of day, not to mention the threat of complete unavailability

[4] Short, J., Shirk, A., & Pupillo, A. (2022, December). Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet. American Transportation Research Institute publication. Retrieved on 14 June 2022, from https://truckingresearch.org/2022/12/charging-infrastructure-challenges-for-the-u-s-electric-vehicle-fleet/

[5] Electric Highways: Accelerating and Optimizing Fast-Charging Deployment for Carbon-Free Transportation. Accessed on 14 June 2023, from https://calstart.org/electric-highways-study/

in the case of extreme weather or blackouts. This complicates the ZEV transition experience for fleets, impacting dealership business, and negatively affecting sales.

Of course, the availability of hydrogen (H2) fueling infrastructure is even further behind that for battery electric vehicles and thus Volvo Group does not believe the requisite charging and hydrogen fueling infrastructure will develop sufficiently on a year-over-year basis to support penetrations of the magnitude EPA has determined in its stringency setting. We urge the agency to include a provision in the Phase 3 regulation tying manufacturer compliance to minimum infrastructure availability and density thresholds. Without some such mechanism it is beyond OEMs' capacity to control their own compliance with the regulation.

Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA) impacts

At many points throughout the NPRM, EPA asserts that Inflation Reduction Act (IRA)+ credits will significantly reduce vehicle costs, potentially enabling them to reach parity with equivalent diesel vehicles in as little as one to three years of operational use. The impacts of these provisions are unproven, and we remain skeptical that the value of the incentives and credits offered in this federal program will drive the same behavior change as more financially significant state incentive programs like the HVIP voucher in California.

The primary credit intended to reduce the cost of commercial vehicles is the Qualified Commercial Clean Vehicle Credit (Section 45W). The credit was initially designed to cover the lesser of the incremental cost of the vehicle to its diesel comparison or 30% of the purchase. Unfortunately, a $40,000 cap was placed on all vehicles greater than 14,000 pounds, thereby greatly limiting its value and impact on purchases of both Class 7 and Class 8 zero emission vehicles. IRS guidance recognized early in the process that there was no situation where a Class 7 or 8 vehicle's incremental cost or 30 percent price threshold would be less than the cap. In fact, for many Class 8 vehicles, the $40,000 credit will not even fully cover the 12 percent federal excise tax that is levied on all Class 8 motor vehicles. This is especially true for vocational vehicles like refuse trucks where significant cost is added by the custom body designed for the customer. For any Class 8 truck costing more than $333,333, the 12 percent federal excise tax would be more than the full value of the 45W credit. Additionally, this credit does not include any transferability, so customers with limited tax liabilities will not be able to leverage this tax credit. Many trucking companies have low profit margins and therefore may not have enough taxable income to utilize the 45W credit.

The NPRM asserts that the Advanced Energy Production Credit (Section 45X) is the second primary program to deliver meaningful price reductions for medium and heavy-duty zero emission vehicles. The intent of the credit is to incentivize local production of battery cells and modules, electrode active materials and critical minerals in the U.S. The upfront investment to begin manufacturing these products is overwhelmingly high, in some cases over $4 billion[6]. As a result, regardless of whether a truck or battery manufacturer is making the investment in new domestic battery supply chains, the high upfront costs of building and equipping these facilities makes it unlikely that the credit benefits will be passed on to end-consumers, especially as the end consumer may be more than five steps or tiers away from the supplier directly receiving the 45X credit.

[6]https://www.cnbc.com/2022/10/11/hondas-new-4point4-billion-ev-battery-plant-will-be-built-in-ohio.html

It is true that other IRA programs like the $1 billion Clean Heavy-Duty Vehicle Program support the purchase of zero-emission vehicles, necessary infrastructure, and workforce training for certain governmental and tribal customers. Yet this deceptively named program is limited to Class 6 and 7 vehicles and excludes Class 8 vehicles, thereby preventing fleet owners of vehicles accounting for the greatest volume of emissions from accessing the program.

Federal programs to reduce the cost of charging infrastructure

As discussed throughout the NPRM and our comments, customers are now investing in both a more expensive vehicle and a fuel source to support that vehicle. While the IRA has tools designed to support the investments in charging infrastructure, many of these tools are still being developed and have not yet proven their ability to reduce costs for the end customer. The chief tool to reduce the cost of charging infrastructure for private charging depots is the Section 30C tax credit for Alternative Fueling Infrastructure. This credit includes a new geographic limitation for low-income and non-urban locations. Unfortunately, many operators of battery electric trucks will not have the flexibility to move their charging stations to one of these targeted neighborhoods or modify their operations to access the full 30% investment tax credit.

Additionally, there is $7.5 billion available for public charging infrastructure from the Bipartisan Infrastructure Law (BIL). Of this funding, $5 billion will be obligated to states by formula through the National Electric Vehicle Infrastructure (NEVI). Despite the urging of the Heavy-Duty vehicle industry and the specific inclusion of flexibility for commercial use of public charging as well as consideration for semi-trailers in the statute, this program has been geared towards light duty charging. Not one state—including states opting into California's Advanced Clean Trucks rule—proposed a charging station in their plan that would accommodate heavy duty vehicles. The Federal Highway Administration (FHWA), however, released guidance on June 8th of this year clarifying the eligibility of Medium- and Heavy-Duty charging infrastructure for NEVI funding.

An additional $2.5 billion in BIL funding is found in the Department of Transportation's (DOT) Charging and Fueling Infrastructure competitive grant program. We are optimistic that medium and heavy-duty projects will be prioritized in these programs given the light duty emphasis that has dominated the NEVI program. The initial application window has just opened so it is too early to determine if medium and heavy-duty vehicles will receive the priority signaled by U.S. DOT.

Federal barriers to adoption of ZEVs and Hydrogen powered Vehicles

While the Volvo Group was proud to support the Inflation Reduction Act and Bipartisan Infrastructure Law's zero emission vehicles program incentives and funding, there are still many federal policies in place that will make it either operationally more difficult or more expensive to adopt battery electric and hydrogen-powered vehicles. Below are a few examples:

1. The 12 percent federal excise tax (FET) on Class 8 trucks creates an increased disincentive on the purchase of higher purchase price battery electric and hydrogen-powered trucks.[7]

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[7] Perrotta, L., President, American Truck Dealers, Spear, C. President and CEO, American Trucking Associations, Gore, A., Executive Director, Zero Emission Transportation Association (2023. February 22). Federal Excise Tax for Heavy-Duty Trucks and Trailers. Letter to Senate Majority Leader Charles Schumer, Senate Minority Leader Mitch McConnell, House Speaker Keving McCarthy, and House Minority Leader Hakeem Jeffries, Accessed 14 June 2023 at https://ata.msgfocus.com/files/amf_highroad_solution/project_2358/FET_Repeal_Coalition_Letter_2.22.pdf.

2. Battery electric trucks and hydrogen-powered trucks do not have payload parity with their diesel counterparts. Early adopters lose payload as they take on additional battery weight. This either limits the amount of freight that can be carried or reclassifies a Class 7 truck as a Class 8 truck forcing the carrier to pay the 12 percent FET.
3. The U.S.-Mexico-Canada trade agreement (USMCA) regional value content requirements raise the possibility that steep tariffs could be imposed on battery electric vehicles made in the U.S. and exported to Canada (6%) and Mexico (20%) because of nascent domestic battery supply chains. Similarly, battery electric vehicles made in Canada and Mexico that do not meet USMCA content requirements will pay duties coming into the U.S. market.

Stringency and Overall Feasibility

Volvo Group does not support additional engine or conventional vehicle stringency increases

Volvo Group has been increasing its investment levels as much as possible to develop HD ZEVs, and prepare our manufacturing facilities for a full-spectrum electrification offering. This offering not only includes electric vehicles, but also EV powertrains, services, infrastructure, financing and insurance solutions, dealer development resources, and more. Of course, achieving these goals will also require good public policies across the globe to ensure that the initial high cost of these products is lowered over time, and most importantly, that the requisite charging and fueling infrastructure is in place to support these penetration rate goals.

To support our shift to electrification, we have created an entirely new business area, Volvo Energy, with full profit and loss responsibility. Volvo Energy's responsibilities cover the entire life cycle of electromobility technologies, from supporting the Volvo Group's sales and service of EVs, to monitoring and optimizing battery performance in-use, securing charging infrastructure and services, remanufacturing, refurbishing, and recycling batteries, repurposing batteries for second life, and growing partnerships across the E-mobility ecosystem. We have also formed an E-mobility organization in our Group Trucks Technology division, realigning our engineering organization with a focus on developing the necessary skillsets and knowledge internally, or hiring individuals externally, to transition our development efforts to meeting our electrification goals, and becoming an industry leader in heavy-duty commercial EVs. Volvo Group will continue to support our conventional product offer through this transition to carbon-neutrality with cost-effective, real-world fuel economy improvements for our customers; however, additional engine, or conventional vehicles standards beyond those set for the Phase 2 2027 step would force us to deploy more resources and budget for less gain, and at the expense of investment on this transition.

With Phase 2, EPA finalized model year 2027 stringency steps for both the engine and vehicles powered by internal combustion engines (i.e., conventionally powered vehicles, or conventional vehicles). For Phase 1 and Phase 2, the agency provided three-year stringency steps, with a four-year lead time between the two. Since EPA seemed to publicly support the belief that the Clean Air Act lead time and stability requirements were applicable to motor vehicle greenhouse gas regulations when it published its final Phase 2 rule late in calendar year 2016, the stringency steps for model year 2027 engines and vehicles were expected to cover at least the three-year period of model years 2027 through 2029. The Volvo Group has been investing at record levels to meet the demands of the Phase 2 program. Spending to meet the MY 2027 Phase 2 stringency step will be close to ten times the level spent to meet the 2017 standards. As a result, further engine or conventional vehicle stringency increases are infeasible.

Additionally, if EPA were to open a stringency assessment for engines or conventional vehicles to increase model year 2027 stringencies, we believe it would require a review of the entire Phase 2 stringency development, since the Phase 2 2027 stringencies are intended to serve as the baseline for the Phase 3 rule making. This review would need to consider the technology packages used to set model year 2021, 2024, and 2027 stringencies, including assumptions on technology availability, timing, benefit, penetration, and cost. Reopening the stringency determination for engines and vehicles from model year 2027 could actually result in decreased stringency for engines and conventional vehicles.

Firstly, we believe this to be true because items included in EPA's technology packages have not reached the levels projected (e.g., 6x2 axle configurations in tractors and vocational vehicles); are not expected to be commercialized in EPA's projected timeline (e.g., engine stop-start and mild hybridization for HHD vocational vehicles); are no longer being developed for commercialization (e.g., Rankine Cycle waste heat recovery); and face higher costs from recent supply chain disruptions.

Secondly, EPA's stringency would need to account for the impact of higher engine and conventional vehicle costs due to decreasing volumes of conventional vehicles as a result of the expected increasing shares of EVs. Not only would this create higher prices from reducing economies of scale, but also because engine and conventional vehicle development, industrialization, and commercialization costs will need to be spread over lower volumes. The latter concern will already become an issue due to more stringent NOx standards and longer useful life periods promulgated by both CARB and EPA.

Finally, EPA's engine and conventional vehicle stringencies would need to be re-evaluated for the increased costs due to the development of the new NOx controls required by EPA's Clean Trucks Plan NOx rule, spreading those unaccounted-for costs over lower volumes of conventional vehicles, and, for the increased consumption of fuel and diesel exhaust fluid driven by these new NOx standards.

Packaging Challenges

The proposed rulemaking requests comment on stringency adjustments based on the suitability of electrification/alternative fuels for various duty cycles. The Volvo Group would presumably register vehicles among 16 of the 101 vehicle categories listed. As we shift our platforms toward more CO2-neutral products, greater packaging challenges will drive new initiatives to ensure we remain compliant with the Code of Federal Regulations (CFR) and Federal Motor Vehicle Safety Standards (FMVSS).

As we modify products to comply with 2027 stringencies, new components consuming valuable frame space are required, making our ability to meet a 43" trailer gap for day cabs while maintaining the fuel capacity to meet our customers' requirements increasingly difficult. The Exhaust After Treatment System (EATS) requires more 'immediate' on demand heat and the exhaust stream requires additional Diesel Exhaust Fluid (DEF). As the EATS grows in size, the DEF volume increases, requiring frame rail extensions to accommodate necessary components. Despite consideration of numerous alternatives in packaging concepts as the rear bogie(s) move rearward, the ability to meet a 43" trailer gap is less likely with the prescribed trailer configuration outlined in 1037.501. If we were to push out our standard 'best aero' day cab configuration to ~48" trailer gap, we would expect overall aerodynamics to be negatively impacted by 1.5%. To continue to achieve a 43" trailer gap we must weigh the spend (millions of USD) it takes to re-package components, perform simulations, and ultimately accrue mileage to achieve the expected reliability growth targets before putting a solution into production.

The frame rail packaging not only impacts the trailer gap, but also our ability to protect for bodybuilders' 'clean back of cab' requirements. While the NPRM expects us to move away from carbon-based products, the electrification of multi-purpose vehicles and refuse trucks classified in the urban subcategory complicates our ability to close the immense power gap required to drive the bodybuilder functions. Additional battery packs take away from customer payload while simultaneously creating new concerns around front axle loading to ensure we meet federal bridge laws. Although a cement mixer is listed as a good opportunity for electrification in the EPA's HD TRUCS analysis results, we have identified risks associated to Gross Axle Weight Rating (GAWR) due to the power density required to ensure the vehicle can run its cycle and power the mixing drum. Some body builders have started to incorporate batteries into the body to power all the hydraulic features, but this is not yet available for all applications within the multipurpose and urban subcategories.

Similarly, as we look to develop concepts for hydrogen fuel cells and/or internal combustion engines (ICE), we will face similar space constraints associated with battery electric vehicles. Heavier weights on the front axle will need to be balanced with limits to customer payload to ensure bridge law compliance. In this case the weight studies are focused on the hydrogen fuel tank assemblies and the structure required to mount and protect the tanks in the event of an accident. With the utmost interest in the safety of our drivers and the surrounding environment, we must ensure designs can pass the standard frontal crash test. This requires simulation efforts to ensure all hydrogen is evacuated and properly vented within a fraction of a second upon front impact.

Incorporation of emission reductions realized from renewable fuels

In January of this year, the Biden Administration released its National Blueprint for Transportation Decarbonization which emphasizes the importance of battery electric, hydrogen, and sustainable liquid fuels for reaching a net-zero economy in 2050. The report notes that renewable diesel fuels are "already being developed using standards to ensure they are safe for use and are fully compatible with existing vehicle fleets and fueling infrastructure and minimize emissions in their full life-cycles" while going on to say that "even greater opportunities lie ahead to leverage existing industrial infrastructure by converting petroleum refineries and other facilities for sustainable fuel production."[8]

Renewable diesel fuel is a 100% drop in fuel that can use the existing diesel distribution system. When used, it can reduce GHG emissions 50-85% or even more compared to petroleum diesel and while also reducing nitrogen oxide (NOx), particulate matter (PM) and other emissions. One of the biggest challenges to greater renewable diesel use has been its availability; however according to a recent Today in Energy article by the U.S. Energy Information Agency, eight new renewable diesel refineries recently began production which could result in more of a doubling of available supply by 2025.[9]

With such growth in volumes, the lack of needed infrastructure investments and the significant levels of emission reductions, it seems counter to the administration's own Decarbonization Blueprint not to account for the significant contribution renewable diesel can play in meeting the reductions being sought through the Phase 3 proposal. According to a study released by the Diesel Technology Forum

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[8] U.S. Departments of Energy, Transportation, Housing and Urban Development, and U.S. Environmental Protection Agency (2023, January). The U.S. National Blueprint for Transportation Decarbonization, A Joint Strategy to Transform Transportation. Accessed on 14 June 2023 at https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf.

[9] U.S. Energy Information Administration. https://www.eia.gov/todayinenergy/detail.php?id=55399

last year, it was found that "accelerating fleet turnover and use of renewable and biodiesel fuels can deliver significantly more benefits (3X) that outweigh those possible from EVs in the region in the study period."[10]

While we recognize new mechanisms to account and verify the reductions gained through use of renewable diesel would be required, it is certainly no more difficult than trying to ensure the development or expansion of an entirely new vehicle fueling infrastructure that, depending on the power source, may not offer significantly more full life-cycle emission reductions. Achieving our mutual greenhouse gas reduction goals and keeping to no more than 1.5 degrees Celsius (C) increase in global warming will require an "all of the above" approach to emissions reductions. The Volvo Group is investing heavily in zero-emission powertrains and while we want to enable an environment for their utilization, we also want to see emissions reduced in the most cost-effective and quickest way for the benefit of our customers and the country.

NOx regulation impacts on engine greenhouse gas emissions

With respect to the engine standards, EPA's stringency setting for the 2027 model year did not provide any consideration for EPA's new NOx standards within the Clean Trucks Plan finalized in December of last year. This regulation includes an 82.5% greater stringency in NOx in 2027 in addition to increased useful life and warranty periods, resulting in the need to provide a significantly higher margin on certified engine levels to meet those extended useful life periods.

Reductions in NOx have a direct impact on greenhouse gas emissions for compression ignition combustion engine technology. NOx can be mitigated with on-engine technologies or aftertreatment devices. Engine based NOx reduction is achieved by reducing peak temperature during combustion, inherently less efficient combustion by modifying fueling such as retarding timing or increasing exhaust gas recirculation. Aftertreatment systems have grown in volume significantly also, requiring advanced reductant mixing geometries and complex packaging, all increasing exhaust backpressure which further decreases engine efficiency. Additionally, the aftertreatment system must be warmed to enable chemical reactions to reduce NOx, and the warming of the catalyst via any means requires fuel energy.

The key technology required to achieve 2027 NOx emission levels could increase actual fuel consumption up to 25% for some applications, with vehicles in all applications experiencing some level of increased fuel consumption. Today's diesel engines are very advanced in technology and further refinements are planned. However, many OEMs are approaching 50% brake thermally efficient capable engines and are near the theoretical limit of the capabilities of a combustion engine. Therefore, any further engine specific requests for reduction in greenhouse gas emissions or increase in fuel economy will not be reliable, cost effective or even theoretically possible if we maintain the requirement to comply with ultra-low NOx emission requirements.

In summation, Volvo Group firmly supports EPA's proposal not to promulgate additional engine standards beyond the 2027 model year standards finalized with Phase 2. We believe this is justified

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[10] Unknown (2022, July 22). Research Finds More Emissions Benefits at Lower Cost from Accelerated Fleet Turnover and Use of Bio- and Renewable Fuels than Switching to Electrified Medium and Heavy-Duty Trucks. Waste Advantage Magazine. Accessed 14 June 2023 at https://wasteadvantagemag.com/research-finds-more-emissions-benefits-at-lower-cost-from-accelerated-fleet-turnover-and-use-of-bio-and-renewable-fuels-than-switching-to-electrified-medium-and-heavy-duty-trucks/

given the Clean Trucks Plan's significant impact on fuel economy and greenhouse gas performance that will need to be clawed back just to meet the Phase 2 MY 2027 National Highway Traffic Safety Administration (NHTSA) and EPA fuel economy (FE) and greenhouse gas standards. Additionally, as the Phase 2 and proposed Phase 3 benefits are calculated solely on a complete vehicle level, separate engine standards provide no additional benefit; rather they artificially inflate costs and unreliability by forcing technologies onto the engine, as opposed to allowing manufacturers to utilize potentially lower cost and risk technologies on the vehicle that provide the same, or greater benefit.

Conventional Vehicle Stringency

Volvo Group supports EPA's inclusion of only BEV and FCEV penetrations in the stringency calculations. As traditional heavy-duty vehicle manufacturers transition to zero-emission technologies, we must be able to focus our limited investments on developing and commercializing zero-emission vehicles (ZEVs), while continuing to support our internal combustion engine (ICE) technologies in order to meet the needs of the transportation industry and, ultimately, all consumers during this technology transition. Additionally, the largest greenhouse gas emission reductions will come from zero and near-zero-emission technologies and greater utilization of sustainable liquid fuels, not from minor engine and vehicle improvements.

For these reasons we do not believe that conventional vehicle stringencies should be increased beyond the current model year 2027 levels set in the Phase 2 rulemaking. Furthermore, if EPA determines to re-evaluate either, or both of the 2027 engine and conventional vehicle levels, the agency must take all of the factors noted above into consideration, especially the impact of NOx and increased engine emissions useful life on engine fuel maps used in EPA's Greenhouse Gas Emissions Model (GEM) to calculate a vehicle's Family Emission Limit (FEL).

Phase 3 Proposed Stringencies

Safety Valves

The stringencies proposed by the agency rely heavily on many assumptions and factors outside of either the agency's, or manufacturers' ability to control. As such, Volvo Group believes that safety valves must be placed in the regulation such that industry compliance is not dependent on the actions of other stakeholders or beyond EPA's authority to regulate. These include such items as the availability and price of battery raw materials or sufficient charging and refueling capacity located where it can support the proposed adoption rates, plus some additional level of capacity (margin) so as not to disadvantage any single OEM based on their product portfolio, regional strengths, etc.

With respect to infrastructure, Volvo Group proposes that the agency link either the vehicle stringencies or manufacturer compliance determination for each model year of the Phase 3 regulatory period to the actual infrastructure capacity, accessibility, and density within geographic areas and along freight corridors. That infrastructure must be able to support the agency's adoption rates in each vehicle subcategory such that, regardless of geographic area or freight corridor in which the infrastructure is installed, it can support the previous years' fleet plus the total number of zero-emission vehicles determined by the agency's annual adoption rates.

For example, if a city had enough chargers to charge 1,000 HD EVs daily, but the total fleet (regardless of fuel/energy source) operating in or transiting to and from this city was only 500 HD vehicles daily, then the additional capacity would not be included in the capacity assessment. Of course, it is not realistic that there would be this much excess capacity; the numbers are exaggerated to make the point.

If 50 of those vehicles were locally domiciled Class 8 vocational vehicles that returned to base every night and had available infrastructure to charge batteries that met their range 100% of the time, then that capacity would be counted toward the required Class 8 adoption rate. However, if the chargers were private, but had additional capacity beyond this fleet's needs, this additional capacity should not be counted.

Thus, this determination, is not a one-to-one equivalence when it comes to number of chargers, making the assessment more complicated. As noted, the chargers must be accessible, which means a mix of public and private chargers. Additionally, they must be available for a sufficient amount of time for charging when and where vehicles need them. In some cases, this will require opportunity charging, which is not included in the agency's analysis.

There should also be some consideration given to an individual OEM's ability to comply based on its product portfolio and market share by region and segment. If the infrastructure is sufficient to meet the adoption rate for Class 8 high roof day cab tractors based only on infrastructure on the West Coast, but a manufacturer has no sales in that region, they will be at risk of noncompliance. Thus, there must be some margin applied so that a manufacturer is not deemed non-compliant due to such factors.

Because of the myriad complicating factors that go into assessing the sufficiency of infrastructure, we suggest the agency reach out to the broadest possible group of stakeholders. At a minimum, we think the agency should enlist utilities and public utility commissions; hydrogen, alternative fuel, and diesel fuel producers and distributors; charging service providers and EVSE manufacturers; vehicle manufacturers; dealers; public and private fleets; expert industry consultants in clean transportation; trucking industry service providers; and additional state and federal agencies such as CARB and DOE.

We also suggest EPA undertake a data collection effort as soon as possible to determine how to assess sufficiency. One good source of data will be available through the Electric Power Research Institute's (EPRI) EVs2Scale 2030 project.[11] This project will include a three-year comprehensive study to model grid impacts (load profiles/clusters) for 50% EV market share by 2030 for light, medium and heavy-duty vehicles. This study will provide critical information to utilities to determine the pace of year-over-year action and investment required to prepare the grid in advance of this load. The goal is to help support rapid deployment of millions of electric vehicles and trucks – while minimizing grid impacts and ensuring regulators/utilities are in lockstep with OEMs and vehicle regulations. The result will be a 50-state roadmap to 2030 outlining EV loads, grid impacts, lead times, workforce, and costs, assuming 50% EV adoption across all weight classes.

Of course, this need does not only apply to infrastructure. It is important to remember that this is a nascent industry, and many of the assumptions being made may or may not come to fruition. With such high stringency increases above the Phase 2 2027 model year vehicle standards, the only pathway to meeting the NPRM's proposed improvements will be through zero, or near-zero emissions technologies.

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[11] Walton, R (2023, April 19). EPRI launches 3-year initiative to address grid constraints, develop tools to serve coming EV loads. UtilityDive.com. Accessed on 14 June 2023 at https://www.utilitydive.com/news/epri-initiative-electric-vehicle-loads-power-grid-constraints-interconnection/648024/

Thus, it is absolutely critical that the agency work with all stakeholders during the rulemaking period to assure the best possible assumptions and inputs are utilized in the stringency setting, and that there be some included safety valves in acknowledgement of the uncertainty and volatility around this emerging technology.

EPA Stringency Setting Process

In Volvo Group's view, the agency's proposed stringencies are too high, as they rely on unrealistic assumptions and incorrect data as inputs. Volvo Group has worked with EMA regarding assessment of the agency's HD TRUCS tool and support their comments with respect to the stringency setting process. We encourage EPA to engage with EMA during the rule making period to assure that the assumptions and inputs used for the final stringency determination are representative of actual industry practices and values.

Assumptions and inputs covered in the EMA comments, specifically concerning to the Volvo Group include:

- The agency's payback vs. adoption rate table (RIA 2.7.9, Table 2-73), shows fleets purchasing BEVs and FCEVs at payback periods of up to 15 years in 2027, and beyond 15 years in 2032. This is unrealistic, as most fleets look for a payback period of two years or less.
- EPA's estimates of vehicle availability and application suitability in the 101 vehicle categories do not agree with our internal timelines and knowledge. One example is concrete mixers at an 18% penetration of BEVs in 2027. Concrete mixers are highly weight and space constrained, so much so that some customers specify medium-heavy duty engines in heavy-heavy duty vehicles in order to maximize payload. Concrete mixers are not seen as a candidate for electrification given the current and expected technologies in the Phase 3 timeframe. One telling fact, at the 2023 World of Concrete show held in Las Vegas on January 17th through 19th of this year, there was zero emphasis on zero-emission vehicle technologies.
- Costs are too low based on current data and internally anticipated cost reductions, especially for batteries.
- The agency referenced many studies and analyses in their determination (ACT Research, ICCT, EDF/ERM, etc.), but many of those studies have already been shown to be outdated based on their model year 2021 and 2022 heavy duty ZEV sales projections when compared to actual industry sales volumes and vehicle registrations.
- EPA should update their analysis based on the most recent data, including the Energy Information Administration's 2023 Annual Energy Outlook.

Volvo Group is committed to working with the agency through the Phase 3 rule making period to assure the most accurate and recent data is available.

Vocational Vehicle Stringency Setting Process

The Agency has proposed determining the Vocational Vehicle stringencies by taking the expected stringency increases for each model year, calculating the absolute grams per ton-mile reduction in the Multi-Purpose subcategory for each service class, and applying this absolute gCO2/ton-mile reduction to the Urban and Regional subcategories. For Heavy-Heavy-Duty (HHD), the proposed stringency increase results in a model year 2027 standard of 193 gCO2/ton-mile in the HHD Compression Ignition (CI) Multi-

Purpose subcategory, an absolute reduction of 37 g/CO2/ton. This absolute 37 gCO2/ton-mile reduction is then applied to both the HHD CI Urban and Regional Vocational Vehicle subcategories to determine the new standard for each. The result is an actual stringency increase of 14% in the Urban subcategory, and 20% in the Regional.

	HHD Vocational Vehicle Stringency Increase From MY2027 Baseline					
	MY 2027	**MY 2028**	**MY 2029**	**MY 2030**	**MY 2031**	**MY 2032**
Class 8 Vocational (HHD)	16%	18%	19%	30%	33%	40%

Table 1. Extracted from Table 2-82 of the Draft Regulatory Impact Analysis.

Although this might seem advantageous for OEMs producing more vehicles in the Urban subcategory, this actually results in lost credits for the OEM since EPA is proposing that all zero-emission vocational vehicles are be placed in the Compression Ignition Multi-Purpose subcategories in their service class regardless of the conventional vehicle they displace. From Table 2 below, if a zero-emission vehicle that replaces a HHD CI Urban Vocational Vehicle must be classified in the HHD CI Multi-Purpose subcategory, the resultant loss of credit for that ZEV is 127 Mg of CO2 from what it would receive if it were classified as Urban. The reverse is true for the HHD CI Regional subcategory. Even though a HHD CI Regional Vocational Vehicle sees a 20% stringency increase from baseline in MY 2027, a HHD CI Regional ZEV gains 134 Mg when classified against the Multi-Purpose standard.

		Proposed Stringencies		Increase Over Baseline 2027: Percent		Increase Over Baseline 2027: Absolute g/ton-mi		Credits for ZEVs.		Lost/Gained Credits	
Model Year		**MHD, CI**	**HHD**	**MHD, CI**	**HHD**	**MHD, CI**	**HHD**	**MHD, CI**	**HHD**	**MHD, CI**	**HHD**
Baseline 2027	Urban	258	269								
	Multi-Purpose	235	230								
	Regional	218	189								
2027 (New)	Urban	213	232	17%	14%	213	232	221	757	-24	-127
	Multi-Purpose	190	193	19%	16%	45	37	197	630		
	Regional	173	152	21%	20%	173	152	179	496	18	134
2028	Urban	209	228	19%	15%	209	228	217	744	-24	-127
	Multi-Purpose	186	189	21%	18%	49	41	193	617		
	Regional	169	148	22%	22%	169	148	175	483	18	134
2029	Urban	202	225	22%	16%	202	225	209	734	-24	-127
	Multi-Purpose	179	186	24%	19%	56	44	185	607		
	Regional	162	145	26%	23%	162	145	168	473	18	134
2030	Urban	195	200	24%	26%	195	200	202	653	-24	-127
	Multi-Purpose	172	161	27%	30%	63	69	178	525		
	Regional	155	120	29%	37%	155	120	161	392	18	134
2031	Urban	188	193	27%	28%	188	193	195	630	-24	-127
	Multi-Purpose	165	154	30%	33%	70	76	171	502		
	Regional	148	113	32%	40%	148	113	153	369	18	134
2032 and later	Urban	176	177	32%	34%	176	177	182	577	-24	-127
	Multi-Purpose	153	138	33%	40%	82	92	159	450		
	Regional	136	97	38%	49%	136	97	141	316	18	134

*ZEV vocational credits from MY2027 must be calculated against the Multi Purpose standard within a vehicle weight category (proposed 1037.705(b).

**The ZEV credits for Urban and Regional are what they would be if calculated against the proposed standard in their respective subcategories.

Table 2. Volvo Group Analysis of the effect on Vocational Vehicle credits from certifying all ZEVs against the Multi-Purpose subcategories.

A cursory review of absolute credits gained or lost with this stringency setting process might appear beneficial; however, the impact depends upon an OEM's mix of vehicles classified as Urban, Multi-Purpose, or Regional. If a manufacturer has a significantly higher penetration of vehicles classified as Urban than it does as Regional, they would be at a disadvantage. The OEM's product mix of ZEVs also has significant implications. If an OEM has greater Urban ZEV product offerings or sales than for Regional vocational vehicles, the disadvantage could be substantial. This is most apparent for Mack's distribution of MHD product, where an overwhelming percentage are classified in the Urban subcategories.

Lastly, all conventional Regional Vocational Vehicles would be required to meet this increased stringency without consideration for the actual expected ZEV penetration in the Regional subcategories, or the technology packages that EPA deemed appropriate for those subcategories in the Phase 2 rule making.

Because of the unintended disadvantages created by this stringency setting process, as well as the proposed modifications to 1037.705(b) that would require all ZEVs to meet the standard of the CI Multi-Purpose subcategories in their respect service classes, Volvo Group suggests EPA re-evaluate the stringency setting procedure and ZEV categorization for vocational vehicles.

Alternative Stringencies

Volvo Group believes that the proposed stringency levels are inflated due to incorrect assumptions and inputs used in the agency's analysis as further explained in EMA's comments. As such, we believe penetration levels above the proposal are likely not feasible. Specifically:

- EPA should not consider applying CARB's Advanced Clean Truck (ACT) volumes on a national level. As noted earlier, California has instituted many financial and policy incentives to accelerate the penetration of medium- and heavy-duty ZEVs, and yet we already see conditions challenging the realization of ACT volumes in that state due to the lack of timely charging infrastructure deployment. California's passage of the Advanced Clean Fleets (ACF) rule was meant to further support heavy-duty ZEV adoption, yet importantly acknowledges infrastructure challenges and includes provisions to postpone requirements and prevent non-compliance for up to five years if fleets are unable to acquire infrastructure. The Volvo Group encourages EPA to include analogous provisions for OEMs if their customers face similar infrastructure challenges within the Phase 3 regulation.
- EPA should not incorporate ACT mandated volumes on top of the estimated ZEV penetration levels anticipated from the Phase 3 proposal itself. California will account for the majority of EV sales during the Phase 3 period, especially in the early years, where most other states will lag substantially due to the lack of similar HVIP-like purchase incentives and charging infrastructure. As a result, incorporating additional ACT related sales on top of the national deliveries coming out of Phase 3 is not feasible.

Flexibilities

Full credit fungibility across vehicle averaging sets

In NPRM Section III.A.3 "Other Potential HD CO2 Emission Credit Flexibilities" the agency requested "comment on the potential need for additional flexibilities to assist manufacturers in the implementation of Phase 3."

First and foremost, Volvo Group no longer sees the need to restrict vehicle credits to use within an averaging set. Since the Phase 1 program development began in 2009, and continuing through the development of the Phase 2 program finalized in late 2016, the Volvo Group has been the sole voice of opposition among the major vehicle OEMs to movement of vehicle credits across averaging sets. Since Volvo Group did not have a significant North American offer outside of the Heavy-Heavy Duty (HHD) vehicle averaging set during this time, we opposed this flexibility due to the unlevel playing field and resultant competitive disadvantage it would create. With the 2020 launch of the well-received Mack MD Class 6/7 medium duty trucks, Volvo Group no longer sees a competitive disadvantage to movement of credits across vehicle weight classes, nor does it see a competitive advantage provided to any one OEM by expanding credit fungibility. An expanded allowance would, however, allow manufacturers to focus development resources and budgets on the most cost-effective improvements for customers, further easing the transition to ZEV technologies. Thus, Volvo Group requests the agency finalize an allowance for full credit fungibility across vehicle sub-categories without restriction. Since credits in each averaging set are calculated in Mg of CO_2 reduction, and already account for the payload and useful life mileage within the averaging set in which they were earned, Volvo Group sees no reason that these credits should be subjected to discounting, or any other method of reduction in value of transferred credits.

Vehicle Advanced Technology (AT) credit fungibility to engine averaging sets

The agency also went on to further specifically "request comment on providing the flexibility for manufacturers to use advanced technology credits across averaging sets, subject to a cap" (emphasis is the agency's own). Volvo Group sees no reason why one-way movement of any vehicle credit, regardless of the technology from which it is derived, should not be allowed to offset engine deficits. Nor do we see the need for a cap on the number of credits that could be moved from the vehicle averaging sets into the engine averaging sets. Since, as noted previously in these comments, the benefits of the current Phase 2 regulation and the proposed Phase 3 rule are derived solely from complete vehicle improvements that incorporate the actual fuel map of the installed engine, the greenhouse gas reductions from the regulation are not decreased by offsetting engine deficits with vehicle credits. Additionally, a cap does nothing to increase the calculated benefit of the regulation but is rather an arbitrary and capricious method of driving additional engine improvements above and beyond the engine efficiency reductions manufacturers will need to claw back due to the discussed impacts of the EPA's model year 2027 NOx reductions finalized in the Clean Trucks Plan NOx regulation. Since, the expected engine level of improvements from the model year 2024 to the model year 2027 compression ignition engine standards range only from ~0.5% to ~0.9% (see table below for specific values and averaging sets), the expected improvements are negligible compared to the actual benefit derived from a Phase 3 regulation predicated on any level of zero-emission vehicle penetrations. Lastly, in a scheme where only one-way movement of vehicle credits into engine averaging sets is allowed, any amount of credits moved from the vehicle to engine averaging sets are effectively retired, reducing the OEMs available credit balance to be carried forward.

Based on 40 CFR 1036.108(a)(1)(iii) Table 2 - Compression-ignition Engine Standards for Model Years 2021 and Later

Model years	**Light HDE**	**Medium HDE, vocational**	**Heavy HDE, vocational**	**Medium HDE, tractor**	**Heavy HDE, tractor**
2021–2023 Standard	563	545	513	473	447
2024–2026 Standard	555	538	506	461	436
2027 and Later Standard	552	535	503	457	432
% Improvement, MY 2027 to MY 2024	-0.54%	-0.56%	-0.59%	-0.87%	-0.92%

As such, Volvo Group urges the agency to finalize an allowance for unrestricted one-way movement of any category or class of vehicle credits into engine averaging sets throughout the Phase 3 regulatory period from model year 2027 through 2032 with no cap on the number of credits that can be moved.

Credit Correction Allowance

Volvo Group firmly believes that there are both potential and realized unintentional errors that can occur with the amount of data handling for the reports that are required of manufacturers, and so it is imperative to have the ability to correct these errors and have fair and robust final reports behind EPA's datasets. Having only one-sided correction allowed does not produce fair and robust data, and therefore biases the overall dataset built from these reports. The Volvo Group acknowledges concern about potential use of corrections to unfairly and unjustly improve an OEM's position, however we maintain that the ability to correct can be firmly limited to demonstrable errors to prevent any such gaming.

The Volvo Group fully supports the proposed allowance to correct credit calculation errors submitted in the model year final report, but we believe the allowance should be extended indefinitely and without penalty, since limiting the allowance to demonstrable errors in no way allows an OEM to unfairly improve its position; but rather allows an OEM to justly recover those credits that were earned through proven compliance with the requirements of the regulation.

Response To Additional Agency Requests for Comment

Expiring BEV and Plug-in Hybrid Electric Vehicle (PHEV) Advanced Technology credit multiplier in 2026

The Volvo Group is still concerned that the conditions and enablers within the market will not be available at levels allowing any finalized standards to be achieved across all averaging sets. Thus, we suggest the agency set specific MY2026 total industry EV sales penetration thresholds within an averaging set as a criterion for reducing or removing the multiplier at the end of the 2026 Model Year. For example, the EPA could set a threshold ratio comparing actual model year 2026 EV sales percentages within an averaging set to the MY 2027 adoption rate used to set stringency. If the decided ratio were met, the multiplier would expire as proposed.

The agency could also set a range for this ratio. If the minimum level were met, the multiplier would be reduced, ramping down until meeting the maximum threshold, where it would expire as proposed. A method such as this would help to minimize potential risk in the early years of the transition, while also minimizing, or potentially eliminating concern over credit windfalls, as any credit multiplier would be dependent on the market readiness for EVs within a specific averaging set, and not applied to all equally.

Providing a Weight Class Modifier on Credits to Incentivize Adoption in Heavier Weight Classes

Volvo Group agrees that this approach would be valuable to incentivize development of EVs in heavier weight categories.

Definition of U.S.-directed Production Volume

Volvo Group agrees that the agency must codify new language as noted in Section III.A.1 of the NPRM revising the current definition of “U.S.-directed production volume” to include all vehicles produced for sales and delivery in the U.S., regardless of whether the vehicles are certified to federal, or state emissions standards.

Conclusion

Climate change is one of the biggest threats facing our society today. The Volvo Group is committed to reducing emissions from our products and facilities and wants to be a constructive partner with EPA in reducing emissions from the heavy-duty transport sector. We have worked collaboratively with EPA on past emissions regulations and recognize that the development of zero emission vehicle technologies offer the best opportunity to limit global warming to no more than a 1.5 degrees C temperature increase. Our adoption of the Science Based Targets Initiative reflects our "leaning in" to finding a solution.

Until now, our success was in our own hands. But in these early days of the paradigm shift to electric trucks, customer acceptance is heavily dependent on the actions of others. Likewise, our ability to comply with EPA's proposed Greenhouse Gas regulation will depend upon conditions and actors which are not subject to its requirements. This poses an unprecedented situation since the adoption of a completely unfamiliar new fuel has never before been a determining factor of our ability to comply with the agency's regulations.

Over time the market challenges we face today will subside as supply chains stabilize, fleets gain more experience with zero-emission technologies, fueling infrastructure is developed and production levels grow. The problem lies in the uncertainty of that timeline. The state of California has led efforts to mandate the availability of zero-emission technologies, yet as awareness of the dependence of regulatory compliance on infrastructure availability has grown, the California Air Resources Board rightly incorporated safety valves into its Advanced Clean Fleet regulation, acknowledging the inability of the regulated entities to fully control the timeline at which certain milestones could be achieved. We're hopeful that as a result of these comments and the continued engagement of industry with EPA staff, the agency will decide to take similar steps. We look forward to helping the agency promulgate a Greenhouse Gas Phase 3 regulation that provides a strong, yet realistically achievable path towards a zero-emissions transportation future. Failure to do so will threaten the future of our industry and our environment.