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June 16, 2023

The Honorable Michael Regan
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Filed electronically: https://www.regulations.gov

Re: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3 (Docket ID No. EPA-HQ-OAR-2022-0985)

Dear Administrator Regan:

The American Petroleum Institute appreciates the opportunity to submit the following comments on the proposed rule entitled "Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3." API is a national trade association representing all aspects of America's oil and natural gas industry. Our industry supports nearly 11 million U.S. jobs and accounts for approximately 8 percent of U.S. GDP. API has nearly 600 members, from fully integrated oil and natural gas companies to independent companies, comprising all segments of the industry, including producers, refiners, suppliers, retail marketing, pipeline operators, and marine transporters, as well as service and supply companies that support all segments of industry. As producers, suppliers and retailers of transportation fuels that power the more than 99% of all vehicles covered by the proposed rule, API members have a significant interest in, and will be heavily impacted by, the vehicle emissions standards that would be imposed by the standards.

API's *Climate Action Framework* reflects our policies and goals, which are incorporated in our comments below. The challenge of meeting the world's growing need for energy while simultaneously ushering in a lower-carbon future is massive, intertwined, and fundamental. It is the opportunity of our time – governments, industries, and consumers must act to solve it together. Our industry is at the center of this challenge. We share the goal of reduced emissions across the broader economy and, specifically, those from energy production, transportation and use by society.

API supports technology-neutral policies at the federal level that drive GHG emissions reductions in the transportation sector, taking a holistic "all-of-the-above" approach to fuels, vehicles, and infrastructure systems. Such policies include: 1) federal fuel standards, 2) a full lifecycle approach to vehicle standards, 3) optimization of fuel/vehicle systems to improve efficiency, and 4) supportive infrastructure measures. We have significant concerns that the

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proposed rule does not include many of these elements. A few of these concerns are summarized below and our detailed comments are attached.

a. API supports decarbonization of the transportation sector.

API is aligned with EPA's goal to address greenhouse gas emissions in the transportation sector, and API members have similarly been working to advance the development, transmission, and use of cleaner fuels and technologies to provide lower-carbon choices for consumers.

b. API supports the concepts of a lifecycle approach to GHG emissions reductions.

EPA should employ a technology-neutral approach that holistically encompasses the lifecycle GHG emissions of both the fuel and the vehicle, rather than narrowly focusing on tailpipe emissions only.

c. Both this proposal and the light- and medium-duty proposal miss the mark.

EPA's focus on zero-emission vehicle (ZEV) solutions, and specifically battery electric vehicles (BEVs), ignores fuel- and vehicle-based options that could better accomplish the agency's objectives to expeditiously achieve greater transportation sector-related emission reductions from the entire vehicle fleet (both new and in-use) at lower cost.

d. Technical Feasibility

API is concerned that there is significant uncertainty with regard to technology and infrastructure readiness for the proposed 2027-2032 timeframe; further, the transportation industry will be competing for the same resources to successfully implement both the heavy-duty and light- and medium-duty proposed programs on the same timeframe.

e. Energy Security

API is concerned that the proposed rule could negatively impact U.S. energy security if vehicle technologies are shifted to ZEVs in the exponential rate that the proposal would likely entail, as it would increase the country's dependence upon foreign sources for needed minerals forgoing the use of existing U.S. resources.

f. Program Review

API recommends that EPA consider incorporating pre- and mid-program assessments into its final program, with sufficient lead time following review to adjust the standards if needed.

g. Legal Concerns

API is concerned that EPA is exceeding its statutory authority under the Clean Air Act by, among other things, mandating the production of ZEVs.

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Please note that due to the compressed comment period for such a complex rule, coupled with the lack of an extension, the record is still being developed and API will also be submitting supplemental documentation that is important to this rulemaking.

Thank you for the opportunity to provide our comments on this important rulemaking. If you have any questions, please do not hesitate to contact me.

Sincerely,

Will Hupman

c: Mr. Brian Nelson, Office of Transportation and Air Quality, Assessment and Standards Division

Detailed Comments of API on "Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3" (Docket ID No. EPA-HQ-OAR-2022-0985)

a. API supports decarbonization of the transportation sector.

API appreciates EPA's efforts to address transportation sector greenhouse gas (GHG) emissions. As detailed in the API Climate Action Framework, we support technology-neutral federal policies that drive GHG emissions reductions in the transportation sector and our members have committed to delivering solutions that reduce the risks of climate change while meeting society's growing energy needs. API members work to advance the development, transmission, and use of cleaner fuels and technologies to provide lower-carbon choices for consumers. Specifically, API members have made, and continue to make, significant investments in new technologies that reduce carbon emissions in transportation, including:

- Stand-alone production and coprocessing of bio-feedstocks to make renewable fuels.
- Manufacturing of low-carbon ethanol.
- Manufacturing of renewable natural gas from wastewater, landfill gas, and biodigesters at farms as fuel for compressed natural gas (CNG) vehicles.
- Production of blue and green hydrogen for transportation and stationary applications including building infrastructure.
- Direct air carbon capture.
- Carbon capture and sequestration of CO_2.
- Development of advanced plastics to meet auto industry standards and consumer expectations while mitigating environmental impact through emissions reduction and improved vehicle efficiency by light-weighting.
- Installation of electric vehicle charging stations.
- Installation of hydrogen fueling stations.

API shares the goal of reduced emissions across the broader economy and, specifically, those from energy production, transportation and use by society. To achieve meaningful emissions reductions that meet the climate challenge, it will take a combination of policies, innovation, industry initiatives and a partnership of government and economic sectors. The objective is large enough that no single approach can achieve it.

b. API supports the concepts of a lifecycle approach to GHG emissions reductions.

i. EPA should use a lifecycle assessment (LCA) approach vs. tailpipe only

To effectively achieve emissions reductions in the transportation sector, we believe that technology-neutral solutions are needed, utilizing an approach that addresses fuels, vehicles, and infrastructure systems. This is best accomplished through holistic policies that encompass the lifecycle emissions of both the fuel and the vehicle. This combination makes for the most effective reduction of transportation GHG emissions, as emissions occur at multiple stages of the lifecycle of internal combustion engine vehicles (ICEVs) and battery electric vehicles (BEVs) and the fuels used in them. Further, utilizing a lifecycle approach would enable quantification of the emissions associated with heavy-duty (HD) vehicles, and allow technologies to be identified that provide more expeditious and robust GHG emissions reductions.

Use of a lifecycle approach would better achieve the goals of the proposed rule, as it would allow the agency and stakeholders alike to fully identify and reduce transportation sector carbon emissions and to identify and develop meaningful solutions. The reductions achieved by EPA's existing programs – including the Phase 1 and Phase 2 HD GHG rules, and criteria pollutant programs – are due in large part to addressing emissions holistically, and utilizing all available and emerging technology to do so.[1] The myopic focus on tailpipe emissions in the proposed rule essentially means that the rule would only address certain transportation carbon emissions, while ignoring other sources of emissions and potential emissions reduction solutions. A lifecycle approach would allow EPA to quantify all of the emissions associated with HD vehicles, and to mitigate those emissions more effectively.

ii. Zero emission vehicles also have emissions impacts

As with ICEVs, ZEVs have carbon emissions impact associated both with their production and throughout their lifetime which EPA should incorporate in its analysis. While ZEVs can be an important part of a diverse transportation future to reduce GHG emissions, they do produce GHG emissions. Battery electric vehicle (BEV) and fuel cell electric vehicle (FCEV) production, use, and the disposal of BEV batteries, are not zero-emission activities. Further, all fuels – whether conventional fuels or electricity – have associated carbon emissions regardless of their source. As noted in the results of a report by the American Transportation Research Institute (ATRI), BEVs and FCEVs generate significant CO_2 emissions and will continue to have CO_2 emissions impacts in the future. Further, for certain HD truck classes, especially in the near term, BEVs may be more CO_2 emissions-intensive relative to comparable ICEVs in performing the same work (*see Table 17, Figure 11*).[2] While meaningful reductions have historically been accomplished by focusing on tailpipe emissions from the vehicle, the growing market share of different technologies that include significant upstream emissions warrant inclusion of those emissions in the standard.

The HD ZEV market is nascent, which has resulted in limited data on their emissions impacts and the proposal does not present or consider the actual GHG emissions associated with their production and use. We encourage the agency to not only acknowledge and address the CO_2 emissions of HD ZEVs, but to also continue to study the impacts. (As noted below in

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[1] By EPA's own account, transportation pollution has been reduced significantly since the passage of the Clean Air Act – fuel sulfur levels are 90 percent lower and new heavy-duty vehicles are nearly 99 percent cleaner than 1970 models (https://www.epa.gov/transportation-air-pollution-and-climate-change/history-reducing-air-pollution-transportation), and new heavy-duty diesel engines being manufactured today achieve near-zero criteria pollutant emissions with increasing fuel efficiency and lower CO_2 emissions.
[2] "Understanding the CO_2 Impacts of Zero-Emission Trucks", American Transportation Research Institute, May 2022.

these comments, we strongly recommend that EPA include both a readiness assessment prior to program implementation as well as a program review once implementation begins.) The nascent HD ZEV market makes it hard to adequately assess the emissions impact due to the lack of available technology to actually evaluate. Yet, there will be CO_2 emissions associated with the production and use of ZEVs, and it is important to address these emissions to provide a full picture of the emissions impacts and mitigation needs.

c. Both this proposal and the light- and medium-duty proposal miss the mark.

i. EPA is missing millions of vehicles that will contribute to emissions

API is concerned that this proposal, as well as EPA's light- and medium-duty proposed GHG rule, seriously misses the mark with respect to reducing carbon emissions from the transportation sector. The proposals focus heavily on ZEV technologies, and specifically BEVs, for reductions in the 2027 to 2032 timeframe. Yet, EPA is leaving emissions reductions on the table for existing HD vehicles, given HD vehicles' lifespan, as well as new ICEVs that will be sold between now and 2032. EPA's overly limited focus on ZEV solutions, and specifically BEVs, ignores options that could better accomplish the agency's objectives to achieve greater transportation sector-related emission reductions at lower cost to society.

According to data from the American Trucking Associations (ATA), over 38 million trucks were registered and used for business purposes (excluding government and farm) in 2020[3], with an additional 400,000-500,000 HD trucks expected to be sold annually, based on data over the past decade[4]. The proposed rule's focus on new zero-emission vehicles ignores the secondary benefit that a technology-neutral approach could accomplish through reductions from millions of in-fleet vehicles that will contribute to carbon emissions over the life of the program.

ii. EPA failed to address carbon reductions in the existing HDV fleet to help achieve near-term emission reductions

Fuel- and vehicle-based carbon reduction solutions are currently available in the marketplace, and could achieve nearer-term emission reductions from the existing HD fleet. A singular focus on future ZEV technologies (some of which may not come to fruition as anticipated) does not seem to meet the stated goals of the proposed program. The proposal would require the use of potential technologies that are unproven at the scale of the current market, would depend on infrastructure that is not yet available, and would be on an extremely challenging (at best) timeline. Meaningful carbon emission reductions are achievable sooner, and potentially at lower cost, via the use of proven and available technology. For example, the U.S. Department of Energy (DOE) Co-Optimization of Fuels & Engines (Co-Optima) initiative

[3] American Trucking Associations "Economics and Industry Data": https://www.trucking.org/economics-and-industry-data.

[4] "ATD Data 2022", North American Dealers Association – American Truck Dealers division (https://www.nada.org/media/5008/download?inline).

examined fuels and engine/vehicle technologies simultaneously.[5] The combination of sustainable fuels uncovered by Co-Optima research can reduce the emissions of vehicles now, while enabling a faster transition to net-zero-carbon emissions for on-road transportation in the future. Such an approach could be utilized by EPA to better achieve the stated goals of the proposed Phase 3 program.

iii. Non-electrification decarbonization solutions

1. Technology neutrality – all solutions should be allowed to compete

In the preamble to the proposed rule, EPA states that "[t]he proposed standards do not mandate the use of a specific technology, and EPA anticipates that a compliant fleet under the proposed standards would include a diverse range of technologies, including ZEV and ICE vehicle technologies." (*81 FR 25952*) EPA further notes that the proposal does not *mandate* ZEV sales like California's programs. However, we disagree, as the stringency of the proposed standards – and even the technology mixes suggested by EPA in the proposal – essentially forces manufacturers to solely focus development efforts on BEVs. API strongly believes in an all-of-the-above strategy to reducing carbon emissions, and we recommend that EPA adjust the standards to allow all solutions the ability to compete. Further, doing so would provide more time for nascent technologies to be proven with less risk to vehicle original equipment manufacturers (OEMs) and the public if these technologies do not pan out in the proposal's implementation timeframe.

To that end, various studies have highlighted the importance of allowing all technologies to be utilized to reduce emissions faster, more effectively, and at a lower cost.[6] [7] By limiting the scope to tailpipe emissions, the proposal is inherently not technology neutral. Setting strict tailpipe-only standards results in a limited, prescribed solution set.

2. Current and future solutions – lower carbon fuels, hydrogen, ICE-based solutions

As previously noted in our comments, lower carbon options currently exist and could be used for near-term reductions as well as the early years of the HD GHG Phase 3 program. Lower carbon fuels are available in the market now, and research and development to bring costs down and improve operability is ongoing. Vehicle-based solutions also currently exist and

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[5] U.S. Department of Energy Office of Energy Efficiency & Renewable Energy, "The Road Ahead Toward a Net-Zero-Carbon Transportation Future Findings and Impact, FY15–FY21" (https://www.energy.gov/sites/default/files/2022-06/beto-co-optima-fy15-fy21-impact.pdf).

[6] "Environmental Benefits of Medium- and Heavy-Duty Zero Emission Vehicles Compared with Clean Bio- & Renewable-Fueled Vehicles 2022-2032," prepared for Diesel Technology Forum by Stillwater Associates LLC, July 19, 2022.

[7] "Multi-Technology Pathways to Achieve California's Air Quality and Greenhouse Gas Goals: Heavy-Heavy-Duty Truck Case Study," prepared for Western States Petroleum Association by Ramboll US Consulting, Inc., February 1, 2021.

are being developed, including the development of engines and vehicles to meet EPA's recently finalized HD Low NOx program.

While still in the early stages of development and prove out, hydrogen-based vehicles (FCEVs and H2-ICE) are a promising technology that many stakeholders are considering. API members are engaged in hydrogen projects to support development of hydrogen focused technology. Companies are partnering with HD OEMs to explore commercial business opportunities to build demand for commercial vehicles and industrial applications powered by hydrogen. Demonstration projects target hard-to-abate applications like rail and marine, with a goal to develop viable large-scale businesses and advance a thriving hydrogen economy.

As noted by the American Trucking Associations (ATA), in testimony before the U.S. Senate Committee on Environment and Public Works[8]:

> When battery electric vehicles are not the answer, federal support should refrain from playing favorites, and instead assist in the buildout of alternative fuel facilities. Proposals for hydrogen infrastructure for trucks need to ensure that the infrastructure is in place where that technology best fits in supply chains. Where lifecycle emissions can be reduced by deploying renewable diesel and renewable natural gas, those fuel stocks need to be available for trucking.

Bio and renewable fuels, such as renewable diesel, renewable natural gas, and biodiesel can and should be considered as part of an "all-of-the-above" approach to decarbonization of the transportation sector, including biocircularity. Especially for HD vehicles (and other hard-to-abate sectors) which may not be EV-ready or have infrastructure available, renewable fuels can serve as a lower emission and cost option that is readily available. As previously noted, API members are currently investing heavily in renewable fuel production – continued investment and development will increase the available volumes of such fuels in the marketplace and allow them to serve both as a viable lower carbon solutions leading up to the start of the Phase 3 program, throughout implementation, and beyond. Further, key findings of a study prepared for the Diesel Technology Forum showed results (for the scenarios considered in the study) of cumulative GHG reductions that were up to three times greater than BEVs for ICEVs fueled with 100 percent renewable diesel, and reductions from vehicles fueled with biodiesel blends were on par with BEV reductions.[9]

Further, EPA's LCA modeling for the proposal is based on biocircularity with atmospheric CO_2 consumed by biomass, resulting in zero tailpipe carbon emissions if the combusted biofuels

[8] U.S. Senate Committee on Environment and Public Works, hearing on "The Future of Low Carbon Transportation Fuels and Considerations for a National Clean Fuels Program", February 15, 2023 (https://www.epw.senate.gov/public/index.cfm/2023/2/the-future-of-low-carbon-transportation-fuels-and-considerations-for-a-national-clean-fuels-program).

[9] "Environmental Benefits of Medium- and Heavy-Duty Zero Emission Vehicles Compared with Clean Bio- & Renewable-Fueled Vehicles 2022-2032," prepared for Diesel Technology Forum by Stillwater Associates LLC, July 19, 2022.

were made from renewable biomass. The agency is thus not taking the source of carbon into account, and is classifying all carbon tailpipe emissions as the same related to their atmospheric GHG impact. For example, the agency should have considered in its analysis that a Class 7/8 ICEV run on 100% Renewable Diesel made from used cooking oil would have a greater than 70 percent tailpipe carbon reduction. EPA's approach is not consistent with other existing EPA policies (e.g., the Renewable Fuel Standard).

iv. Stakeholders missing from the discussion – utilities

EPA requested comment on stakeholders that may be missing from the discussion. As noted during the public hearing testimony, of the various stakeholders who testified, representation from the utilities was lacking. We implore the agency to fully engage the utilities in discussion prior to finalizing the Phase 3 rule. Because infrastructure is such an important piece of the program, the main stakeholder group needs to be included in the design of the program to provide EPA guidance. For example, a set of truck chargers of sufficient size to charge a fleet of fully electric trucks requires power enough for a small town.[10] If there are National Electric Vehicle Infrastructure (NEVI) charging facilities (i.e., four direct current fast chargers (DCFCs) with the capability to deliver 150 kW simultaneously) located on the same grid, there could be significant challenges to delivering the power without impacting other residential, commercial, and industrial customers. Further, a guidance report by the North American Council for Freight Efficiency (NACFE) and RMI highlights that "[c]harging infrastructure includes not only the chargers themselves, but the interrelated system of vehicles, duty cycles, chargers, and electric utilities."[11]

v. EPA's limits are not set on a realistic scientific based approach

EPA's proposed standards are based on projected ZEV penetration rates based on OEM stated ambitions and on California ZEV targets such as the Advanced Clean Trucks rule. These ambitions are stretch goals that OEMs likely will not be able to comply with. For instance, one study found that multi-year queues for service, uncertainty, and growing costs are delaying grid upgrade and increasing power production costs, which will translate into inability to meet the targets set by the California rules.[12] EPA's targets are also based on using the 2027 model year as a baseline, which has not materialized yet. This approach misses the mark as it is not grounded on application fit, total cost of ownership (TCO), or necessary infrastructure considerations. EPA should revisit its methodology for setting the standards by holistically evaluating technology adoption rates based on feasibility of all technologies per specific application requirements, and consider a more realistic baseline. Further, EPA should consider

[10] "Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet," American Trucking Research Institute, December 2022.

[11] "Charging Forward with Electric Trucks," North American Council for Freight Efficiency (NACFE) and RMI, June 2023.

[12] Gladstein, Neandross & Associates (GNA), "State of Sustainable Fleets 2023 Market Brief", May 2023, Santa Monica, CA. Available at: https://www.stateofsustainablefleets.com/.

a lifecycle approach that would accurately capture all the emissions associated with the life of a vehicle and capture the efficiency differences of different technologies in different applications.

d. Technical Feasibility

i. Vehicle readiness

1. Technology readiness

The proposed rule identified various HD ZEVs available in the marketplace or in production, as well as select manufacturer goals and commitments to producing HD ZEVs by a certain timeframe. However, given the nascent technology, there is significant uncertainty regarding EPA's expectation for rapid availability of ZEV powertrains. Further, it should be noted that these vehicles are small in number, some are not able to perform the work that a comparable ICEV would perform (due to charging, range, and duty-cycle constraints), and all are for localized operations; long-haul ZEVs are in the pilot stage and have significant challenges. OEM goals and commitments, coupled with IRA/BIL funding may help to increase the availability of HD ZEVs; however, it will be extremely challenging to meet the proposal's implementation schedule. We have concerns that vehicles may not be available at the rates that EPA is projecting for the 2027-2032 timeframe.

Even with a fully stocked HD ZEV market, key barriers to entry include customer uptake, capital costs to purchase vehicles, and infrastructure readiness.

2. ZEV penetration/customer uptake and adoption rates

HD ZEVs are currently not available in sufficient quantities or at affordable levels to significantly displace ICEVs. Further, the cost to purchase a ZEV is currently prohibitive – not only is the purchase price currently higher than that of an ICEV, some fleet owners and operators are finding that HD ZEVs result in more work or trips needed to accomplish the same task as with an ICEV. This is largely due to battery range and charging, but can also be affected by temperature, road grade, and other factors. A study by ATA noted vehicle and fleet owner concerns with regard to total cost of ownership, despite IRA and BIL funding.[13] [14]

Owners may choose to continue to use and extend the life of ICEVs, along with lower carbon fuels and/or other low carbon technologies, to avoid these issues. And at lower costs than those of ZEVs.

3. Capital cost to purchase vehicles

The average cost of a HD tractor is about $180,000, while the electric version of the same vehicle can be nearly $400,000. Expending this additional capital for a vehicle that may

[13] Advanced Clean Transportation (ACT) Expo 2023 Mainstage - Monday - 2023 State of Sustainable Fleets: https://vimeo.com/824774094.
[14] Advanced Clean Transportation (ACT) Expo 2023 Keynote Address: https://vimeo.com/824772504.

not meet the duty-cycle, is significantly heavier (and thus reduces the payload of the vehicle), and may require additional vehicles to achieve the same job, creates massive challenges that may not be able to be overcome.

4. Compounding concern – resource focus will be on LD, on the same timeframe

EPA released the proposals for HD and for LD/MD simultaneously – and the programs will be implemented on the same 2027-2032 timeframe as well. API has serious concerns about the implications of this timing. Both proposed programs are significantly flawed in that they rely on resources and infrastructure that are not yet ready. However, this would provide even greater difficulty for the HD program, as HD ZEVs are not at the same level of readiness as LD vehicles and the deployment of charging infrastructure is at an even greater disadvantage. Even with EPA's projections regarding the use of BIL and IRA funding, the transportation industry will be competing for the same resources to successfully stand up both programs. Furthermore, the availability of and process for obtaining such funding is not certain.

ii. Infrastructure

1. Leadtime and deployment

API, and many other stakeholders, are concerned about the lack of infrastructure for the HD ZEV market. Even coupled with significant tax credits and incentives, fleet operators and vehicle owners will not purchase new HD ZEVs without a reliable charging infrastructure. For the small number of HD ZEVs that are currently available[15], it appears most are utilizing depot charging and the vehicles are largely being used for shorter trips.

EPA notes in the proposal various partnerships and plans to build battery manufacturing plants in the U.S., taking advantage of incentives such as the IRA, one must view these as highly complex projects – in addition to siting and construction, it will take time for these new battery manufacturing facilities to ramp up to full production. Further, there is the probability that not all announced projects will materialize.

2. Grid and charging

A robust analysis of the potential for the development and application of ZEV technologies in the HD sector must be conducted by EPA. We have concerns that EPA is overly optimistic about the technology readiness of ZEVs across the HD vehicle classes. Even with the low numbers of vehicles available on which to provide data, numerous studies and reports have been issued noting important concerns regarding ZEV readiness of the HD fleet. For example, a 2022 report by ATRI identified three overarching challenges in the deployment of HD ZEVs: electricity needs, battery materials and technology sourcing, and truck charging and parking

[15] https://ww2.arb.ca.gov/news/california-approves-groundbreaking-regulation-accelerates-deployment-heavy-duty-zevs-protect#:~:text=There%20are%20already%20about%20150%20existing%20medium-%20and,that%20are%20commercially%20available%20in%20the%20U.S.%20today

infrastructure.[16] The report cites the need for up to a 40 percent increase (based on HD vehicle class) in the nation's present electricity generation to fully electrify the U.S. vehicle fleet, and individual states would need 28 to 63 percent to meet vehicle travel needs. ATRI quantified that the truck charging needs at a single rural rest area would be equal to the amount of daily electricity required to power more than 5,000 U.S. households.

EPA requested comment on whether certain HD sectors may need alternate standards or timing due to the energy content required for charging. The ATRI study, as well as a study prepared for the Diesel Technology Forum, indicate significant electricity demand and costs associated with HD ZEV charging for larger vehicles as well as for fleets with multiple vehicles. HD vehicle charging may require megawatt-levels of charging, which will require significant buildout of electricity distribution that does not exist today.[17]

iii. Critical minerals

Reliance on a limited number of technologies (e.g., ZEVs) on the timeline required by the proposed rule will likely result in a non-resilient transport sector that is vulnerable to unexpected disruptions. Both the federal government and the private sector have recognized that critical minerals are essential to the future of ZEV technology, and likewise, that unstable critical mineral supply chains could disrupt this future.

BEV battery supply chains, including critical minerals and precursors are controlled by a small number of countries, some with unsustainable environmental and human rights practices, and geopolitical concerns. The mining sector will need to grow exponentially to meet demand, and mining is an energy- and environmental-intensive activity. The accelerated ZEV technology penetration rate required under EPA's proposal poses significant challenges for best practices to be widely and fully deployed in the timeframe anticipated by the proposed rule.

Regarding the availability of critical minerals, especially those essential to the manufacturing of a Li-ion battery, the supply is dominated by three lithium producing countries — Australia, Chile and China, which account for nearly 90 percent of the global market. While 70% of global cobalt production comes from the Democratic Republic of Congo[18], most of the mines are owned/operated by China and more than 60 percent of cobalt processing is located in China. China produces 67 percent of the world's graphite.[19] The U.S. imports most of its

[16] "Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet", American Transportation Research Institute, December 2022.

[17] "Environmental Benefits of Medium- and Heavy-Duty Zero Emission Vehicles Compared with Clean Bio- & Renewable-Fueled Vehicles 2022-2032," prepared for Diesel Technology Forum by Stillwater Associates LLC, July 19, 2022.

[18] "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report: https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

[19] "Graphite," Professional Paper 1802-J, US Geological Survey: https://pubs.er.usgs.gov/publication/pp1802J#:~:text=China%20provides%20approximately%2067%20percent%20of%20worldwide%20output,costs%20and%20some%20mine%20production%20problems%20are%20developing.

manganese from Gabon, a less geopolitically stable country, providing 65 percent of the United States' supply.[20] Electricity networks need a large amount of copper and aluminum. The need for grid expansion that would result from this rapid increase in electricity demand underpins a doubling of annual demand for copper and aluminum.[21] China possesses over half of the entire world's aluminum smelting capacity.

There are sources that indicate a shortage of critical minerals as well as volatility in critical mineral prices. U.S. energy security would also undergo a dramatic paradigm shift if vehicle technologies were shifted from ICEVs to ZEVs in the exponential rate that the proposal contemplates. Domestic production of critical minerals required for battery production is insufficient to meet the projected demands. Although Congress and the Administration have taken significant steps to accelerate this activity by funding, facilitating, and promoting the rapid growth of U.S. supply chains for these products through the IRA, BIL, and numerous Executive Branch initiatives, more will still be needed given the proposed increase in demand. Further, EPA failed to consider all the complexities, such as federal permitting, National Environmental Protection Act reviews, and the supply chains for these critical materials in their technology feasibility assessment. API requests that EPA include a thorough evaluation of the full supply chains for each critical mineral/material in their final proposal and their implications on energy security, factoring in sensitivity cases and acknowledging potential disruptions in the supply chain. Please see Appendix A for more discussion regarding our concerns on critical minerals.

e. Energy Security

i. Support energy security through production of U.S. energy

U.S. energy security would also undergo a dramatic paradigm shift if vehicle technologies were shifted from ICEVs to ZEVs in the exponential rate that the proposal would likely entail. The U.S. would move from being energy secure to being dependent largely upon foreign sources for the minerals needed to make ZEV technologies such as batteries.

ii. Address EPA's projections—

1. Decrease in non-GHG refinery emissions

We question the agency's projections of refinery emissions decreases due to reduced fuel demand (Draft RIA, Table 4/18). The analysis assumes that there will be less domestic fuel demand due to a marked uptick in the use of HD ZEVs. However, as we have noted throughout these comments, there is significant concern that the market may not reach the levels of HD ZEV penetration suggested by the proposal. If fleets continue to use ICEVs in significant numbers, which could reasonably be expected based on various factors (e.g., the life of HD

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[20] https://oec.world/en/profile/bilateral-product/manganese-ore/reporter/usa

[21] "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report: https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

vehicles, costs of purchasing new vehicles, etc.), even with an increased use in biofuels, there will continue to be a demand for conventional fuels. There could also be increased demand for refined products in other countries that the U.S. could supply.

Furthermore, EPA's analysis assumes that lower domestic fuel demand, due to increased usage of HD ZEVs, will result in reduced refinery throughput. However, this assumption may not hold true as the U.S. has emerged as a major player in the global market for refined products, actively exporting significant quantities. While the EPA assumes that a gallon of reduced domestic demand would reduce net crude and product imports by 0.864 (Draft RIA Section 6.5), their assumption fails to consider the possibility that refinery throughput could remain steady while the U.S. simultaneously increases its exportation of refined products.

EPA justifies its assumption that imports will fall 86.4 percent by comparing the AEO 2022 Reference case with the AEO 2022 Low Economic Growth case. This comparison is not suitable for drawing these conclusions because in the Low Economic Growth case, U.S. refined product exports are lower compared to the Reference Case, suggesting a decline in global demand for refined products. Regardless of the assumption's merits, the EPA doesn't explicitly state, in its regulatory impact analysis, that the reduced global demand for refined products is, in part, an assumption based on the forecasts EPA uses for its analysis and not attributable to its regulation.

2. Cost benefits due to "reductions in energy security externalities caused by U.S. petroleum consumption and imports"

Similarly, we have concerns with EPA's projections that the Phase 3 rule would increase U.S. energy security because "[a] reduction of U.S. petroleum imports reduces both financial and strategic risks caused by potential sudden disruptions in the supply of imported petroleum to the U.S." EPA's treatment of "energy security" is overly focused on oil imports, petroleum markets and consumption of refined products. Especially in the context of EPA's proposed rule, which will require a significant increase in production of batteries, the agency should focus on the energy security implications beyond liquid fuels.

Mineral security and energy security, defined as "the uninterrupted availability of energy sources at affordable prices"[22] are essentially interchangeable concepts because EPA's proposed rule will require affordable supplies of critical minerals, that while available within the U.S., are largely inaccessible due to permitting challenges.[23]

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[22] 88 Fed. Reg. 25,929 (April 27, 2023).

[23] The Martec Group, "Electric vehicle growth in the U.S.: A look Into the EV Battery Supply Chain", March 2022, https://martecgroup.com/electric-vehicle-battery-supply-chain/.

According to the Congressional Research Service[24], the U.S. has a heavy dependence on imported critical minerals and for the five critical minerals used in battery production there is a "higher potential" for disruptions to the supply chain. In addition to domestic reserves of critical minerals where it may not even be economical to produce[25], there is a lack of liquidity[26] in global markets that are highly concentrated. Markets for critical minerals are "small, thin, and opaque,"[27] as well as inefficient, which can be crippling to development of critical minerals.

Given the market and domestic resource challenges identified above, the EPA has failed to properly address effects on energy security of the U.S. The proposed rule would make the U.S. more reliant on imported critical minerals that are subject to supply disruptions and market concentrations. As EPA mentions, disruptions in petroleum supply chains and critical mineral supply chains are not perfectly comparable; however, similarities should not be ignored.

We also have concerns with the methodology EPA uses to estimate energy security benefits which were originally developed by Oak Ridge National Laboratory's (ORNL) 2008 study entitled, "The Energy Security Benefits of Reduced Oil Use, 2006-2015"(Draft RIA Section 7.3.5). We believe that portions of this methodology are outdated and are no longer applicable given the current structure of global oil markets.

In ORNL's study, a significant portion of the estimated security premium is the potential reduction of "the transfer of U.S. wealth to foreign producers" which "can lead to macroeconomic contraction, dislocation, and GDP losses" during an oil supply disruption. In 2008, when ORNL calculated energy security premiums, net U.S. crude and product imports were over 50 percent of U.S. liquid petroleum consumption. However, since ONRL's calculations the U.S. has become, and is projected to be, a net oil and product exporter, thus an increase in global oil prices would likely lead to a net transfer of wealth to the U.S. not away from it. Without modifications that account for the transfer of wealth to the U.S. during a supply disruption, EPA's calculated energy security premium estimates are likely overstated and not meaningful.

f. Program Review

i. Assessment of both vehicle and infrastructure development/deployment progress

The design of a program with such significant unknowns and heavy reliance on technology and infrastructure that will "hopefully" or is "anticipated/expected to" be available is optimistic at best. The proposal appears premature on the stated timeline, and essentially in conjunction with the LD/MD program, which would be competing for the same resources. If

[24] Tracy, B. S. (222). *Critical Minerals in Electric Vehicle Batteries* (CRS Report No. R47227). Retrieved from Congressional Research Service website: https://crsreports.congress.gov/product/pdf/R/R47227.
[25] Ibid.
[26] https://www.barrons.com/articles/markets-critical-minerals-lithium-cobalt-copper-51671227168
[27] https://www.barrons.com/articles/markets-critical-minerals-lithium-cobalt-copper-51671227168

EPA is not willing to adjust the timeline and/or standards of the Phase 3 program, API requests that the agency consider incorporating a pre-program assessment as well as a program progress assessment. It is imperative that EPA provide a real-world evaluation, with an honest assessment provided to the public, regarding progress on infrastructure readiness and ZEV technology deployment. The opportunity for stranded investments by all stakeholders impacted by this program is just too great not to incorporate pre- and mid-program reviews.

For a mid-program assessment, EPA could consider something akin to the Midterm Evaluation that was finalized in its 2012 rulemaking establishing the MY 2017-2025 LD GHG standards.[28] Further, we recommend that EPA engage a broad stakeholder community to identify necessary elements to incorporate into such an assessment.

ii. Future program incentives and program adjustment of standards

In the development of the Phase 3 program, EPA needs to consider future program incentives such as adoption of a lifecycle approach, combined with fuel carbon intensity reductions. Such an approach would provide a broad spectrum of industries that power the transportation system (e.g., OEMs, petroleum refiners, power generators, and renewable fuel manufacturers) with incentives to reduce GHGs.

In addition, we also request that the agency report out on the findings following review with enough time to adjust the standards if needed. Adequate leadtime must be provided to the regulated community to allow for necessary adjustments to regulatory compliance strategies, and to avoid stranded investments as much as possible. A proposal based on stretch goals must incorporate an “offramp” or some opportunity to pivot if the essential elements of the program, such as charging/fueling infrastructure, do not materialize.

g. **Legal Concerns.**

The Phase 3 proposal is fundamentally different than the Phase 1 and Phase 2 HD GHG rules that preceded it. Rather than continuing to rely exclusively on improved technology for gasoline- and diesel-powered vehicles, the rule instead would establish standards that require a significant portion of new vehicle production and sales to consist of ZEVs (again, most of which EPA projects would be BEVs). While we believe that ZEVs can and should be a choice available to manufacturers and vehicle purchasers, we disagree that EPA should impose a binding mandate for the production of ZEVs and believe that such a mandate exceeds EPA’s authority under the Clean Air Act (CAA).

[28] https://www.epa.gov/regulations-emissions-vehicles-and-engines/midterm-evaluation-light-duty-vehicle-greenhouse-gas

i. EPA does not have authority to impose standards that are only achievable through the use of ZEV technology because there is no clear statement in the Clean Air Act authorizing EPA to mandate a shift away from internal combustion engines.

The Proposed Rule marks a pronounced shift in EPA's approach to regulating greenhouse gas ("GHG") emissions from heavy-duty vehicles. EPA explains in the Proposed Rule, it "did not premise the HD GHG Phase 2 CO_2 tractor emission standards on application of hybrid powertrains or ZEV technologies." 88 Fed. Reg. at 25957. But in the current proposal, the Agency "developed technology packages that include both ICE vehicle and ZEV technologies." *Id*. at 25958. Moreover, the Proposed Rule would do more than just lock in the ZEV sales projected to occur in the absence of this rule. Instead, it would mandate that more ZEVs be sold than otherwise would be the case. Today, ZEVs make up just a tiny fraction of the heavy-duty vehicle fleet and current new heavy-duty vehicle sales. Under the Proposed Rule, EPA projects that, by 2032, ZEVs would comprise 50% of new vocational vehicle sales and 25-30% of new tractor sales. *Id*. at 26000.

Such a shift from internal combustion engines ("ICE") to ZEVs would be truly transformative. BEVs, which EPA predicts will be the technology that is mostly used to satisfy the proposed ZEV mandate, require fundamentally different vehicle technologies than those used on conventionally fueled vehicles – e.g., electric motors instead of internal combustion engines, batteries to store power rather than on-board fuel tanks. Moreover, BEVs rely on a wholly different infrastructure (e.g., electric power generation and distribution, charging stations, battery manufacturing) – much of which does not yet exist or exists only in limited form. Additionally, switching to BEVs will fundamentally change the manner in which vehicles are used, for example requiring careful scheduling of vehicle operations to accommodate the long periods needed to adequately charge the vehicles. Lastly, a ZEV mandate would produce widespread effects on the national economy, such as the reduced need for oil and gas production, gas processing, changes to petroleum refining, and distribution. Such changes are fundamentally different and far more expansive than those caused by EPA's heavy-duty motor vehicle emissions standards up to now, which worked by requiring changes to ICE drivetrains and vehicles and in the fuels used by these vehicles instead of (as here) forcing a shift to a wholly different powertrain technology.

EPA asserts that the ZEV mandate is authorized under Clean Air Act ("CAA") Sections 202(a)(1) and (2). 88 Fed. Reg. at 25927. EPA explains that these provisions "are technology forcing when EPA considers that to be appropriate." *Id*. at 25949. EPA further explains that "Section 202 does not specify or expect any particular type of motor vehicle propulsion system to remain prevalent." *Id*. The Agency points to legislative history to support the notion that Congress understood that powertrain technologies might evolve over time and quotes Representative Pallone as opining that the "recently enacted [Inflation Reduction Act] "reinforces the longstanding authority and responsibility of [EPA] to regulate GHGs as air pollutants under the Clean Air Act," 204 and "the IRA clearly and deliberately instructs EPA to use" this authority by "combin[ing] economic incentives to reduce climate pollution with regulatory drivers to spur greater reductions under EPA's CAA authorities."" *Id*. at 25050.

But such an expansive claim of authority cannot depend on a generally stated statute, such as CAA §§ 202(a)(1) and (2), or on the views of Members who participated in the development of the CAA or the IRA. The U.S. Supreme Court has concluded that such an "extraordinary" claim of authority exists only when there is "clear congressional authorization." *West Virginia v. EPA*, 142 S.Ct. 2587, 2609 (2022). At their core, CAA §§ 202(a)(1) and (2) authorize EPA to establish "standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [the Administrator's] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." Because this provision includes no clear statement that EPA may mandate a fundamental shift in propulsion technology, EPA lacks authority to impose emissions limitations that effectively will require the production and sale of ZEV vehicles.

The lack of a clear statement is particularly notable given that Congress's most recent efforts to address GHG emissions – the Inflation Reduction Act and the Bipartisan Infrastructure Act – almost exclusively consisted of economic incentives and pointedly gave EPA no new or expanded authority to substantively regulate GHG emissions. If Congress had intended EPA to have authority to mandate a fundamental shift in powertrain technology, surely it would have done more than spend money on the issue. Moreover, EPA's claim of authority plainly conflicts with other relevant statutes, such as the Renewable Fuel Program, under which Congress mandated that significant and increasing volumes of renewable fuels should be blended into that national motor fuel supply. In contrast, the Proposed Rule is designed to significantly reduce the amount of motor fuel consumed by the heavy-duty fleet. The Proposed Rule thus would frustrate Congressional intent by reducing rather than expanding the volume of renewable fuel consumed by motor vehicles in the U.S.

It also is telling that EPA has abandoned any pretense of "co-regulating" with NHTSA, the national regulatory authority that actually has been authorized by Congress to establish motor vehicle fuel efficiency standards. Among other things, this is a clear attempt to free EPA from unambiguous statutory obligations that otherwise would constrain a joint rulemaking, such as the requirements that NHTSA must provide a full four years of model year lead time and NHTSA may not regulate more than five years in advance. It is simply not plausible that the general standard-setting authority of CAA § 202(a) can be construed to confer omnibus authority for EPA to effectively rewrite directly relevant statutory directives.

ii. EPA's authority under CAA §§ 202(a)(1) and (2) to prescribe emissions standards for vehicles and engines does not extend to a mandatory shift in powertrain technology.

As explained above, the Proposed Rule would require that a significant proportion of new heavy-duty vehicles must be powered by ZEV drivetrains. That proportion exceeds the level of new vehicle ZEV sales that otherwise would occur. As a result, the Proposed Rule would constitute a mandate to produce ZEV vehicles.

Moreover, ZEVs are not just another form of conventional diesel or gasoline fueled ICE-driven vehicles. For example, a ZEV cannot be produced by modifying a conventional ICE drivetrain (e.g., by changing combustion conditions) or by adding pollution control technology to a conventional ICE drivetrain (e.g., catalytic converter or diesel particulate filter). Rather, ZEVs employ wholly different propulsion technology as compared with conventional ICE drivetrains. The BEVs that EPA predicts will make up the vast majority of the ZEVs that would have to be produced under the Proposed Rule use electricity and batteries rather than liquid fuels stored in fuel tanks and employ electric motors for propulsion rather than ICE engines. In short, ZEVs are a fundamentally different type of drivetrain than conventional ICE drivetrains.

EPA asserts that CAA §§ 202(a)(1) and (2) authorize the imposition of a ZEV mandate. But for the following four reasons, EPA does not have authority under CAA §§ 202(a)(1) and (2) or under any other CAA provision to impose such a fundamental and mandatory shift in powertrain technology.

First, EPA may regulate a class of motor vehicles under CAA § 202(a)(1) only if emissions from that class of vehicles "cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." EPA treats ZEVs as if they do not emit GHGs for the purposes of this proposal. As a result, under EPA's rationale, ZEVs do not emit the pollutant that is the object of the Proposed Rule and cannot cause or contribute to the endangerment that EPA asserts as the basis for its authority to regulate here under CAA § 202(a)(1). Thus, it is beyond EPA's authority to impose a ZEV mandate.

Second, CAA § 202(e) – entitled "New power sources or propulsion systems" – states that EPA may defer the certification for a new motor vehicle employing a new power source or propulsion system until after the Agency has "prescribed standards for any air pollutants emitted by such vehicle or engine which in [the Administrator's] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger the public health or welfare but for which standards have not been prescribed under [CAA § 202(a)]." Thus, EPA must take two actions when assessing a new power source or propulsion system. EPA first must determine whether emissions from the new power source or propulsion system cause or contribute to air pollution that endangers public health or welfare. If the answer is yes, EPA second must establish new emissions standards for the new power source or propulsion system or, alternatively, determine that appropriate standards have already been established.

ZEVs clearly constitute a new power source or propulsion system. As a result, before certifying any ZEVs, CAA § 202(e) requires EPA determine whether emissions from ZEVs cause or contribute to air pollution that endangers public health or welfare. But, under EPA's rationale, ZEVs do not emit GHGs, which is the pollutant that would be regulated under the Proposed Rule. Consequently, EPA cannot determine that emissions from ZEVs cause or contribute to any endangerment caused by GHG emissions and, therefore, the Agency has no need or authority to impose GHG emissions standards on ZEVs prior to certifying them.

Third, CAA § 202(a)(1) in relevant part authorizes EPA to establish "standards applicable to the emission of any air pollutant from any ***class or classes*** of new motor vehicles or new motor vehicle engines." CAA § 202(a)(1) (emphasis added). This provision requires EPA to define appropriate classes of vehicles for purposes of making the cause/contribute finding and in subsequently establishing emission standards.

From the outset of its CAA-based motor vehicle regulatory program, EPA has properly distinguished between fundamentally different powertrain technologies – e.g., regularly developing and issuing separate standards for gasoline-powered vehicles and diesel-powered vehicles. In contrast, EPA here combines all powertrain types into the same classes for purposes of imposing GHG emission standards. That is unreasonable and arbitrary because conventionally powered vehicles have fundamentally different emissions characteristics than electric powered vehicles. See also CAA § 202(e) (requiring EPA to separately evaluate emissions from "a new power source or propulsion system.")

As demonstrated by EPA's Phase 1 and Phase 2 GHG standards for heavy-duty vehicles, there is a wide variety of emissions control techniques that may be applied to conventionally powered heavy-duty vehicles to reduce GHG emissions – including such things as improved engine efficiency, better aerodynamics, and lower rolling resistance. Applying such measures to ZEVs does not affect their GHG emissions profile because, by EPA's definition, ZEVs do not emit GHGs. This shows that conventionally power vehicles and ZEVs should not occupy the same class under these rules because wholly different regulatory approaches are needed to appropriately control GHG emissions from these two fundamentally different types of vehicles. Further to our argument, the Clean Fuel Vehicles program can only be prescribed to areas that have the worst ozone nonattainment and to the pollutants that contribute to ambient ozone levels.

Fourth, EPA's regulatory approach is unlawful because it treats ZEVs as if their powertrain were an emissions control technology and then mandates the use of that purported emission control technology. EPA claims throughout the proposed rule that its proposed standards do not require manufacturers to implement any specific technology and, instead, that they retain flexibility to comply with the rule in whatever manner they deem appropriate. But the proposed rule inescapably will require a significant industry-wide shift from internal combustion to ZEVs. A particular manufacturer may avoid producing a ZEV though creative use of the ABT provisions, but the industry as a whole will have no choice but to produce increasing numbers of ZEVs over time. This is contrary to CAA § 202(a), which authorizes EPA to set emissions standards, but does not authorize EPA to mandate the use of any particular emissions control technology in meeting those standards.

iii. EPA has no authority under CAA §§ 202(a)(1) and (2) to establish emissions standards based on the average performance of two emissions control technologies.

The Proposed Rule is fundamentally different from the Phase 1 and Phase 2 GHG standards for heavy-duty vehicles in the manner in which the emission standards are established. EPA explains that the prior Phase 2 GHG standards for HD vehicles were not premised on the application of hybrid powertrains or ZEV technology. 88 Fed. Reg. at 25957. In contrast, the HD 3 proposal "include[s] both ICE vehicle and ZEV technologies." *Id.* at 25958.

In particular, averaging is incorporated into EPA's standard setting analysis in the Proposed Rule. EPA for each model year and for each vehicle type conducts an analysis of what standards could be met by traditional ICE vehicles and whether ZEVs are available for that model year for that vehicle type and, if so, at what volume. EPA then proposes an emissions standard for each model year and vehicle type that is a blended rate of the ICE value and the ZEV value (which is presumed to be zero) that is based on EPA's projection of how much of the market could be met with ZEVs. *Id.* at 25991-2.

EPA asserts that it "has long included averaging provisions for complying with emission standards in the HD program and in upholding the first HD final rule that included such a provision the D.C. Circuit rejected petitioner's challenge in the absence of any clear evidence that Congress meant to prohibit averaging." 88 Fed. Reg. at 25950. That is the only legal justification EPA asserts for using averaging in standard setting.

The use of averaging in standard setting is legally flawed for two reasons. First, EPA's asserted legal justification is inadequate. It is true that EPA has long used emissions averaging as a compliance method under its vehicle emissions standards. But here EPA is doing more – EPA uses averaging in setting the standards themselves. EPA provides no explanation of its legal authority for this novel approach.

Second, and in any event, EPA does not have legal authority to consider emissions averaging in standard setting. CAA § 202(a)(1) authorizes EPA to establish emission standards for "classes" of motor vehicles. In this case, EPA has used emissions data from two distinctly different classes of vehicles (ICE-powered vehicles and BEVs) in setting a single standard. That exceeds EPA's authority under CAA § 202(a)(1). Moreover, using averaging is unreasonable because there is no identifiable vehicle configuration that corresponds to EPA's proposed standards. That means the industry as a whole would have to certify at least two fundamentally different types of vehicles to satisfy the proposed standards. As a result, EPA is effectively setting two different standards for the same pollutant for the same class of vehicles under the guise of establishing a unitary standard for a single class of vehicles.

Furthermore, CAA § 202(a)(3)(A)(i) requires that HD standards reflect the "greatest degree of emissions reduction achievable through the application of technology which the EPA determines will be available." 42 U.S.C. § 7521(a)(3)(A)(i). Congress specifically directed EPA to set emissions for vehicles, not fleets of vehicles. Congress further required EPA to test these "motor vehicles or motor vehicle engines" to ensure they "conform to the standards." 42 U.S.C. § 7525(a)(2); see also id. § 7525(a)(1) (requiring certificates of conformity for specific vehicles). And Congress authorized EPA to grant waivers from certain nitrogen-oxide emissions standards "of no more than 5 percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater." The testing of specific vehicles or engines and the presence of the waiver provisions cannot be implemented as intended under an averaging structure in which a significant portion of the fleet can be above the emissions standard so long as other vehicles perform sufficiently well to create average compliance.

iv. The use of ZEV technology is not an emissions standard under CAA §§ 202(a)(1) and (2).

By factoring ZEVs into the proposed emission standards, EPA effectively is treating ZEVs as an emissions control technology that can form the basis of an emission standard. This exceeds EPA's authority under CAA § 202(a).

EPA is authorized under CAA § 202(a)(1) to prescribe "standards applicable to emissions." In other words, EPA is authorized to prescribe emission standards for motor vehicles. The term "emission standard" means a requirement "which limits the quantity, rate, or concentration of emissions of air pollutants." CAA § 302(k).

The problem with EPA's regulatory approach here is that a ZEV is not an emissions control technology for a conventionally powered vehicle. A ZEV does not limit the "quantity, rate, or concentration" of air pollutant emissions from a conventionally powered vehicle. Rather, a ZEV represents an entirely different type of propulsion system and powertrain. The existence of ZEVs has no bearing on the relative emissions from conventionally powered vehicles.

Consequently, a ZEV powertrain is not an emissions reduction technology applicable to conventionally powered vehicles and cannot form the basis of emission standards applicable to conventionally powered vehicles.

v. The Clean Air Act already expressly provides a regulatory scheme for Clean Fuel Vehicles in Part C of Title II. That regulatory scheme precludes the regulation of ZEVs together with internal combustion engines.

CAA § 242(a) requires EPA to "promulgate regulations under this part containing clean-fuel vehicle standards for the clean-fuel vehicles specified in this part." A clean fuel vehicle is one that is powered by a "clean alternative fuel," which is defined to include electricity. CAA § 241(2). CAA § 245 limits EPA's authority to regulate heavy-duty clean fuel vehicles – specifying that EPA may establish standards for NOx and NMHC, and further specifying that no standards may be promulgated for heavy-duty vehicles of more than 26,000 lbs. gross vehicle weight. The state implementation plan for areas designated in severe or greater nonattainment with ozone National Ambient Air Quality Standards must include a clean-fuel vehicle program. CAA § 182(c)(4). The program must apply to centrally fueled fleets. *Id*. at § 246.

EPA cites the Clean Fuel Vehicles program as an indication that Congress generally intended to "promote further progress in emissions reductions." 88 Fed. Reg. at 25950. EPA thus points to the Clean Fuel Vehicles program as supporting its proposed interpretation that CAA §§ 202(a)(1) and (2) authorize EPA to mandate the production and sale of ZEVs. But in doing so, EPA fails to address the regulatory program required under the Clean Fuel Vehicles program and fails to reconcile the particular requirements of that program with the CAA § 202(a) general rulemaking authority on which it relies as the primary authority for the Proposed Rule.

The Clean Fuel Vehicles program plainly requires EPA to establish an alternative regulatory scheme for clean fuel vehicles, including electric powered vehicles. For heavy duty vehicles, CAA § 242(b) specifies that such vehicles "shall comply with all requirements of this title which are applicable in the case of conventional gasoline-fueled or diesel-fueled vehicles of the same category and model year." This provision clearly signals that Congress intended EPA to develop emissions standards for ICE-powered vehicles and to apply those standards to clean fuel vehicles (including BEVs). In the very least, Congress's explicit inclusion of electric powered vehicles in the Clean Fuel Vehicles program and its exclusion of any mention of electric powered vehicles in Section 202 must be given meaning. *Compare* 42 U.S.C. § 7581 *with* 42 U.S.C. § 7521(a), (e); *Bittner v. United States*, 143 S. Ct. 713, 720 (2023) ("When Congress includes particular language in one section of a statute but omits it from a neighbor, we normally understand that difference in language to convey a difference in meaning (*expressio unius est exclusio alterius*).") This Clean Fuel Vehicles Program would be rendered meaningless if, as in the Proposed Rule, EPA were to consider conventionally fueled vehicles together with clean fuel vehicles (including BEVs) in developing and implementing emissions standards.

Moreover, the Clean Fuel Vehicles program is narrowly targeted to the worst ozone nonattainment areas and to the pollutants that contribute to ambient ozone levels. The program also imposes important constraints on how vehicles may be regulated (for example, as explained above, it dictates separate emissions standards for clean fuel vehicles and limits the applicability of those standards to only certain heavy-duty vehicles). These detailed and prescriptive requirements demonstrate that Congress intended EPA to regulate clean fuel vehicles only in particular ways. EPA's claim in the Proposed Rule of omnibus authority to regulate clean fuel vehicles along with conventionally fueled vehicles cannot be reconciled with the targeted and carefully crafted regulatory scheme set out in the Clean Fuel Vehicles program.

Lastly, the Proposed Rule also is flawed because EPA fails to acknowledge the regulatory requirements imposed under the Clean Fuel Vehicles program and fails to explain how it still finds authority to regulate under CAA § 202(a) in the face of the more specific obligations imposed under the Clean Fuel Vehicles program. That violates EPA's procedural obligation to set forth in the Proposed Rule "the major legal interpretations … underlying the proposed rule." CAA § 307(d)(3)(C).

In sum, the CAA clearly instructs EPA as to where and how heavy-duty clean fuel vehicles should be regulated. Those specific requirements displace any authority EPA might otherwise have had to regulate clean fuel vehicles under the general authority of CAA §§ 202(a)(1) and (2). EPA is thus mistaken in asserting that CAA §§ 202(a)(1) and (2) authorize the proposed Phase 3 emissions standards for heavy-duty vehicles. In addition, the Proposed Rule fails to provide adequate notice and opportunity to commenters on the important legal questions surrounding the scope and extent of the Clean Fuel Vehicles program and how the specific regulatory scheme established under that program can be reconciled with EPA's claim of authority under CAA §§ 202(a)(1) and (2).

Appendix A
Critical Minerals Assessment

There are hurdles to address in order to support the scale-up of HD ZEV technology adoption. These hurdles include impacts on supply chains, energy resilience and the environment. Consideration to both the hurdles and mitigation measures should be given to inform responsible and effective implementation of vehicle standards.

Reliance on a limited number of technologies (e.g., ZEVs) on the timeline required by the proposed rule will likely result in a non-resilient transport sector that is vulnerable to unexpected disruptions. Both the federal government and the private sector have recognized that critical minerals are essential to the future of BEVs, and likewise, that unstable critical mineral supply chains could disrupt this future.

I. Mineral availability and mining

BEV battery supply chains, including critical minerals and precursors are controlled by a small number of countries, some with unsustainable environmental and human rights practices, and geopolitical concerns. The mining sector would need to grow exponentially to meet the proposed rule's demands. According to a forecast by BMI, at least 384 combined new mines for graphite, lithium, nickel, and cobalt are required to meet the global demand by 2035.[29] This analysis was heavily centric on the requirements for the light-duty vehicle sector. Impacts from heavy-duty vehicle sector requirements would be additive.

Mining is an energy- and environmental-intensive activity. Critical minerals for electric batteries such as lithium and copper are particularly vulnerable to water stress given their high water requirements[30]. Over 50 percent of today's lithium and copper production is concentrated in areas with high water stress levels. Activities associated with mining produce GHG emissions, as well as particulate matter emissions, nitrogen oxide emissions, and other air pollutant emissions from mining equipment. A strong focus on environmental and ethical best practices in this sector are needed to safeguard natural lands, biodiversity, sustainable water use, indigenous peoples' rights, and labor protections.[31]

Regarding the availability of critical minerals, especially those essential to the manufacturing of a Li-ion battery, the supply is dominated by three lithium producing countries — Australia, Chile and China, which account for nearly 90 percent of the global market. While

[29] More than 300 new mines required to meet battery demand by 2035: https://source.benchmarkminerals.com/article/more-than-300-new-mines-required-to-meet-battery-demand-by-2035.
[30] "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report: https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf
[31] https://mining2030.org/

70% of global cobalt production comes from the Democratic Republic of Congo[32], most of the mines are owned/operated by China and more than 60 percent of cobalt processing is located in China. China produces 67 percent of the world's graphite.[33] The U.S. imports most of its manganese from Gabon, a less geopolitically stable country, providing 65 percent of the United States' supply.[34] Electricity networks need a large amount of copper and aluminum. The need for grid expansion that would result from this rapid increase in electricity demand underpins a doubling of annual demand for copper and aluminum.[35] China possesses over half of the entire world's aluminum smelting capacity.

II. Supply chain resilience.

In the Draft Regulatory Impact Analysis (DRIA), EPA states "according to analyses by the U.S. Department of Energy's Li-Bridge, no shortage of cathode active material or lithium chemical supply [also known as critical materials] is seen globally through 2035 under current projections of global demand." There are many sources that contradict this point. Looking forward toward 2030, based on current and anticipated global production plans, a global supply shortfall is likely to begin toward end of the decade, if planned mining projects do not deliver as expected, some critical minerals could face shortages as early as next year.[36] Globally, it takes on average over 16 years to move mining projects from first discovery to production.[37] According to a review of multiple sources, there is a six-fold demand growth expectation by 2030, and approximately 15 times by 2040, the supply-demand gap only widens. The ability to quickly scale minerals production is further affected by ore quality, which in recent years has been declining and thus requires more material to be mined, more resources such as water in stressed areas for processing, and ultimately greater environmental impacts.

The EPA acknowledges in the DRIA that "much of the supply chain supporting the manufacture of ZEVs is located outside of the U.S." However, the agency claims that "more than half of battery cells and 84 percent of assembled packs in ZEVs sold in the U.S. from 2010 to 2021 were produced in the U.S." Although this is true, it does not take into account the

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[32] "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report: https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

[33] "Graphite," Professional Paper 1802-J, US Geological Survey: https://pubs.er.usgs.gov/publication/pp1802J#:~:text=China%20provides%20approximately%2067%20percent%20of%20worldwide%20output,costs%20and%20some%20mine%20production%20problems%20are%20developing.

[34] https://oec.world/en/profile/bilateral-product/manganese-ore/reporter/usa

[35] "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report: https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

[36] L. Lee, Energy Intelligence "Mining the Gap to a Net-Zero Future," May 15, 2023: https://www.energyintel.com/00000188-1e5f-d806-ad9f-5edfeb1d0000?utm_campaign=website&utm_source=sendgrid.com&utm_medium=email.

[37] "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report: https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

value chain before the battery cells production. The domestic supply chain is in its early stages and to meet the proposed goals, automakers and battery manufacturers will still need to rely on foreign sources of critical materials and precursors. For instance, BMI foresees a 77 percent deficit in domestic available cathode active material to meet 2035 demands in North America. This estimate was done prior to the proposal. This step in the value chain will require import/export until it is further built out, which will add to cost to the battery pack.[38] Although Congress and the Administration have taken significant steps to accelerate this activity by funding, facilitating, and promoting the rapid growth of U.S. supply chains for these products through the IRA, BIL, and numerous Executive Branch initiatives, more will still be needed given the increase in demand.

For any one of these minerals, this regulation, taken to their logical end, puts the U.S into a situation resembling the oil embargoes of the 1970s, where foreign actors control majorities of the critical raw material supplies used in the manufacture of fuels, battery, and motor components designed to provide transportation mobility services for the U.S. consumer. Compared with fossil fuel supply, the supply chains for clean energy technologies can be even more complex (and in many instances, less transparent).[39] [40]

EPA failed to consider all the hurdles and complexities such as federal permitting, National Environmental Policy Act reviews, and the supply chains for these critical materials in their technology feasibility assessment. API requests EPA include a thorough evaluation of the full supply chains for each critical mineral/material in their final proposal and their implications on energy security.

III. Operational inefficiency of battery production facilities.

While many OEMs, mostly light-duty vehicle manufacturers, and battery manufacturers have announced plans to build gigafactories in North America, taking advantage of incentives such as the IRA, one must view these as highly complex projects. It should also be noted that it will take time for these new battery manufacturing facilities to ramp up to full production. Capacity gives a reflection of what a plant could potentially produce; capacity reflects ambition. EPA notes in the DRIA that "the Department of Energy estimates that recent plant announcements for North America to date could enable an estimated 838 GWh of capacity by 2025, 896 GWh by 2027, and 998 GWh by 2030, the vast majority of which is cell manufacturing capacity." This assumes battery manufacturing capacity at initial opening or at mature stage at 100% scale. This is not accurate. In their early years, battery factories will likely operate at approximately 50 percent production capacity. Mature battery factories today rarely operate

[38] Benchmark Minerals Intelligence, BMI (*see* Charts 2, 3 & 4): https://source.benchmarkminerals.com/article/ambition-versus-reality-why-battery-production-capacity-does-not-equal-supply.

[39] "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report: https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

[40] https://secureenergy.org/wp-content/uploads/2020/09/The-Commanding-Heights-of-Global-Transportation.pdf

above 80 percent utilization rates.[41] The EPA projects a ten-fold increase in North American battery manufacturing capacity in just eight years, from 90 gigawatt hours per year in 2022, to 998 GWh/year in 2030, with the great majority of that sited in the U.S. Wood Mackenzie projects U.S. capacity of less than half that level, at 422 GWh/ year in 2030.[42] Given the disparity in forecasts from different reputable sources, EPA's technology feasibility assessment should factor sensitivity cases and acknowledge potential disruptions in the supply chain.

IV. Raw materials are specialty chemicals, not commodities.

In the DRIA, EPA states "despite recent short-term fluctuations in price, the price of lithium is expected to stabilize at or near its historical levels by the mid- to late- 2020s, further suggesting that a critical long-term shortage is not expected to develop." This analysis misses the mark. Some projects may not materialize if pricing goes too low translating into low margins, or due to high costs of supply in needed operations. To meet the ambitions that OEMs have set forth in terms of percentage of BEV entering the market, they must secure adequate amounts of raw materials. With the projected supply and demand gap that many analysts foresee, as mentioned earlier, pricing of critical minerals could remain volatile as we have seen through the early 2020s. There are varying views by different analysts on the direction of critical mineral pricing scenarios. Morgan Stanley estimates BEV manufacturers will need to increase prices by 25 percent to account for rising battery prices.[43] Battery raw materials are not commodities, they are classified as specialty chemicals, and pricing should be analyzed as such as they will not follow traditional commodity pricing structures, especially given where these supplies are geographically concentrated in areas with geopolitical instabilities.

V. Recycling of batteries and related electrical components is in its infancy.

Another critical aspect to be considered with this proposal is that recycling of the battery and related electrical components of BEVs are in a state of infancy and poses unique materials handling and safety challenges. The environmental profiles of both BEVs and ICEVs should be considered in light of the production, operation, and disposal of the vehicle (its useful life). Electric battery disposal-related issues are likely to impact the environment and need to be addressed in EPA's proposal:

- Battery packs could contribute 250,000 metric tons of waste to landfills for every 1 million retired BEVs.[44]

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[41] Xiao, Maya, "Lithium-ion battery production goes global," January 26, 2022: https://www.controleng.com/articles/lithium-ion-battery-production-goes-global/.

[42] Wood Mackenzie: https://identity.woodmac.com/sign-in?goto=https%3A%2F%2Fmy.woodmac.com%2Fdocument%2F150115630

[43] https://www.bloomberg.com/news/articles/2022-03-25/morgan-stanley-flags-ev-demand-destruction-as-lithium-soars#xj4y7vzkg, see Chart 7.

[44] Kelleher Environmental, "Research Study on Reuse and Recycling of Batteries Employed in Electric Vehicles: The Technical, Environmental, Economic, Energy and Cost Implications of Reusing and Recycling EV Batteries," September 2019 (Kelleher Environmental Study). See https://www.api.org/oil-and-natural-gas/wells-toconsumer/fuels-and-refining/fuels/vehicle-technology-studies.

- Less than five percent of lithium-ion batteries, the most common batteries used in BEVs, are currently being recycled "due in part to the complex technology of the batteries and cost of such recycling."[45]
- Economies of scale will play a major role in improving the economic viability of recycling, which currently cost is the main bottleneck. Increasing collection and sorting rates is a critical starting point.[46]
- The cathode is where the majority of the material value in a Lithium-ion battery is concentrated. Currently, there are numerous cathode chemistries being deployed. Each of these chemistries needs to be known, and then the appropriate method of recycling identified, which poses a challenge, as batteries pass through a global supply chain and all materials are not well tracked.
- Lithium can be recovered from existing Lithium-ion recycling practices, but it is not economical at current lithium prices. Cobalt, one of the highest supply risk materials for BEV in the short- and medium-term, is currently being profitably recovered.
- Benchmark forecasts near-term recyclers are likely to use scrap material from the increasing number of gigafactories coming online versus used electric vehicle batteries. Scrap material is anticipated to account for 78 percent of recyclable materials in 2025.[47]
- In 2022, Benchmark expected over 30 gigawatt hours of process scrap to be available for recycling, growing ten-fold across the next decade. Loss rates vary by region, and tend to be higher in earlier years of a gigafactory.[48]
- EV batteries are high-cycle batteries and are made to function for approximately 10 years, shorter time for a mid-duty vehicle.
- Many 'spent' EV batteries still have 70-80 percent of their capacity left, which is more than enough to be repurposed into other uses such as energy storage and other lower-cycle applications.[49] This will extend the time that batteries and raw materials remain in use.
- Repurposing used EV batteries could generate significant value and help bring down the cost of residential and utility-scale energy storage to bring forth

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[45] Harper, G., Sommerville, R., Kendrick, E. et al. Publisher Correction: "Recycling lithium-ion batteries from electric vehicles." *Nature* 578, E20 (2020). https://doi.org/10.1038/s41586-019-1862-3.

[46] "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report: https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

[47] BMI: https://source.benchmarkminerals.com/article/battery-production-scrap-to-be-main-source-of-recyclable-material-this-decade, (See Chart 8).

[48] BMI: https://source.benchmarkminerals.com/article/battery-production-scrap-to-be-main-source-of-recyclable-material-this-decade.

[49] Engel, H., Hertzke, P., & Siccardo, G. (2019, April). Second-life EV batteries: The newest value pool in Energy Storage. McKinsey Center for Future Mobility. https://www.mckinsey.com/~/media/McKinsey/Industries/Automotive%20and%20Assembly/Our%20Insights/Second%20life%20EV%20batteries%20The%20newest%20value%20pool%20in%20energy%20storage/Second-life-EV-batteries-The-newest-value-pool-in-energy-storage.pdf.

further penetration of renewable power to electricity grids. Initial trials are underway.[50]

- Clear guidance on repackaging, certification, standardization, and warranty liability of spent EV batteries would be needed to overcome safety and regulatory challenges reuse poses at scale.[51]
- Recycling BEV batteries to recover high-value metals has not been proven at commercial scale. The majority of analysts are aligned that recycling will not become an integral supplier of raw materials until the 2030s, and at that point, only will provide approximately 20 percent of demand.[52]

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[50] "The Role of Critical Minerals in Clean Energy Transitions", International Energy Agency World Energy Outlook Special Report: https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

[51] Ibid.

[52] BMI: https://source.benchmarkminerals.com/article/battery-production-scrap-to-be-main-source-of-recyclable-material-this-decade.