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Administrator Michael Regan
Environmental Protection Agency
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Attention: Docket ID No EPA-HQ-OAR-2022-0985
Submitted to the Federal eRulemaking Portal (www.regulations.gov)

Re: EPA-HQ-OAR-2022-0985, Notice of Proposed Rulemaking: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3

Dear Administrator Regan,

On April 27, 2023, the U.S. Environmental Protection Agency ("EPA" or "Agency") proposed revised greenhouse gas ("GHG") standards for model year ("MY") 2027 heavy-duty highway vehicles and new standards for MY 2028 through MY 2032 and later heavy-duty highway vehicles.[1] "Despite the significant emissions reductions achieved by previous rulemakings,"[2] EPA sees a need to revisit the existing regulatory regime to set emission standards that effectively ban internal combustion engine vehicles ("ICEVs") in favor of mandating so-called zero emission vehicles[3] ("ZEVs"). The purported authority for these revisions is lacking.

EPA contends President Biden's Executive Order 14037, "Strengthening American Leadership in Clean Cars and Trucks," necessitates the proposed changes, but an executive order cannot expand an agency's statutory authority. Likewise, EPA cannot transform the carrot from Congress to voluntarily incentivize electric and fuel cell vehicle companies in the Inflation Reduction Act and Bipartisan Infrastructure Law into a regulatory stick to require the electrification of the transportation sector. The Proposed Rule far exceeds EPA's authority under the Clean Air Act. In setting truck standards that diesel-powered trucks cannot meet, EPA is claiming authority to effectively ban ICEVs. However, Congress has never authorized and has specifically rejected legislation to phase out ICEVs. Moreover, EPA fails to account for impacts outside of the Agency's expertise and jurisdiction that would counsel *against* a ZEV mandate, such as impacts on the economy, the demand and stability of the electric grid, the U.S. refining and petrochemical industry, and national security. While the American Fuel & Petrochemical Manufacturers ("AFPM") supports cost-effective efforts to increase fuel efficiency and reduce the carbon intensity of transportation, we oppose a *de facto* mandate to a single compliance option—the production of

[1] 88 Fed. Reg. 25,926 (April 27, 2023) [hereinafter, "Proposed Rule"].

[2] *Id.* at 25,928.

[3] Note that ZEVs is a misnomer as ZEVs are not actually zero emissions when accounting for the vehicle lifecycle, including GHG and criteria pollutant emissions associated with electricity generation required for charging certain ZEVs. For ease of review, however, "ZEVs" is used throughout these comments and encompasses all ZEV technologies, including battery electric vehicles ("BEVs") and fuel cell electric vehicles ("FCEVs").

ZEVs. Instead, AFPM endorses a cost-effective, technology-neutral approach for greenhouse gas emission standards that is authorized by Congress.

AFPM represents the U.S. refining and petrochemical industries. Our members are committed to sustainably manufacturing and delivering the fuels that power our transportation needs and enable our nation to thrive. We are further committed to finding ways to improve emissions from our nation's fleet of vehicles affordably and reliably. AFPM does not oppose ZEVs, which should be part of a diverse transportation future. AFPM seeks to maintain a level playing field. When considering the available suite of emission control technologies, EPA must pursue policies built on a holistic assessment of a vehicle's cradle-to-grave lifecycle emissions – the carbon intensity of different transportation fuels is only one component of that assessment. This approach requires a complete evaluation of the GHG emissions from heavy-duty vehicles. EPA's Proposed Rule fails to establish standards that take a comprehensive view of all available technologies and their associated environmental impacts. Instead, the Proposed Rule forces heavy-duty automotive electrification in a manner that both exceeds its statutory authority and employs arbitrary and capricious decision-making.

EPA's Proposed Rule must be put in context. The Agency takes this action as part of a "whole-of-government" effort to electrify the entire transportation sector. Contemporaneously to this proposal: (1) EPA published a proposed rule to extend and substantially increase greenhouse gas ("GHG") standards for light-duty vehicles; (2) the Department of Energy ("DOE") published a proposal to revise its regulations regarding calculating a value for the petroleum-equivalent fuel economy of electric vehicles ("EVs") for use in determining compliance with the Corporate Average Fuel Economy program; [4] (3) the Internal Revenue Service proposed regulations regarding the Inflation Reduction Act's New Clean Vehicle Credit; (4) the California Air Resources Board ("CARB") submitted to EPA a preemption waiver for CARB's Advanced Clean Cars II program, which requires all light-duty vehicles be electric, plug-in hybrid, or fuel cell by 2035; and (5) EPA issued waivers for California's Advanced Clean Trucks Regulation, the Zero Emission Airport Shuttle Regulation and the Zero-Emissions Power Train Certification Regulation. These actions represent a coordinated effort to completely transform the transportation sector.

EXECUTIVE SUMMARY

EPA is circumventing the public's ability to provide adequate comments to the Proposed Rule by limiting the comment period to 50 days, denying AFPM's request to extend the comment period, and concurrently proposing light- and medium-duty standards, and other significant rulemaking proposals related to vehicle electrification, fuels, and electricity generation. Significant time is required to read and respond to the sheer volume of the material covered in each rulemaking docket, particularly given EPA's evident lack of rigor and discipline in its citation and characterization of underlying sources.

EPA's Proposal Runs Afoul of the Major Question Doctrine

This rule requires 40-percent sales of zero-emission vehicles by 2032, up from 0.1 percent globally for heavy-duty trucks, and 4 percent globally for bus fleets.[5] The Multi-Pollutant

[4] 88 Fed. Reg. 21525, 21526 (April 11, 2023).

[5] Trends in electric heavy-duty vehicles, IEA (2022).

Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles (Light-Duty Rule) would require close to 67 percent of new vehicles sold in model year 2032 to be ZEVs – a dramatic shift away from ICEVs.[6] If promulgated, these proposals will comprehensively convert vehicle and vehicle parts manufacturing, eliminate U.S. refining of liquid fuels (including renewables), overhaul the electricity sector, require construction of a coast-to-coast charging infrastructure system, and nationwide decommissioning of approximately 145,000 fueling stations across the United States.[7] The electrification required to implement the Heavy-Duty and the Light-Duty Vehicle proposals profoundly impacts national security by forcing the American truck and engine manufacturing industry to depend on critical minerals coming from foreign suppliers, most notably China - rather than utilize domestically-abundant and secure resources. The transformational shift of our nation's transportation and electricity sectors raise "major questions" of "vast economic and political significance" that must be addressed by Congress.[8] As explained in these comments, Congress clearly conveys its preference to decarbonize liquid fuels through the Clean Air Act's Renewable Fuel Standard, and to incentivize, not mandate, ZEVs through the Inflation Reduction Act and the Bipartisan Infrastructure Law.

The Proposal is Contrary to the Clean Air Act and the Energy Independence and Security Act (EISA).

EPA lacks congressional authorization under the Clean Air Act to impose a single manufacturing-shifting standard to all vehicle classes. Section 202(a) of the Clean Air Act authorizes EPA to only set "standards" for "emission[s]" from "any class or classes of new motor vehicles or new motor vehicle engines, which . . . cause, or contribute to" the emissions of pollutants.[9] EPA's emissions standards address solely tailpipe emissions for a single class of vehicles – ICEVs. EPA is authorized under the Clean Air Act to increase emissions standard stringency through lower-polluting fuels and installation or enhancement of vehicle emissions control technology.

EPA suggests a single fleet-wide emissions standard applicable to both ZEV and ICEV classes, but that cannot be met by ICEVs alone. There is nothing in the statute to support EPA's authority to allow averaging across vehicle classes. In fact, the Clean Air Act's regulatory structure contemplates EPA regulating each vehicle class separately. EPA also attempts to circumvent lead time requirements by not providing four full years that manufacturers need to meet new standards.

The Agency also violates the Clean Air Act's requirement to sufficiently evaluate ZEVs' real-world health and safety impacts. The docket is replete with documentation regarding the health effects of tailpipe emissions but is devoid of any discussion of the full lifecycle impact of

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[6] Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29,329.

[7] American Petroleum Institute, Service Stations FAQs. https://www.api.org/oil-and-natural-gas/consumer-information/consumer-resources/service-station-faqs#:~:text=How%20many%20service%20stations%20are,are%20convenience%20stores%20selling%20fuel.

[8] West Virginia v. Environmental Protection Agency, 142 S. Ct. 2587 (2022).

[9] Clean Air Act, Section 202(a).

ZEVs and the safety implications of significantly heavier ZEVs and the risks posed by their batteries.

EPA's Proposal is Infeasible within the proposed Timeline and Arbitrary and Capricious

Even if EPA had Congressional authority to promulgate the Proposed Rule, EPA's proposal is infeasible and arbitrary and capricious. The EPA is forcing a rapid transition to ZEVs when it is unclear whether (1) vehicle manufacturers could produce and sell an adequate number of ZEVs beyond the West Coast,(2) there will be adequate charging infrastructure, (3) our nation's already strained electrical generation and transmission companies will be able to acquire land, permit, construct, and connect the necessary infrastructure to deliver energy throughout the country, and (4) fails to properly evaluate the lifecycle impacts of its proposal. Discussions of these concerns are factually inadequate and lack a proper cost-benefit analysis.

First, the United States lacks the critical minerals needed for BEV production. Despite the IRA's objective of creating U.S. manufacturing capacity and granting tax credits for largely domestically produced BEV batteries, EPA's proposal would be reliant on China for more than 50 percent of imports for approximately 19 critical minerals needed for BEV production.[10] Thus, regulations making the United States less energy independent violates the EISA and IRA. Even assuming adequate battery and HD ZEV production, EPA ignores market penetration data. Cost, limited range for HD BEVs, weather, and reduced freight capacity are barriers to HD BEV deployment.

Second, EPA assumes that creating a pot of money to build the necessary charging infrastructure will translate into timely land acquisition and permitting, and adequate supplies of copper and other scarce resources needed for construction and grid connection. EPA's discussion of charging infrastructure fails to address the unique charging requirements of HD BEVs, such as significantly more expensive conduits and transformers and vastly more electricity than charging light- and medium-duty vehicles. Developing and building the necessary charging technology for heavy-duty vehicles will take many more years to develop and deploy if it is even economically feasible.

Third, EPA is mandating a transition to electric vehicles when relevant stakeholders express serious concern that our nation's electric grid cannot meet current demand, let alone the increasing electrical demand if EPA's proposal is adopted. PJM Interconnection released a report highlighting that "retirements [of older power units] are at risk of outpacing the construction of new resources."[11] The recently announced emissions standard for electric generating units exacerbates this concern. EPA's expectation of adequate electricity and transmission infrastructure is unrealistic given chronic delays and uncertainty associated with acquiring land, federal and state permitting of new electrical generation and transmission lines, and new regulatory requirements leading to retirement of baseload units.

Finally, EPA's environmental impact analysis is completely skewed by comparing HD BEV and ICEV tailpipe emissions. EPA disregards that an HD BEV's fuel source—a battery

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[10] *Combatting Child Labor in the Democratic Republic of the Congo's Cobalt Industry*, US Dept. of Labor, note 14.

[11] *See* Energy Transition in PJM: Resource Retirements, Replacements & Risks (Feb. 24, 2023).

composed of carbon intensive minerals and the electricity generated to power the battery—produces *upstream* emissions, but no tailpipe emissions. Moreover, the GHG emissions and environmental impact associated with mineral resource extraction and increased power generation have largely been ignored.

I. The Proposal Fails to Provide Meaningful Opportunity for Public Comment.

AFPM welcomes the opportunity to meaningfully engage with regulators to discuss cost-effective, efficient, and feasible measures to reduce the carbon intensity of the transportation sector. Unfortunately, the concurrent comment periods for this rule and EPA's proposed light- and medium-duty vehicle tailpipe standards are insufficient to provide a reasonable opportunity to comment meaningfully on either proposal. Although AFPM requested that the comment period for both rules be extended, EPA declined to extend the comment period for either rule, claiming that its pre-publication release of material meant that the public in fact had 66 days to comment on the heavy-duty rule and 83 days to comment on the light/medium duty rule.[12] Contemporaneously with these proposals were two related rules addressing electric vehicles: (1) the Department of Energy (DOE) published a proposal to revise its regulations regarding calculating a value for the petroleum-equivalent fuel (PEF) economy of electric vehicles (EVs) for use in determining compliance with the Corporate Average Fuel Economy (CAFE) program; [13] and (2) the Internal Revenue Service proposed regulations regarding the Inflation Reduction Act's New Clean Vehicle Credit. The table below illustrates that in the span of 88 days (April 11-July 5), interested parties were required to analyze 531 pages of proposed rules in the Federal Register and more than 30,000 pages of supporting material to understand the basis for each proposed rule. The page estimate excludes the voluminous amount of data supporting EPA's two proposed vehicle rules.

[12] June 2, 2023, letter from Joseph Goffman, EPA Principal Deputy Assistant Administrator, responding to Patrick Kelly, AFPM.

[13] 88 Fed. Reg. 21525, 21526 (April 11, 2023).

Proposed Rule	No. of Federal Register pages	Publication Date	Comments Due	Comment Period (including pre-publication days)	Estimated pages of supporting documents
Petroleum-Equivalent Fuel Economy Calculation	15	April 11, 2023	June 12, 2023	61 days	5
Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles—Phase 3	236	April 27, 2023	June 16, 2023	66	More than 20,000
Light-Duty Vehicles rule	263	May, 2023	July 5, 2023	83	More than 10,000
30D New Clean Vehicle Credit	17	April 17, 2023	June 16, 2023	60	0

EPA's refusal to grant additional time to respond to this proposal and the light-duty vehicle rule denied the public ample time to formulate meaningful comments responsive to the underlying information in support of the Agency's proposal. The Agency's action is an arbitrary departure from its typical practice of granting reasonable extensions of time—often thirty days, but frequently sixty or even ninety—in order to provide for meaningful input from the public on proposed rules.[14]

The Administrative Procedures Act requires opportunity for meaningful public input, and Executive Order 12866 states that, in most cases, agencies should provide a comment period "of not less than 60 days." Even counting the handful of additional days afforded by EPA's pre-publication release of the preambles, this period is not sufficient to adequately address the sweeping scope of EPA's proposal to force electrification of the nation's heavy-duty transportation fleet. Significant time is required simply to read and respond to the sheer volume of material covered in each rulemaking docket, particularly given EPA's evident lack of rigor and discipline in its citation and characterization of underlying sources. As illustrated in these comments, our review identified numerous instances in which examination of sources cited by EPA as support for its conclusions indicated that characterization of these sources is inaccurate, incomplete, or misleading. Thus, to meaningfully respond to EPA's proposal, the public must fact-check EPA's work. There are 1,040 footnotes in the text of the HDV rule preamble and 908 in the LD/MDV rule. Assuming it takes an average of one hour to identify, locate or acquire and read the underlying reference work cited, and draft a meaningful comment in response, that equates to

[14] Around the same time AFPM's extension request was denied, EPA saw fit to grant an extension of time to submit comments on the "Commercial Sterilization Facilities NESHAP." *See* EPA Docket EPA-HQ-OAR-2019-0178-0154.

130 eight-hour workdays that would be required just to fact-check the HD rule (65 days if one assumes this work takes only half an hour per cite on average). For the LD/MDV rule, that would equate to 113.5 eight-hour workdays (or 57 based on assuming 30 minutes per citation). This analysis does not include the time required to verify sources cited in the DRIAs, much less the 1,420 supporting and related materials posted to the HDV docket and the 429 posted to the L/MDV docket.

Further, the difficulties presented by the short and concurrent comment periods on these closely related rules are exacerbated by EPA's unduly narrow identification of industries affected by this rule. Under the heading "Does this action apply to me," EPA limits its identification of affected industries to entities with direct compliance obligations: vehicle manufacturers, engine manufacturers, automotive repair and maintenance, and state and local governments (with the qualification that "the proposed revisions do not impose any requirements that state and local governments must meet, but rather implement the Clean Air Act preemption provisions for locomotives"—suggesting that these entities are not otherwise expected to be affected).[15] Although EPA notes that "this table is not intended to be exhaustive…other types of entities could also be affected," EPA is well aware that many entities necessarily rely on regulatory screening tools based on search terms tied to their own NAICS codes to alert them to new proposed rules that may impact them.

By narrowly limiting the identification of industries affected based on this extremely short and incomplete list of NAICS codes and by its arbitrary refusal to extend the comment periods, EPA has unreasonably constrained the number and types of entities that will find out about these proposed actions in time to comment. EPA appears to count on closing the comment period before retailers, farmers, food distributors, truckers, renewable fuel producers, original equipment manufacturers (OEMs), small businesses, emergency response providers, or any of the host of other interests who will be affected by the profound changes in how commercial goods are moved even realize what is at stake. This sort of gamesmanship is at odds with EPA's responsibility under the Administrative Procedures Act and the Due Process clause of the U.S. Constitution. Based on the limited time to review, analyze, and prepare a written response to EPA's proposed rule, AFPM submits the following comments.

II. Banning the Internal Combustion Engine is a "Major Question" that Congress did not Delegate to EPA.

The Proposed Rule goes beyond setting an appropriate and feasible GHG emissions standard for all vehicle classes; rather, it establishes standards that require the OEMs to sell increasing amounts of ZEVs and ultimately phase out ICEVs. Though EPA contends the proposed standards do not mandate a specific technology (*e.g.*, battery electric vehicles ("BEVs")), it would be impossible for heavy-duty vehicle manufacturers to comply with the proposed standards unless they shift production to ZEVs. Consequently, the Proposed Rule obligates manufacturers to increase the percentage of ZEVs in their fleets at rates well in excess of market forces. EPA predicts that for MY 2032, ZEV adoption rates will be between 15–57%

[15] Proposed Rule at 25,927.

across all regulatory subcategories of vehicles covered by the Proposed Rule.[16] This is a tremendous jump from the 0.2 percent of the heavy-duty vehicles ("HDV") that were ZEV certified by EPA in MY 2021.[17] As a result, the Proposed Rule transforms the transportation system far beyond the authority delegated to the Agency by Congress.

The question of whether the U.S. government will order vehicle manufacturers to shift production to BEVs is a "major question" of economic significance that has not been delegated to any agency, let alone EPA. The "major questions doctrine" holds Congress must "speak clearly when authorizing an agency to exercise [such] powers" of "vast economic and political significance."[18] And as EPA is aware, this doctrine applies in the context of environmental regulation. In *West Virginia v. EPA*, the Supreme Court relied on the major questions doctrine in holding that the EPA exceeded its statutory authority in adopting its Clean Power Plan. That regulation sought to impose GHG caps by requiring utilities and other providers to shift electricity production from coal-fired power to natural gas and then to renewable energy in place of imposing source-specific requirements reflecting the application of state-of-the-art emission reduction technologies.[19]

As noted by the Court, EPA "announc[ed] what the market share of coal, natural gas, wind, and solar must be, and then require[d] plants to reduce operations or subsidize their competitors to get there."[20] EPA's attempt to devise GHG emissions caps based on a generation-shifting approach would have had major economic and political significance impacting vast swaths of American life and substantially restructured the American energy market; however, EPA's purported authority was only based on a "vague statutory grant" within Section 111(d) of the Clean Air Act—far from the "clear authorization required by [Supreme Court] precedents."[21]

EPA's Proposed Rule presents an analogous situation. Mandating a GHG emissions standard requiring a rapid transformation from ICEVs to ZEVs will dramatically reshape the American transportation system. While it is impossible, given the abbreviated public comment period, to quantify the full economic impact of EPA's effort to mandate the conversion of light-, medium-, and heavy-duty ICEVs to ZEVs, it is clear EPA's rulemakings directly impact the entire transportation system and will have collateral effects of "vast economic and political significance" without any congressional authorization. Indeed, as discussed below, Congress expressed its preference for incentives, rather than mandate.

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[16] U.S. Environmental Protection Agency, "Greenhouse Gas Emissions Standards for Heavy Duty Vehicles: Phase 3, Draft Regulatory Impact Analysis," pg. 245, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10178RN.pdf [hereinafter, "RIA"].

[17] Proposed Rule, 88 Fed. Reg. at 25,940.

[18] Nat'l Fed. Of Indep. Bus. v. Dep't of Labor, 595 U.S. __, slip op. at 6 (Jan 13, 2022); see also Ala. Assoc. of Realtors v. Dep't of Health & Human Servs., 141 S. Ct. 2485, 2489 (2021); Utility Air Regulatory Group v. EPA, 573 U.S. 302, 324 (2014); U.S. Telecom Assoc. v. FCC, 855 F.3d 381, 419-21 (D.C. Cir. 2017) (Kavanaugh, J., dissenting from denial of rehearing en banc) (explaining provenance of "major rules doctrine").

[19] *West Virginia v. EPA*, 597 U.S. __ (2022).

[20] *Id.*, slip op. at 33, n.4.

[21] *Id.*, slip op. at 24.

As further discussed herein, the direct compliance costs are enormous – EPA estimates that the cost of vehicle technology (not including the vehicle or battery tax credits) and electric vehicle supply equipment ("EVSE") would be approximately $9 billion and $47 billion respectively, and these figures do not include the enormous investments required by the electric power sector (i.e., upgrades to power generation, transmission, and distribution infrastructure).[22] The reach of this proposal is vast. Virtually every product delivered by a heavy-duty vehicle, and the petroleum supply industry (from upstream oil extraction to the retail sale of gasoline), the trucking industry, and agricultural interests will be impacted by EPA's proposal. The Proposed Rule could change what consumers are able to purchase by commanding a market transition to an entirely different product. The Proposed Rule undoubtedly forces manufacturers to meet production lead times that would not exist but for EPA's new ZEV mandate.

Beyond the obvious impacts to heavy-duty vehicle and utility markets, the Proposed Rule will eliminate American jobs in the refining sector. The Proposed Rule will significantly strain the electric grid, requiring utilities to rapidly increase generation, transmission, and distribution capacity to a degree not fully analyzed by EPA. EPA assumes the Inflation Reduction Act ("IRA") incentives will contribute significant quantities of electricity generated from renewable sources.[23] Yet, the U.S. may need to invest $4.5 trillion to fully transition the U.S. power grid to renewables during the next 10-20 years, annual investments exceeding the U.S. defense budget and not fully provided for by the IRA.[24] Clearly such expenditures require congressional approval.

And it will have profound impacts on national security by forcing the American truck and engine manufacturing industry to depend on critical minerals coming from foreign suppliers, with geopolitical challenges—most notably, China—rather than a domestically-abundant and secure resource. EPA should, but does not, address the market constraints for foreign sources of critical minerals needed to produce EV batteries and copper for transmission wiring.[25] These issues go well beyond EPA's expertise, and the Agency is not positioned to fully grapple with the consequences that such a rapid push for ZEV will have across the nation. EPA can only proceed with the Proposed Rule if Congress bestowed clear authorization to do so. But Congress did not.

As with the Clean Power Plan, EPA lacks Congressional authorization in the Clean Air Act to impose a manufacturing shifting standard to a preferred powertrain and effectively order regulated parties to phase out combustion engine technologies. EPA's standard-setting tools are limited to those which Congress provided in Section 202(a) of the Clean Air Act. Here, EPA is only authorized to set "standards" for "emission[s]" from "any class or classes of new motor vehicles or new motor vehicle engines, which . . . cause, or contribute to," potentially harmful air pollution. EPA has elected to focus solely on tailpipe emissions. But ZEV do not have tailpipe emissions of carbon dioxide, the pollutant of concern here, so the operation of such vehicles alone cannot "cause, or contribute to," air pollution within the scope of a tailpipe emissions regulation,

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[22] Proposed Rule at 25,935.

[23] 88 Fed. Reg. at 25,935, n.63.

[24] Dan Shreve and Wade Schauer, *Deep decarbonization requires deep pockets* (June 2019), https://www.decarbonisation.think.woodmac.com/.

[25] International Energy Agency, *The Role of Critical Minerals in Clean Energy Transitions* (March 2022), *available at* https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.; James Fernyhough, Copper Mine Flashes Warning of 'Huge Crisis' for World Supply, Bloomberg News, May 2, 2023.

especially when EPA does not require vehicle manufacturers to account for the upstream emissions from ZEVs in their compliance calculations.

Far from "clear congressional authorization," Section 202(a) provides EPA no authority to set standards that go above and beyond that which could be achieved by improvements to ICEVs alone, such that manufacturers must completely cease to produce the underlying technology governed at the time the Clean Air Act was adopted and amended. Notably, Congress instituted a clean fuel vehicles program with reference to "clean alternative fuel" vehicles, which includes BEVs, in its 1990 updates to the Clean Air Act. In doing so, Congress explicitly distinguished such vehicles from "conventional gasoline-fueled or diesel-fueled vehicles of the same category and model year," dispelling the notion that BEVs and ICEVs can be lumped together to set standards that are designed for the former to eventually displace the latter.[26] While EPA points to the clean fuel vehicles program to suggest it has the authority to set standards related to ZEVs,[27] EPA does not—and cannot—explain how such authority can be read to regulate ZEVs and ICEVs under a common standard.[28] It is no surprise then that until the current Administration, EPA has never claimed the authority to mandate even partial electrification.

Congress clarified that it, not EPA, must make the important policy decisions affecting if, when, and how the American transportation system will transition from ICEVs to ZEVs. In the 116th Congress, for example, Congress introduced 44 bills seeking to reduce petroleum-based fuel consumption and GHG emissions from the transportation sector through customer rebates, vehicle and fuel producer incentives, local funding, development of standards, and research and development. But none went so far as to propose requiring adoption, let alone mass adoption of heavy-duty ZEVs through the phase-out of ICEVs.[29] In fact, Congress *rejected* bills banning the sale of new light duty ICEVs by 2040[30] and it has consistently disapproved of EPA's efforts to hamstring the vehicle sector with more stringent air pollution standards than are feasible.[31]

More telling, in April of this year, both houses of Congress passed a Congressional Review Act resolution to rescind EPA's December 2022 heavy-duty NOx standards, sending a strong signal that Congress views EPA's efforts in this space as unnecessary, infeasible, and uninformed

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[26] 42 U.S.C. §§ 7581, 7582(b); *see also* § 7585(a) (defining NOx and non-methane hydrocarbon emission standards for heavy-duty clean-fuel vehicles as a percentage of conventional heavy-duty vehicles).

[27] 88 Fed. Reg. at 25,950.

[28] AFPM does not dispute EPA's authority to regulate ZEV emissions consistent with Title II of the CAA.

[29] "Alternative Fuel and Vehicles: Legislative Proposals," Congressional Research Service (July 28, 2021).

[30] *See* Zero-Emission Vehicles Act of 2019, H.R. 2764, 116th Cong. (2019); Zero-Emission Vehicles Act of 2018, S. 3664, 115th Cong. (2018); *see also* 116 Cong. Rec. 19238-40 (1970) (proposed amendment to Title II that would have banned ICE vehicles by 1978).

[31] *See, e.g.*, S. J. Res. 11, 118th Cong. (2023) (Although passed only by the Senate thus far, the joint resolution calls for disapproval of the rule submitted by the Administrator of the Environmental Protection Agency relating to "Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards," 88 Fed. Reg. 4296 (January 24, 2023).).

in light of economic and energy security concerns.[32] It should be no surprise then that in the wake of the Proposed Rule and EPA's parallel proceedings proposing new standards for light-duty vehicles,[33] members of Congress requested the Agency to rescind the proposals, asserting they "effectively mandate a costly transition to electric cars and trucks in the absence of congressional direction."[34] That Congress intended for it, not EPA, to direct these policy decisions is made all the more clear by the passage of the Bipartisan Infrastructure Law ("BIL")[35] and the IRA,[36] whereby Congress identified the policy levers it deemed appropriate. Congress could have, but did not, direct EPA to establish a fleet-wide credit trading regime to further drive ZEV development and rapid adoption. The Proposed Rule also stands in opposite to the Renewable Fuel Standard Program, whereby Congress mandated that "gasoline sold or introduced into commerce in the United States" must contain a year-over-year increasing share of renewable fuels[37] and, in 2022, must include tens of billions of gallons of renewable fuel.[38] There is no similar congressional instruction to EPA directing a shift in transportation technology from vehicles that can operate on increasing volumes of renewable fuel to ZEVs. In fact, such a statutory construction contradicts the Clean Air Act's Renewable Fuel Standard. Consequently, Congress, not EPA, most determine how to regulate electrification of transportation either through market forces influenced by several billion dollars earmarked in the IRA, the mandates such as those EPA proposed, or through some other mechanism. EPA does not have the proper expertise or authority to make this threshold decision.[39]

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[32] Senate Resolution S.J. Res. 11, 118th Congress (April 26, 2026); House Resolution H2523 (May 23, 2023); *see also* Congressional Record, H2523 (May 23, 2023) at 1444, Statement from Mr. Walberg (R-MI) ("From tailpipe emissions regulations that will force people to buy expensive and less practical EVs to new rules on power plants that will threaten the reliability of our electric grid. It seems like the EPA hasn't even thought about the economic and energy security of our constituents."). *See also* U.S. EPA, *Our Nation's Air: Trends Through 2021* (Since 1990, annual concentrations of nitrogen dioxide have fallen by 61%, with 85% of nitrogen dioxide concentrations below the National Ambient Air Quality Standards) in 2021.

[33] Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29,184 (May 5, 2023).

[34] Letter from Senator Shelley Capito, et al. to Administrator Michael S. Regan, EPA (May 25, 2023).

[35] Public Law 117–58, November 15, 2021.

[36] Public Law 117–169, August 16, 2022.

[37] 42 U.S.C. § 7545(o)(2)(A)(i).

[38] *Id.*, § 7545(o)(2)(B); 87 Fed. Reg. 39,600 (July 1, 2022).

[39] *See* "Grassley-Cornyn Bill Pulls Plug on Latest Biden Boon for EVs," (May 18, 2023), https://www.grassley.senate.gov/news/news-releases/grassley-cornyn-bill-pulls-plug-on-latest-biden-boon-for-evs (discussing proposed legislation entitled "No Fuel Credits for Batteries Act" introduced to "preserve the integrity of the Renewable Fuels Standard" in light of EPA's proposed E-RINS rule").

III. The Proposed Rule Contravenes the Clean Air Act and Energy Independence and Security Act.

A. EPA Lacks Statutory Lacks Statutory Authority to Set Fleetwide-Average Emission Standards, and EPA May Not Average In Vehicles that Do Not Emit the Relevant Pollutant.

As set forth in detail in the attached brief, EPA lacks statutory authority under Section 202(a) of the Clean Air Act to set fleetwide emission standards, and even if it had such authority, it could not lawfully use it to force electrification by including vehicles that have no tailpipe emissions in the fleetwide average standard for ICEVs. The Proposed Rule results in fleet-wide standards that cannot be met by ICEVs alone; however, under the Clean Air Act, EPA may only set individual vehicle-level emission standards. Such standards must be for "emission[s]" from "any class or classes of new motor vehicles or new motor vehicle engines, which . . . cause, or contribute to," potentially harmful air pollution.[40] The plain language of this provision authorizes EPA to set standards for classes of *individual* vehicles or engines that emit air pollutants.

The Clean Air Act does not authorize EPA to create an emissions standard premised on accounting for vehicles that EPA views as emission-less within the constructs of a tailpipe emissions regulation. For HDVs specifically, emission standards must reflect "the greatest degree of emission reduction achievable through the application of technology which the [EPA] determines will be available" during the relevant model year.[41] The Supreme Court has noted that similar language in Section 111(d) of the Act generally refers to "measures that would reduce pollution by causing [pollution sources] to operate more cleanly."[42] But ZEVs are not the "technology" contemplated by Congress here. Instead, Congress enabled EPA to increase emission standard stringency through cleaner fuels and improved emissions-related systems to be incorporated into ICEVs such as advances in fuel injection, exhaust gas combustion management, and catalysts to neutralize pollutants of concern.[43] By factoring in ZEV performance as a part of its averaging scheme, EPA is ignoring the technological feasibility of emissions-related systems and simply requiring the production of fewer ICEVs. The Proposed Rule does not consider advances to ICE technologies when setting the standard.

And even for criteria pollutants emitted from ICEVs, the Clean Air Act says nothing about averaging across fleets or banking and trading credits across different model years, different vehicle classes, and vehicle manufacturers. While EPA has previously adopted fleetwide averaging, it has also acknowledged that "Congress did not specifically contemplate an averaging program when it enacted the Clean Air Act."[44] And "[j]ust as the statute does not explicitly address EPA's authority to allow averaging, it does not address the Agency's authority to permit banking

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[40] 42 U.S.C. § 7521(a)(1).

[41] 42 U.S.C. § 7521(a)(3)(A)(i).

[42] *West Virginia*, 142 S. Ct. at 2599.

[43] For example, Section 202(m) requires the monitoring of "emission-related systems" such as the "catalytic converter and oxygen sensor." 42 U.S.C. § 7521(m)(l).

[44] 48 Fed. Reg. 33,456, 33,458 (July 21, 1983).

and trading."[45] By definition, then, the Act does not address—let alone clearly authorize—the use of averaging, banking, and trading in a manner that mandates electrification of the national vehicle fleet of heavy-duty motor vehicles and motor vehicle engines.

The structure of the Clean Air Act and its regulatory provisions for standard setting, certification, compliance enforcement, warranties, and penalties also directly conflict with a fleet-wide averaging regulatory regime. Notably, under Section 202(a), EPA "shall test, or require to be tested in such manner as [it] deems appropriate, any new motor vehicle or new motor vehicle engine submitted by a manufacturer" and issue a certificate of conformity "if such vehicle or engine" complies with the standards.[46] And EPA must "test any emission control system incorporated in a motor vehicle or motor vehicle engine . . . to determine whether such a system enables such vehicle or engine to conform to the standards required to be prescribe under [Section 202(b)] of the Act."[47] Section 202(b)(3) further authorizes EPA to grant waivers from certain nitrogen-oxide emission standards-which, again, are standards "under" Section 202(a), for no "more than 5 percent of [a] manufacturer's production or more than fifty thousand vehicles or engines, whichever is greater."[48] This provision would be nonsensical under a fleetwide-averaging regime where, if applied, a manufacturer could essentially give itself a waiver for large swaths of its fleet by over-complying for certain product lines. Taken together, the Clean Air Act regulatory framework contemplates EPA regulating vehicles on an individual basis. But this cannot be accomplished if there is not a clear emission standard applicable to a single vehicle at the start of a model year.

B. EPA Fails to Adequately Evaluate ZEV Safety Risks and Incidental Emissions as Required by Clean Air Act Section 202(a)(4), as well as associated real-world costs.

In setting new emissions standards, EPA must consider whether any technology used to comply with the requirements "will cause or contribute to an unreasonable risk to public health, welfare, or safety in its operation or function" as well as "to what extent the use of any device, system or element of design causes, increases, reduces, or eliminates emissions of any unregulated pollutants."[49] The Proposed Rule's health and safety assessment, however, is myopically limited to the health effects of tailpipe emissions. Therefore, it fails to fully account for all the risks posed by more ZEVs on the road. Nor does it account for the emissions impacts from the full life cycle of ZEVs, particularly heavy-duty ZEVs with batteries that may not achieve either "useful life" standards or mandatory emission control technology warranties applicable to other vehicles with emission standards issued under the Clean Air Act. To the extent heavy-duty ZEVs and their batteries have not been demonstrated to achieve useful life standards and minimum emission control warranty requirements, in real-world operation, EPA must include their replacement costs as part of their analysis; EPA has not. Notably, EPA does not consider that ZEVs—particularly BEVs—are heavier than equivalent ICEVs and, therefore, may result in more severe accidents given the additional mass of the battery. As recognized by National Highway

[45] 54 Fed. Reg. 22,652, 22,665 (May 25, 1989); *see* 55 Fed. Reg. 30,584, 30,593 (July 26, 1990) (same).

[46] 42 U.S.C. § 7525(a)(1).

[47] 42 U.S.C. § 7525(a)(2).

[48] 42 U.S.C. § 7521(b)(3).

[49] 42 U.S.C. § 7521(a)(4)(A) and (B).

Transportation Safety Authority ("NHTSA") Administrator Ann Carlson, "[b]igger is safer if you don't look at the communities surrounding you and you don't look at the other vehicles on the road . . . [i]t actually turns out to be a very complex interaction."[50] Yet EPA has not considered this interaction, on safety directly or the associated increase in insurance costs,[51] which is all the more critical to the Proposed Rule as commercial trucks are involved in 13 percent of all fatal crashes on U.S. roadways and these trucks will be heavier and faster under the Proposed Rule.[52]

The greater prevalence of heavy-duty batteries will also pose additional risks to first and second responders as battery fires burn hotter and longer than similar fires in ICEVs. As documented by the National Transportation Safety Board, these responders face two major risks: (1) shock from damaged high-voltage electrical components and (2) battery reignition after initial fire suppression due to uncontrolled increases in temperature and pressure retained in the battery.[53] Moreover, insufficient information exists from manufacturers on procedures for mitigating the risks of stranded energy to emergency responders. Additionally, storing an EV with a damaged high-voltage lithium-ion battery inside the recommended 50-foot-radius clear area may be infeasible at tow or storage yards.[54] And beyond safety concerns, fighting a battery fire demands 30–40 times more water than a fire from an ICEVs.[55] The Proposed Rule fails to even acknowledge these issues.

1. EPA May Not Use the Proposed Rule to Sidestep Regulatory Limits Established under the Energy Independence and Security Act.

Under Section 103 of the Energy Independence and Security Act of 2007 ("EISA"), NHTSA has the exclusive authority to issue fuel efficiency standards for medium and heavy-duty vehicles. Because fuel economy and GHG emissions are two sides of the same coin, EPA issued joint standards with NHTSA in prior Phase 1 and Phase 2 heavy-duty GHG emission standard proposals. But EPA did not do the same for the proposed Phase 3 standards here. If it did, the joint standards would have to comply with the EISA requirement that all new fuel efficiency

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[50] Reuters, "U.S. NTSB chair raises safety concerns about heavy electric vehicles," David Shepardson (January 11, 2023) *available at* https://www.reuters.com/business/autos-transportation/us-ntsb-chair-raises-safety-concerns-about-heavy-electric-vehicles-2023-01-11/.

[51] Jason Metz & Michelle Megna, Electric Car Insurance: Why It Costs More (Jan. 4, 2023), https://www.forbes.com/advisor/car-insurance/electric-vehicle/ (explaining that electric vehicles are costlier to insure)

[52] U.S. DOT, Federal Motor Carrier Safety Administration, "2020 Pocket Guide to Large Truck and Bus Statistics," *available at* https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/2020-10/FMCSA%20Pocket%20Guide%202020-v8-FINAL-10-29-2020.pdf.

[53] NTSB, "Risk to Emergency Responders from High-Voltage, Lithium-Ion Battery Fires Addressed in Safety Report," (Jan. 13, 2021), *available at https://www.ntsb.gov/news/press-releases/Pages/NR20210113.aspx. (See also Watch This Severe Electric Car Fire And Explosion At A Charging Station (insideevs.com)).*

[54] Id.

[55] Fire Technology, "A Review of Battery Fires in Electric Vehicles," Peiui Sun, *et. al*, (2020) *available at* https://maritimesafetyinnovationlab.org/wp-content/uploads/2021/12/Academic-A-review-of-battery-fires-in-electric-vehicles-2020.pdf; Independent, "Tesla in fireball crash needs 40 times the water as regular car to put out flames, says fire crew," Graeme Massie, (August 12, 2021), available at https://www.independent.co.uk/climate-change/tesla-crash-driver-arrested-fire-b1901603.html.

standards "shall provide not less than 4 *full* model years of regulatory lead time."[56] That means a fuel efficiency standard promulgated in calendar year 2023 cannot be implemented until MY 2028. The Proposed Rule does not meet this standard and, because it effectively promulgates equivalent fuel efficiency standards in the form of greenhouse gas emissions standards, is undercutting Congress's intent in EISA and regulating in a way that is inconsistent with NHTSA's authority.[57] Similarly, the joint standards would have to comply with the EISA requirement that NHTSA may not consider the fuel economy of electric vehicles in setting fuel economy standards.[58]

IV. The Proposed Rule Relies on Incomplete Facts, Employs Mistaken Assumptions, and Is Not Based on Reasoned Decision-Making.

Even if EPA had Congressional authority to promulgate the Proposed Rule, which it does not, the proposal is substantively deficient and based on unrealistic assumptions, illogical reasoning, and incomplete analysis. Therefore, it constitutes arbitrary and capricious decision-making.

A. The Proposed Rule is Infeasible.

1. EPA's Proposed Rule Ignores the Reality of Current ZEV Production and Commands Impractical Adoption Rates.

In describing the need for this regulatory action, EPA suggests that the rapid electrification resulting from the Proposed Rule either is already in progress or aligned with major trucking fleets, heavy-duty vehicle and engine manufacturers and U.S. states. In support, EPA cites the existing ambitions of the automotive industry and publicly-stated original engine manufacturer ("OEM") ZEV adoption rates of 50–60% by 2030.[59] But this circular reasoning cannot support EPA's Proposed Rule here—like the chicken and the egg, EPA and other federal regulators cite auto manufacturers' statements about ZEV adoption projections to justify the feasibility of enormous increases in a federal ZEV mandate, while automakers, in turn, cite EPA's and other federal agency regulations to support their statements about ZEV adoption projections. The underlying reality is that without federal regulation requiring vastly increased EV penetration, providing automakers certainty for long-term planning, automakers could not financially justify long-term investment in a technology with tepid consumer demand. And it is only cross-subsidization that is causing increasing consumer demand for ZEVs—cross-subsidization that depends entirely on federal regulations, since any rational company would not subsidize a losing product line without an ancillary benefit, such as avoiding Clean Air Act penalties. Automakers may be publicly acquiescing to government demands, but this does not demonstrate that the technology and infrastructure will be available in the stated timeframe and, most critically, that consumers are

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[56] 49 U.S.C. 32902(k). In contrast, under the Clean Air Act, new heavy-duty emission standards can begin "no earlier than the model year commencing 4 years after such revised standard is promulgated." 42 U.S.C. § 7521(a)(3)(C).

[57] *See Massachusetts v. EPA*, 549 U.S. 497, 532 (2007) ("The [EPA and NHTSA] obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency.").

[58] 49 U.S.C. 32902(h).

[59] Proposed Rule at 25,929.

ready and willing to adopt electric vehicles. And these government demands can vanish in an instant, through changes in administrations or judicial challenge.[60]

In reality, as EPA acknowledges, the facts show that in model year 2021, only 0.2% of all heavy-duty vehicles certified by the Agency were electric.[61] Thus, the ambitions of even the most aggressive engine manufacturers from a ZEV adoption rate perspective would require over 100% growth over the next seven years.[62] And, of the 0.2%, nearly all were purchased by government and private entities using taxpayer dollars, primarily for things like school and city buses that were also subsidized through other federal and state taxpayer-funded programs.[63,64,65] EPA makes no attempt to account for a substantial percentage, and often the majority, of heavy-duty ZEV costs being covered by taxpayers. There is no support for concluding there will be substantial private consumer adoption of heavy-duty (HD) ZEVs.

Moreover, the HD BEV and FCEV technologies, industries, and markets are not mature enough to support EPA's regulatory impact analysis or proposed standards. Of the estimated 850,000 new heavy-duty vehicle sales per year in the U.S.,[66] EPA projects that 142,000 (16.8%) will be ZEVs in MY 2027 and 390,000 (46.0%) will be ZEVs in MY 2032.[67] By contrast, in 2021, only 543 new HD ZEVs were sold in the U.S.[68] EPA's projections and ambitions in the Proposed

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[60] Notably, the Proposed Rule heavily relies on California programs serving to spur ZEV development, but the underlying Clean Air Act preemption waivers necessary for California to promulgate its own regulations are currently being challenged in Federal court.

[61] Proposed Rule at 25,940.

[62] VOLVO GROUP, "Report on the first quarter 2023," *available at* https://www.volvogroup.com/content/dam/volvo-group/markets/master/news/2023/apr/4519530-volvo-group-q1-2023.pdf; TUBES AND LUBES DAILY, "Volvo launches electric truck with longer range in N. America" (Jan. 2021) *available at https://www.fuelsandlubes.com/volvo-launches-electric-truck-with-longer-range-in-n-america/?mc_cid=b124969b23&mc_eid=4a00dc8f80* (Volvo Trucks set target that half of all trucks sold are electric by 2030); VOLVO GROUP, "Geared for Growth – Annual Report 2022," *available at* https://www.volvogroup.com/content/dam/volvo-group/markets/master/investors/reports-and-presentations/annual-reports/AB-Volvo-Annual-Report-2022.pdf.

[63] Utility Dive. "Volvo wins $21.7M in grants to deploy electric trucks in California" October 21, 2020. https://www.utilitydive.com/news/Volvo-Trucks-VNR-Electric-EV-California-grants-emissions/587451/.

[64] California Air Resources Board. "CARB and DERA School Bus Funding." https://ww2.arb.ca.gov/our-work/programs/school-buses/carb-and-dera-school-bus-funding.

[65] California Air Resources Board. "Funding for Clean School Buses." https://ww2.arb.ca.gov/our-work/programs/school-buses/funding-clean-school-buses.

[66] Proposed Rule Docket at EPA-HQ-OAR-2022-0985-0830, Heavy Duty Technology Resources Use Case Scenario (HD TRUCS) at Tab 1_Veh Prop, Column T.

[67] *Id.* at Tab 4_Adoption Rates, Cells T7 and U7. (In MY 2027, EPA projects that all of the HD ZEV will be BEVs. In MY 2032, EPA projects that the 46.0% ZEV sales will break down as 40.1% BEVs and 5.9% FCEVs).

[68] Claire Buysse, THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION, "Zero-emission bus and truck market in the United States and Canada: A 2021 update" (Sept. 2022), at Fig. 1, *available at* https://theicct.org/wp-content/uploads/2022/09/update-ze-truck-bus-market-us-can-sept22.pdf (The 75 medium truck and van sales are excluded from the sum, as EPA is proposing in separate rulemaking to categorize these as Medium-Duty Vehicles, *see* Docket EPA-HQ-OAR-2022-0829).

Rule would represent a staggering 63,000% growth in HD BEV adoption over 2021 to 2032 and 1,250,000% growth in HD FCEV adoption over the same period.[69] These growth rates are an unrealistic assumption that highlight the infeasibility of the proposal. EPA cannot justify imposing billions of dollars in costs on adoption rates at the scale of a pilot-level program.

Thus, should EPA continue with promulgating a final rule for future HD GHG standards, EPA must account for the reality of today's ZEV market and not the ambitions of the vehicle manufacturing industry and unsupported estimates of future market growth.[70]

2. The Proposed Rule Requires Deployment of Technology Not Feasible within the Timeframe Contemplated.

Section 202(a) of the Clean Air Act does not mandate that EPA set standards to drive pollutant emissions down to zero; rather, EPA must balance benefits to health and welfare against costs of compliance to reflect "the greatest degree of emission reduction achievable through the application of technology which the [EPA] determines will be available" during the relevant model year.[71] Here, the Proposed Rule forces a transition from ICEVs to ZEVs in the MY27–32 timeframe without demonstrating that such a transition is feasible, let alone necessary.

Critically important to increased ZEV adoption is the infrastructure necessary to operate such vehicles. EPA overlooks this issue in the Proposed Rule. Notably absent from EPA's analysis is any demonstration that sufficient charging stations, utilities, and other infrastructure needed to support accelerated ZEV implementation will be available by MY27. As engine manufacturers have acknowledged, even as new ZEVs are ready to enter into production, the necessary infrastructure for both electric vehicles and hydrogen vehicles continue to lag, especially when multiple facilities are needed to support the multiple fuel and powertrain technologies EPA contemplates.[72] Focusing solely on electric vehicles themselves, EPA has not adequately evaluated or grasped the time and resources required to permit, construct, and operate the necessary infrastructure to power these vehicles. This is particularly concerning in

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[69] *Id.*, Figures 3 and 4 (In 2021, FCEV sales accounted for 7% (Figure 4) of the 51 heavy truck sales (Figure 3)—or 4 vehicles—with the remainder being BEV).

[70] EPA also cannot mandate electric HDVs across all classes of HDVs, in attempt to spread the costs of electrification across a larger buyer pool. EPA has failed to conduct any substantive analysis of the incremental costs of electric HDVs, by weight class. This is unreasonable because as the weight of HDVs increase, the marginal costs of electrification increase even more. Analyzing costs by vehicle class could show that even assuming that electrifying lower weight class HDVs were justifiable (it is not), it would not be justifiable for heavier weight class HDVs. EPA's ignoring of this essential aspect of the problem is arbitrary and capricious.

[71] 42 U.S.C. § 7521(a)(3)(A)(i).

[72] *See* Jack Roberts, Truck Tech, "5 Takeaways from ACT Expo 2020," (May 20, 2022), *available at* https://www.truckinginfo.com/10172184/5-take-aways-from-act-expo-2022 (citing Cummins CEO Tom Linebarger as warning ACT Expo attendees that the undertaking will cost multiple trillions of dollars to accomplish).

light of the very real risk that the electric grid will not be able to meet the increased demand anticipated by the Proposed Rule.[73]

Even assuming sufficient ZEVs can be manufactured with the corresponding consumer demand to buy them, EPA has not fully considered the uncertainty around the grid being able to support them. Grid resiliency is at risk of further deterioration due to increasing power demand from electrification, not just in transportation. Combined with other issues, such as a disorderly transformation of the generation base as conventional units are replaced with intermittent resources, increased electrification raises questions about the grid's ability to reliably meet consumer demand on a regional basis. The regional operation of the power grid is managed by entities called Regional Transmission Organizations ("RTO") or Independent System Operators ("ISO"). These authorities are not only responsible for transmission, but also balancing a regional power system to ensure that supply constantly matches demand. The grids in some RTOs are already under various degrees of stress. For example, the North American Electric Reliability Corporation's ("NERC") recent summer assessment shows roughly two-thirds of the U.S. faces increased resource adequacy risk in the summer of 2023.[74]

EPA's projections of ZEV sales are on a national basis, but the ability to charge the vehicles is driven by the ability to manage regional or local power grids to supply electricity on demand. EPA's national data thus disguises important problems that increasing EV penetration will cause. By 2022, over 50% of BEVs were concentrated in California, Florida, and Texas. The distribution of the BEV fleet across RTOs can be seen in **Figure 1**, in which state shares of EV registrations are allocated across RTOs.[75] EPA barely pays lip-service to this issue. Even without increased demand on the grid from transportation electrification, today's grid is fragile. EPA should discuss the costs of power outages from weather events that could preclude truck recharging and put fleets out of operation for days at a time. Reduced utilization from grid dependency is an important issue that EPA failed to quantify.

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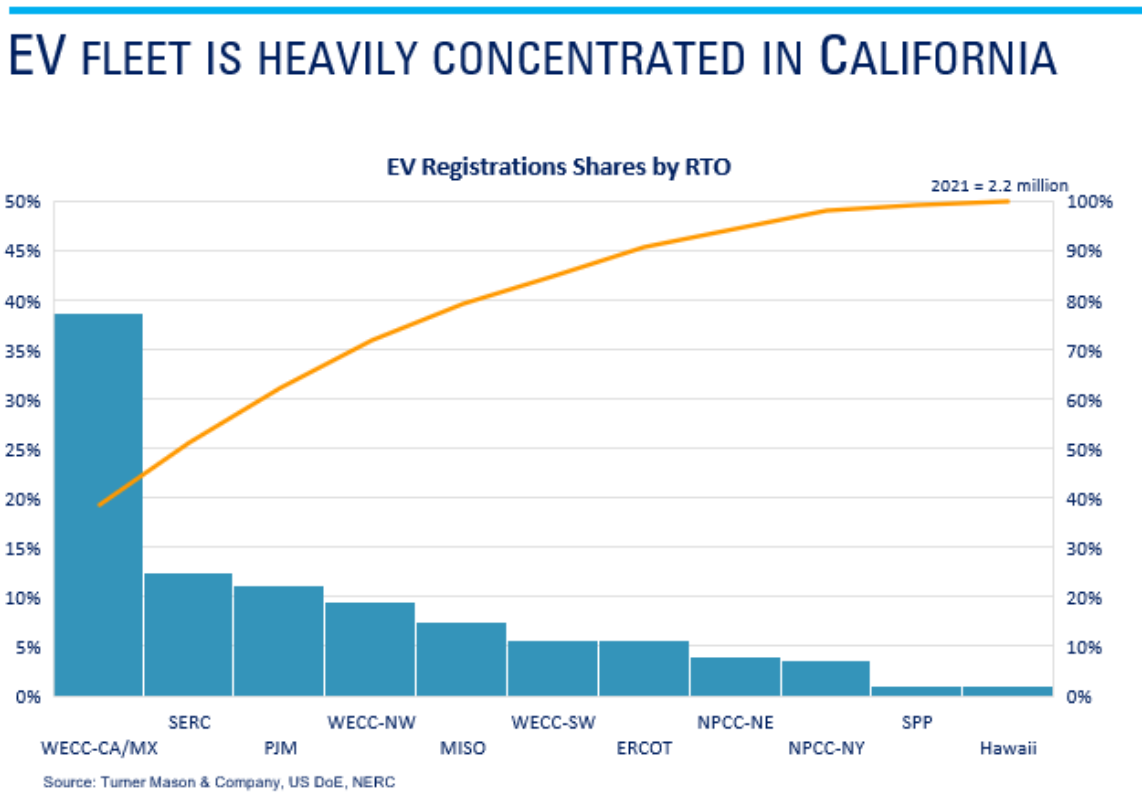
[73] North American Electric Reliability Corporation, *2022 Long-Term Reliability Assessment* (Dec. 2022), 21, *available at* https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf. (indicating that increased demand projections may lead to reliability concerns for the electric grid, especially as dual-peaking or seasonal peaking times change with increased electrification)

[74] North American Electric Reliability Corporation, "2023 Summer Reliability Assessment" (May 2023).

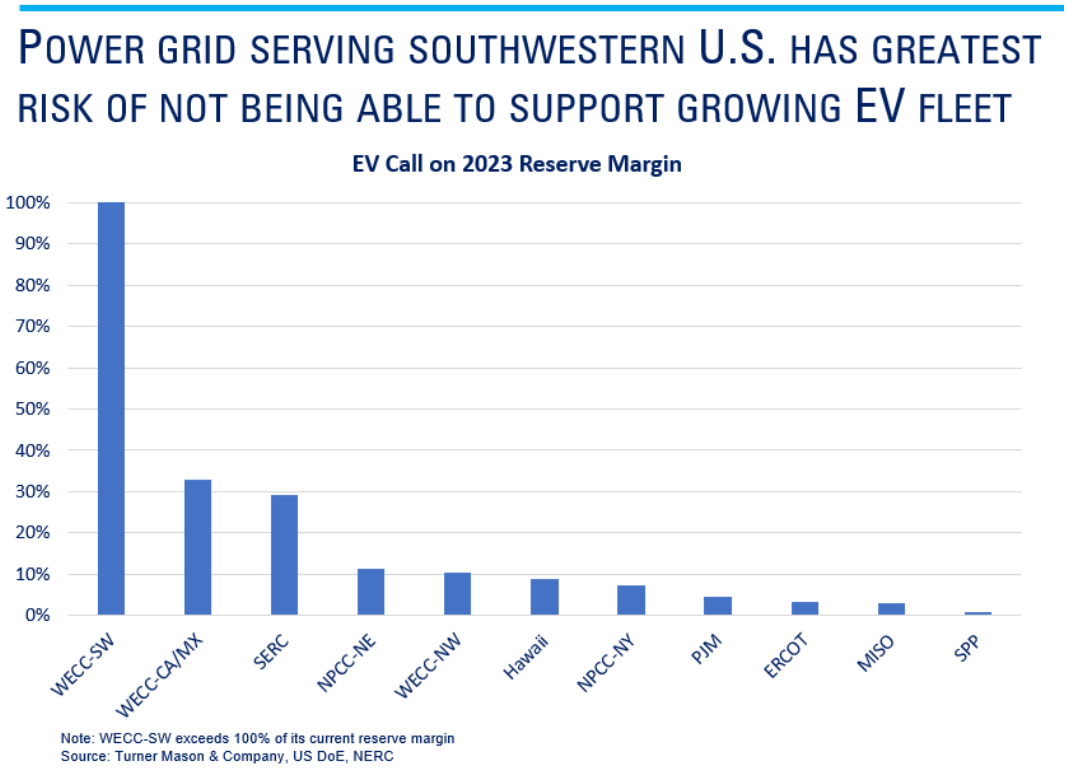
[75] There are several states that are covered by more than one RTO. For this high-level assessment, our consultants have allocated the state's EV sales by roughly the geographic footprint of each RTO within the state.

Figure 1: EV registrations by RTO



Potential stress on the grid within any given RTO is not just a function of EVs on the road, but also power generation capacity within the region. As seen in **Figure 2**, the greatest stress is not in California (though the California's stress is significant), but rather in the southwestern U.S.

Figure 2: EV Power Requirement by RTO



This figure is based on EPA's estimate of EV electricity demand in 2032, allocated to RTOs, under the assumption that no reserve capacity is added over the next eight years. If an RTO wanted to fill incremental EV electricity demand and keep its reserve margin constant, the required capacity investment depends on the source of generation and that source's availability (i.e., expected load factor) specific to that region. For the U.S., the total investment cost could range from $15 to $100 billion, not including up to an additional $80 billion for storage to improve ratability of intermittent sources.

RTOs face another complication with the times of day likely to see greater EV charging. Sparsely available data suggest most EV charging currently occurs during daytime. However, if a growing EV fleet were to switch to overnight charging, it would put much less stress on a grid. EPA should work with other federal entities to ensure the growth in power demand stemming from an expanding EV fleet in the Proposed Rule can be safely and reliably supplied. Furthermore, EPA should provide a comprehensive analysis on how the light- and medium-duty multipollutant and the HD Phase 3 GHG proposed rules will jointly impact these demands on the grid.

Power generation using traditional fuels has an advantage in the capacity being located near demand centers. Except for nuclear, any low-carbon power generation capacity must be located at the energy source (e.g., where the wind blows, water flows, sun shines). Supplying low-carbon electricity to charge EVs also needs to resolve the transmission of that power to the demand center. Installation of transmission capacity in a timely manner is not a guarantee. The Bureau of Land Management ("BLM") recently issued its record of decision for the SunZia

Southwest Transmission Project more than 15 years after the project was proposed.[76] Once this incremental power is transmitted from supply location to a load center, there are potentially additional distribution transmission constraints before the electrons reach charging stations and homes. One supercharger equals the launch of 70 air-conditioning units at once. Such an instant change in the power demand profile is a significant problem for the local distribution grid. And EPA's ambitious light-duty proposal compounds this problem as Level 2 EV chargers, typically used in a home, can increase a home's peak load by 40% to 100%, which can stress neighborhood transformers and compromise reliability.

The intensity is further complicated in that the capacity factor (percentage of time a plant is likely to be available for generation) of solar (28%) and wind (36%) plants is so much lower than dispatchable (typically 90+%) generation capacity. To put the intensity of effective generation capacity in perspective, solar and wind farms require almost three times as much copper to meet the load of a typical (combined cycle gas turbine) natural gas plant. For EPA to achieve its GHG reduction aspirations in the Proposed Rule, all three of these challenges must be met: (1) sufficient materials to manufacture the required EVs, (2) consumer willingness to substitute EVs for incumbent ICEVs currently for sale, and (3) a low-carbon power generation grid capable of reliably supply energy for this mode of transportation.

Relatedly, it is unlikely that the grid can be upgraded quickly enough to overcome the constraints referenced above. A recent DOE-funded study finds that: "[o]nly ~21% of projects (14% of capacity) requesting interconnection from 2000-2017 reached commercial operations by the end of 2022"; "[c]ompletion rates are even lower for wind (20%) and solar (14%); and "[t]he average time projects spent in queues before being built has increased markedly. The typical project built in 2022 took 5 years from the interconnection request to commercial operations."[77] Moreover, EPA has failed to account for the direct effect its new carbon dioxide standards for fossil-fuel fired power plants, proposed shortly after the Proposed Rule, will have on the grid including how the increased demand for baseload and peaking power as a result of the Proposed Rule can be met as affordable base-load generators are rapidly phased out.[78] Even in California, where renewable energy is a priority, daily evening peak load is still routinely supplied by approximately 70 percent fossil fuels.[79]

Beyond the normal approximately four-year lead time for vehicle manufacturers to make incremental changes to their production, the typical duration of an electricity transmission system capital project timeline would need to be accelerated from approximately ten-years to have a

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[76] Emma Peterson, INSIDE CLIMATE NEWS, "SunZia Southwest Transmission Project Receives Final Federal Approval" (May 29, 2023) *available at* https://insideclimatenews.org/news/29052023/sunzia-transmission-project-approval/.

[77] *See* LAWRENCE BERKELEY NATIONAL LABORATORY, "Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2022", *available at* https://emp.lbl.gov/sites/default/files/queued_up_2022_04-06-2023.pdf.

[78] Proposed Rule at 33,240. Notably, EPA's electric generating unit rule is not referenced in the proposed rule. Nor does the electric generating rule's mere one-page assessment of grid reliability considerations even address EPA's parallel efforts to push mass adoption of electric vehicles. *Id.* at 33,415.

[79] *See, e.g.*, CALIFORNIA ISO, "Today's Outlook" (accessed June 13, 2023), *available at* https://www.caiso.com/TodaysOutlook/Pages/supply.html#section-supply-trend (showing data from Aug. 4, 2022, indicating more than 70 percent of energy from natural gas, coal, and imports).

chance to support the proposed ZEV demand, while current large-scale electric generation and storage projects are increasingly backlogged year-on-year due to long lead times for permitting and approvals, supply chain shortages, and shortage of skilled workers. While government programs have recently been put in place to help overcome some of these hurdles, they will take time for the benefits to be realizable.[80]

While a significant percentage of the charging installations deployed today are Level 2 EVSEs, dual charging installations to enable the flexibility of light-duty as well as medium-duty and HDV charging will become increasingly important. Direct current fast charging equipment ("DCFCs") will enable broader market coverage, even for LDVs used in applications where they cannot sit for 6 hours and charge during off-peak, lower-cost electricity periods. As utility companies gear up to provide infrastructure installations, EPA should not minimize the impact of supply chain shortages/strains on the cost of materials necessary for installing supporting charging infrastructure in the short time ahead to 2032. Beyond EVSE chargers, the cost of grid upgrade projects needed to support the incremental electricity demand growth from transportation is not insignificant and can be quite variable. A particular case study of Southern California illustrated in IOPscience notes: "the total cost of these upgrades will be at least $1 billion and potentially more than $10 billion." These costs need to be taken into consideration with expected demand growth, within detailed rate base calculations, and in concert with appliance upgrade costs to fully understand their ultimate impacts on annual ratepayer expenditures." [81] We agree with and support the Proposed Rule's acknowledgement that "a recent study found power needs as low as 200 kW could trigger a requirement to install a distribution transformer." Other anecdotal evidence discussed within an RMI report highlights the expensive mistakes that can emerge from insufficient planning and engagement in details.[82] Demand charges can be particularly punishing, and in some cases make or break the business case for transition from ICEVs to BEVs, particularly for fleets and vehicles that require DCFC charging. Other considerations for high-reliability use cases should include provisional back-up power system considerations, which likely depend upon back-up generators or expensive stationary energy storage batteries. Absent comprehensive understanding of the dynamics between increased ZEV use and charging infrastructure needs, vehicle manufacturers—as well as consumers—are left in a vulnerable position. Regardless of whether manufacturers even *could* comply with the Proposed Rule, they would likely be left in a position where there is no consumer demand, and fleet turnover declines because the infrastructure necessary to support the new ZEVs is either at capacity or nonexistent. Indeed, at least one study to date has concluded that, upon ZEVs becoming the norm in California, it could push the total demand for electricity beyond the existing capacity of the state's grid—

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[80] Gracie Brown, et al., MCKINSEY AND COMPANY, "Upgrade the grid: Speed is of the essence in the energy transition" (Feb. 1, 2022) *available at* https://www.mckinsey.com/capabilities/operations/our-insights/global-infrastructure-initiative/voices/upgrade-the-grid-speed-is-of-the-essence-in-the-energy-transitionl; DELOITTE, "2023 power and utilities industry outlook" *available* https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-eri-power-utilities-outlook-2023.pdf.

[81] Salma Elmallah et al., IOP SCIENCE, "Can distribution grid infrastructure accommodate residential electrification and electric vehicle adoption in Northern California?" (Nov. 9, 2022) *available at* https://iopscience.iop.org/article/10.1088/2634-4505/ac949c

[82] Alessandra R. Carreon, et al., RMI, "Increasing Equitable EV Access and Charging" (2022) *available at* lhttps://rmi.org/insight/increasing-equitable-ev-access-charging/.

turning ZEVs into zero electricity vehicles.[83] Even more important, meeting the demand in California would likely require construction of new power plants, or electricity purchases from neighboring states—further adding to the infrastructure needs with increased transmission and distribution capabilities.[84] Or, in the short term, electricity may come from generators, in which case it makes more sense to leave the ICE in the truck rather than beside it.

Despite the potential for increased demands on domestic energy generation and generation capacity,[85] EPA offers little to no support that these demands will be sufficiently met. Similarly, EPA's draft Regulatory Impact Analysis[86] provides little to no analysis regarding the costs associated with meeting these increased infrastructure and energy generation/capacity needs beyond the flawed reliance on various legislative actions, such as the BIL and IRA.[87] Consequently, EPA is pushing a technology at a pace that cannot be adopted within the timeframe of its own proposal.

B. The Proposed Rule is Arbitrary and Capricious.

In addition to the fact that the proposal is infeasible, and the data and analysis gaps identified along this section raises additional concerns, that would render EPA's finalization of this proposed rule arbitrary and capricious.

1. EPA Cannot Adequately Substantiate the Need for Regulatory Action

EPA states the "need for regulatory action" is supported by the BIL and the IRA, which "together include many incentives for the development, production, and sale of ZEVs, electric charging infrastructure, and hydrogen, which are expected to spur significant innovation in the heavy-duty sector."[88] True, the BIL and IRA support the government-wide approach to reducing emissions through the manufacture, sale, and use of ZEVs. According to EPA, the BIL and IRA will lead to an increase in Class 4–8 ZEV sales anywhere between 13 and 48 percent, with an

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[83] Beth Daley, THE CONVERSATION, "Switching to electric vehicles could save the US billions, but timing is everything" (Dec. 4, 2018), *available at* https://theconversation.com/switching-to-electric-vehicles-could-save-the-us-billions-but-timing-is-everything-106227.

[84] Id.

[85] *See, e.g.*, U.S. DRIVE, "Summary Report on EVs at Scale and the U.S. Electric Power System" (Nov. 2019), *available at* https://www.energy.gov/eere/vehicles/articles/summary-report-evs-scale-and-us-electric-power-system-2019 (summarizing impacts of light-duty vehicles on energy generation and generation capacity alone and acknowledging several potential challenges without including analysis of medium- and heavy-duty ZEVs).

[86] DRIA at 15–17, 20–21.

[87] See, e.g., Salma Elmallah et al., Can distribution grid infrastructure accommodate residential electrification and electric vehicle adoption in Northern California? (Nov. 9, 2022), available at https://iopscience.iop.org/article/10.1088/2634-4505/ac949c (projecting upgrades needed solely for the PG&E service area in Northern California, which serves 4.8 million electricity customers and is subject to aggressive targets for both EV adoption and electrification of residential space and water heating will add at least $1 billion and potentially $10 billion to PG&E's rate base).

[88] Proposed Rule at 25,928.

average of 29 percent by 2029.[89] And the IRA alone is anticipated to result in a 32–40 percent decrease in GHG emissions, compared to 2005 levels, over the same period.[90] But the BIL and IRA do not empower EPA to promulgate ZEV mandates or phase out the use of ICEVs. Congress could have chosen to mandate ZEVs and instead chose to provide incentives through the BIL and IRA. If Congress desired EPA to phase out ICE and mandate ZEV, it would have said so (and if Congress believed that EPA has existing authority under the Clean Air Act to mandate ZEVs, it may very well have concluded that incentivizing ZEVs via the BIL and IRA was unnecessary). EPA cannot interpret congressional silence in the IRA and BIL as tacit acceptance of its approach here.[91] Thus, EPA's reliance on these Acts to underwrite proposed standards' feasibility is arbitrary and capricious.

The structure of the Clean Air Act and its regulatory provisions for standard setting also are premised on EPA identifying sources of emissions that cause or contribute to non-attainment with the National Ambient Air Quality Standards ("NAAQS"). However, EPA makes no attempt to outline a baseline scenario whereby all stationary and mobile sources in the country achieve *current* EPA standards. Such a baseline is necessary because it is the only means by which the agency and the public can compare the marginal costs and benefits of further tightening emission standards and deploying different technologies and alternatives. EPA's failure to conduct either a baseline or marginal analysis (while also failing to account for billions of dollars in costs) is inconsistent with the structure of the Clean Air Act, and good regulatory practice, and makes it impossible to conduct an alternatives analysis, as required under Executive Order 12866 (Regulatory Planning and Review) and OMB Circular A-4; as such, the proposed rule, if finalized, is arbitrary and capricious.

2. EPA Fails to Adequately Account for the Lifecycle Emissions of ZEVs.

As discussed above, because EPA may only prescribe standards applicable to vehicles that "cause or contribute" to air pollution, its standards cannot account for ZEVs with no tailpipe emissions. However, if EPA is authorized to promulgate such standards, those standards must account for any upstream emissions from upstream electric generating units ("EGU"), and the mining of battery materials. The failure to do so ignores the policy objectives of the statute and creates an uneven playing field that substantially disadvantages ICEVs and fails to address a major aspect of GHG emission reduction. Indeed, Clean Air Act Section 202(a)(4)(B) requires that EPA calculate these lifecycle emissions impacts.

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[89] Proposed Rule at 25,941.

[90] Congressional Research Service, Inflation Reduction Act of 2022 (IRA): Provisions Related to Climate Change, 2 (Oct. 3, 2022).

[91] The BIL and IRA themselves are at risk of recission under a new Administration or Congress. *See, e.g.*, Josh Siegel and Kelsey Tamborrino, Politico, *GOP's debt-limit plan would gut Biden's climate law. White House's response: 'Jobs'* (Apr. 20, 2023), *available at* https://www.politico.com/news/2023/04/20/house-gop-debt-limit-plan-inflation-reduction-act-00092891 ("The GOP proposal would revive a prior $7,500 tax credit for qualifying electric vehicles, but would restore that tax break's per-manufacturer limit of 200,000 vehicles. It would entirely repeal the IRA's new incentives for critical battery minerals that are extracted from the U.S. or a close trading partner, and for batteries manufactured or assembled in North America.").

EPA's reference to electric vehicles as "zero emission vehicles" is misleading. For instance, the fuel source of a BEV—a battery composed of GHG emissions intensive minerals and the electricity generated to power the battery—produces emissions. The fact such emissions occur upstream of the vehicle's operation and therefore lack tailpipe emissions stacks the deck in favor of this technology, even though they do cause emissions. There is no logical basis for omission because, as EPA is aware, concerns about GHG emissions relate to their longer-term global concentrations. Consequently, all vehicle related emissions should be an important consideration regardless of where such emissions occur. Without comparing lifecycle ZEV emissions to lifecycle emissions from ICEVs, EPA cannot know if or how much its standards are actually decreasing emissions on a relevant scale. Thus, while EPA is not required to solve all emissions problems in one rulemaking, EPA cannot even claim to be solving *part* of the problem here without addressing upstream and downstream emissions. EPA's approach of mandating BEVs cannot possibly be reasonable if it is merely shifting emissions from one source to another at the cost of hundreds of billions of dollars—trillions when costs to upgrade EV infrastructure are factored in—or could do so more cost-effectively by choosing a different approach.[92]

The flaw in EPA's approach is illustrated by the fact that emissions standards easily become meaningless by changing the engine's location. The Proposed Rule would treat a BEV charged by a diesel-powered generator as if it had zero tailpipe emissions, notwithstanding the fact that it remains "powered" by a diesel engine located outside the vehicle. A HDV directly powered by a diesel engine inside the vehicle, however, is credited with the emissions produced by that engine. Thus, the source of the "fuel" matters, the location should not. EPA arbitrarily ignores emissions from ZEVs.

EPA compounds this flaw by making unsupported assumptions regarding total emissions impacts of its proposal. While it claims that the overall analysis for combined downstream and upstream emissions "likely underestimates the net emissions reductions that may result" from the Proposed Rule, EPA failed to offer a data-based substantiation. The Proposed Rule failed to assess emissions from battery manufacturing or electricity production. EPA acknowledges that its standards will increase the demand for electricity and that demand will subsequently increase emissions from the electric generating sector, but it makes no real attempt to quantify those emissions or compare them to alternative options for reducing emissions from this sector. EPA should provide a more comprehensive analysis to comply with its directive under the Clean Air Act and better assess the resulting impact of the Proposed Rule.

3. EPA's Approach Fails to Address Important Issues That Will Affect Consumers' Best Interest.

EPA's proposal may impose additional costs of economic risk to small business owners who will be asked to depend upon increasingly expensive, lesser-proven HDVs for their livelihood. HD engine standards and the standards for MY 2021 and later light-HD engines apply over a useful life of 15 years or 150,000 miles, whichever comes first. 150,000 miles is well below the period of use for a comparable ICE powertrain. In the Proposed Rule, EPA asserts that it "concurs

[92] 5 U.S.C. § 706(2)(A); *cf,* Antonin Scalia, "Regulatory Review and Management," *Regulation Magazine* 19 (Jan./Feb. 1982) ("Is it conceivable that a rule would not be arbitrary or capricious if it concluded with a statement to the effect that 'we are taking the foregoing action despite the fact that it probably does more harm than good, and even though there are other less onerous means of achieving precisely the same desirable results'?").

with the emerging consensus that battery durability is an important issue. The ability of a zero-emission vehicle to achieve the expected emission reductions during its lifetime depends in part on the ability of the battery to maintain sufficient driving range, capacity, power, and general operability for a period of use comparable to that expected of a comparable ICEVs. Durable and reliable electrified vehicles are therefore critical to ensuring that projected emissions reductions are achieved by this proposed program."[93] EPA further states that it "proposed a specific durability testing requirement in the Proposed Rule and received comment on that proposal, including comment stating that the requirements could result in increases in the battery capacity beyond what was needed to meet the job of the customer. Due to these concerns and because we are still evaluating the range of durability metrics that could be used for quantifying HD BEV performance, EPA is not proposing specific durability testing requirements in this rule."[94] EPA should consider inclusion of durability requirements in this proposal as 150,000 miles is well below the period of use for a comparable ICE powertrain and will impact consumers as there is not enough data regarding these technologies due to their very small market penetration.

4. EPA fails to properly evaluate the environmental costs and benefits of the Proposed Rule.

The Proposed Rule predicts net emissions reductions but does not adequately evaluate local ambient air quality impacts from increased power generation spurred by the mass adoption of electric vehicles. Although EPA modeled changes to power generation anticipated by the Proposed Rule as part of its upstream analysis, EPA does not consider the potential degradation of air quality in areas in the direct vicinity of existing or new power plants.[95]

EPA also assumes the power sector is expected to become cleaner over time using wind/solar generation and electricity storage (i.e., batteries), but ignores the environmental impacts of the overall increase in critical minerals demand for electrical grid storage, the building of additional reliable backup generation, necessary transmission and substations and distribution equipment, and how that compounds the stress on critical minerals for the ZEVs themselves. But the expansion of electrical grids—even ignoring the Proposed Rule's increased demand—requires a large amount of earth minerals and metals. Indeed, copper and aluminum—both needed for ZEVs—are also the two main materials in wires, cables and transformers and, as described above, higher prices could have a major impact on future grid investments.[96] The need for expanded grid capabilities simultaneous to expanded ZEV production places a more pressing demand on materials like copper and aluminum thereby increasing extraction and refining efforts throughout the global market.

In addition to the above, EPA did not fully consider that the higher purchase price of new ZEVs will keep older, more polluting trucks on the road longer whereas new and heavier ZEVs will increase particulate matter ("PM") emissions through increased brake, tire, and road wear.

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[93] Proposed Rule at 26,014–15.

[94] *Id.* at 26,015.

[95] *Id.* at 25,983.

[96] INTERNATIONAL ENERGY AGENCY, "The Role of Critical Minerals in Clean Energy Transitions" (March 2022), 77–80 *available at* https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

Data from EPA's 2020 National Emissions Inventory[97] shows that direct PM2.5 emissions from roadways can be due to roadway dust vs. on-road mobile vehicle engine emissions. Roadway dust emissions which include particles from tire wear are correlated with vehicle weight, so increases in fleet average vehicle weight would be expected to increase roadway dust PM2.5 emissions.[98] In addition, a study by the American Transportation Research Institute found that the weight of a BEV Class 8 Sleeper Cab tractor is nearly double that of a comparable ICEV, weighing 32,016 pounds (lbs) versus 18,216 lbs.[99] Therefore, converting ICEs to ZEVs under the proposed regulation would significantly increase the average vehicle weight on U.S. roadways, which in turn would increase the entrained road dust emissions. There also exist overall truck weight restrictions, which could require a greater number of ZEVs to move the same tonnage of cargo, thus increasing vehicle miles traveled and potentially PM emissions. EPA also ignores the GHG emissions associated with manufacturing more, less dense, remotely located intermittent generation sources and battery back-up, plus the need for more natural gas peaking capacity and massive transmission, substation, and transformer investment to integrate these technologies into the power grid. Those emissions are significant and may offset or eliminate the benefits that EPA calculates.

The mining sector will also need to grow exponentially to meet ZEV demand as anticipated, and required, by the Proposed Rule. Mining is an energy- and environmental resource-intensive activity. Critical minerals for electric batteries such as lithium and copper are particularly vulnerable to water stress given their high-water requirements.[100] Over 50 percent of today's lithium and copper production is concentrated in areas with high water stress levels. Several major producing regions such as Australia, China, and Africa are also subject to extreme heat or flooding, which pose greater challenges in ensuring reliable and sustainable supplies. Activities associated with mining produce GHG emissions, as well as particulate matter emissions, nitrogen oxide emissions, and other air pollutant emissions from mining equipment. One study demonstrates that the steps for extracting, and processing critical minerals are responsible for approximately 20 percent of the lifecycle GHG emissions.[101] Strong focus on environmental best practices in this sector are needed to safeguard natural lands, biodiversity, and sustainable water use. Similarly, focus on ethical best practices is needed to protect indigenous peoples' rights, and to provide better child labor protections.[102] These challenges call for sustainable and socially responsible producers to lead the industry. The accelerated ZEV technology penetration rate required under the EPA's proposal poses significant challenges for

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[97] EPA, "2020 National Emissions Inventory (NEI) Data," *available at* https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data.

[98] EPA, Emissions Factor Documentation for AP-42 (Dec. 31, 2003) *available at* https://www3.epa.gov/ttn/chief/old/ap42/ch13/s021/final/c13s0201.pdf.

[99] AMERICAN TRANSPORTATION RESEARCH INSTITUTE, "Understanding the CO_2 Impacts of Zero-Emission Trucks" (May 2022) *available at* https://truckingresearch.org/wp-content/uploads/2022/05/ATRI-Understanding-CO2-Impacts-of-Zero-Emission-Trucks-May-2022.pdf.

[100] *See supra* at n. 97 ("The Role of Critical Minerals").

[101] H.C. Kim, et al., ENVIRONMENTAL SCIENCE AND TECHNOLOGY (Vol. 50) "Cradle-to-Gate Emissions from a Commercial Electric Vehicle Li-Ion Battery: A Comparative Analysis," (2016), pp. 7715–22.

[102] *See* Global Investor Commission on Mining 2030, *available at* https://mining2030.org/.

the timely and widespread implementation of best practices to be developed, implemented, and ensure oversight mechanisms are working.

Another critical aspect of the Proposed Rule not comprehensively considered is that recycling of the battery and related electrical components of BEV is in a state of infancy and poses unique materials handling and safety challenges. EPA should consider the environmental profiles of both BEVs and ICEVs in light of the production, operation, and disposal of the vehicle (its useful life). The following list provides just some of the electric battery disposal-related issues that are likely to impact the environment and need to be addressed by EPA in the Proposed Rule:

- Battery packs could contribute 250,000 metric tons of waste to landfills for every 1 million retired BEVs.[103]
- 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."[104]
- Economies of scale will play a major role in improving the economic viability of recycling. Currently, cost is the main bottleneck. Increasing collection and sorting rates is a critical starting point.[105]
- 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 is not economical at current lithium prices.
- Benchmark forecasts suggest that near-term recyclers are likely to use scrap material from the increasing number of gigafactories coming online versus used electric vehicle batteries. Scrap is anticipated to account for 78 percent of recyclable materials in 2025.[106]
- 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.[107]

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[103] 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) *available at* https://www.api.org/oil-and-natural-gas/wells-toconsumer/fuels-and-refining/fuels/vehicle-technology-studies.

[104] Gavin Harper, Roberto Sommerville, et al., NATURE, "Recycling lithium-ion batteries from electric vehicles" (Jan. 21, 2020) *available at* https://www.nature.com/articles/s41586-019-1682-5.

[105] IEA Report 2022.

[106] Benchmark Minerals Intelligence, "Battery production scrap to be main source of recyclable material this decade" (Sept. 5, 2022) *available at* https://source.benchmarkminerals.com/article/battery-production-scrap-to-be-main-source-of-recyclable-material-this-decade.

[107] Id.

- EV batteries are high-cycle batteries and are made to function for approximately 10 years for a light-duty vehicle, and a shorter time for medium- and heavy-duty vehicles.
- EV batteries lose approximately 3 percent of their charging capacity and associated range per year of operation. These percentages likely are higher for higher mileage utilization for typical heavy-duty vehicles. EPA has not made any effort to account for battery degradation, and associated reductions in charging efficiency, charging capacity, customer impacts and accelerated battery replacement and costs.
- 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.[108] This will extend the time that batteries and raw materials remain in use and therefore increase the demand for virgin critical minerals.
- 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.[109]
- Recycling BEV batteries to recover high-value metals has not been proven to a commercial scale. The majority of analysts are aligned that recycling will not become an integral supplier of raw materials until the 2030's, and at that point, it only will provide approximately 20 percent of demand.[110]
- Acknowledging the fire risks posed by lithium-ion batteries, EPA has recently stated that ZEV batteries should be handled as hazardous waste in accordance with RCRA universal waste requirements, further driving up the cost of such recycling efforts and limiting the facilities qualified to manage used batteries.[111]

EPA must, therefore, conduct a full lifecycle analysis to compare *all* environmental impacts caused by the proposal.

5. EPA relies on an inadequate cost analysis.

EPA claims that the Proposed Rule will somehow result in $180 billion to $230 billion in net benefits, which represents a five-fold increase over the cost in vehicle technology and associated electric vehicle supply equipment ("ESVE") required to meet the associated standards.[112] As industry experts have asserted, "the derivation of these cost estimates is murky and fundamentally not credible," especially as EPA's estimate of the no-action alternative to which all other proposals are compared ignores the regulatory costs of the Administration's current

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[108] 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

[109] IEA Report 2022.

[110] Benchmark Minerals Intelligence, *supra* at n. 105.

[111] Letter from Carolyn Hoskinson, Director, EPA Office of Resource Conservation and Recovery, "Lithium Battery Recycling Regulatory Status and Frequently Asked Questions," (May 24, 2023).

[112] 88 Fed. Reg. at 25,937

efforts to rapidly escalate electrification and automatically assumes that "American car buyers will suddenly drop their resistance to EVs."[113]

EPA's cost analysis also assumes—without any concrete support—an "upfront" cost for ZEV purchasers of EVSE at or near the time of the vehicle purchase. In addition, EPA underestimates the cost of the electricity to those customers who are not able to install their own charging stations and take advantage of charging at low-cost times, as the EPA's cost analysis uses a commercial rate and does not consider peak power or time of use charges. Notably, the cost to consumer also fails to account for the decreased range and loads for ZEV HDs in accounting for the payback occurring between three and seven years for long-haul tractors. EPA also fails to account for infrastructure impacts from increased operation of heavier ZEVs on the road including road and bridge deterioration and commensurate reduced funding for infrastructure from fuel tax collections as EPA fails to account for the fact that ZEVs do not pay federal and state liquid transportation fuel taxes.

Critically, EPA fails to account for billions of dollars in electric power infrastructure upgrades needed to supply power to the mandated heavy-duty ZEVs, including additional power generation, transmission, substations, transformers, and other distribution equipment.

EPA also fails to account for the massive increase in insurance costs that must occur when significantly more expensive vehicles are mandated to be on the road, particularly when they are vehicles that insurance companies frequently "total", i.e., scrap, after low-impact crashes due to liability concerns associated with battery fires.

6. EPA Proposes Standards that Fail to Consider ZEV Market Demands.

EPA improperly relied on the general characterization of the heavy-duty vehicle and engine market as supplemented by incentives in the BIL and IRA to support its proposition that there will be a rapid increase in ZEV market penetration. But these ZEVs simply do not have the same range, load capacity, and intended use of existing fleets. To illustrate the needs the BEV market must meet, we are providing at Appendix I information on the sales and uses of Class 7 (26,001–33,000 pound) and Class 8 (33,001 pounds and over) HD vehicles from the U.S. Department of Energy.[114] EPA's Proposed Rule provides little to no information regarding how—

[113] Steven G. Bradbury, Distinguished Fellow, The Heritage Foundation, Prepared Statement for the hearing entitled "Driving Bad Policy: Examining EPA's Tailpipe Emissions Rules and the Realities of a Rapid Electric Vehicle Transition," before the Subcommittee on Economic Grown, Energy Policy, and Regulatory Affairs of the U.S. House of Representatives Committee on Oversight and Accountability, at 10 (May 17, 2023) *available at* https://oversight.house.gov/wp-content/uploads/2023/05/Bradbury-Prepared-Statement-for-17-May-2023-Oversight-Hearing.pdf

[114] Stacy C. Davis and Robert G. Boundy, OAK RIDGE NAT'L LABORATORY – U.S. DEP'T OF ENERGY, "Transportation Energy Data Book," 40th ed. (June 2022), 5-4–5-13, *available at* https://tedb.ornl.gov/wp-content/uploads/2022/03/TEDB_Ed_40.pdf.

or whether—the ZEV mandate can meet current market needs for HD vehicles given the higher range[115] and load capacity[116] of current ICE HD engines, particularly diesel.

7. The Proposed Rule incorrectly assumes that a secure supply chain will exist for ZEV technologies.

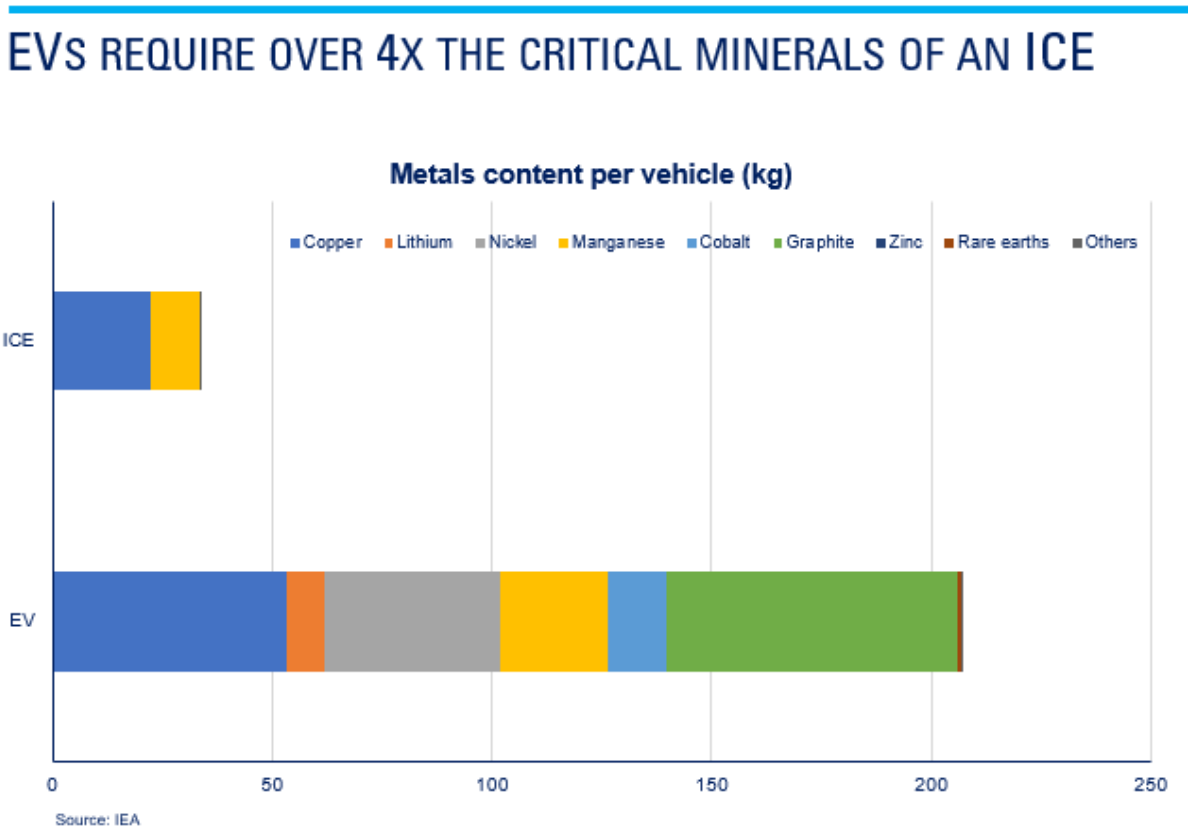
    a. The Proposed Rule does not properly account for the reliance on foreign markets for critical minerals.

Reliance on implementation of a few technologies (e.g., ZEVs) at the pace required by the Proposed Rule will likely result in a non-resilient transport sector that is vulnerable to unexpected disruptions. For instance, both the federal government and the private sector have recognized that critical minerals are essential to the future of ZEV, and likewise, that unstable critical mineral supply chains could disrupt this future. ZEVs, as compared to ICEVs, have a much greater reliance on several critical minerals, as seen in **Figure 3** below. There are six minerals that are critical to the production of EVs: cobalt, copper, graphite, lithium, manganese, and nickel.

[115] Beia Spiller et al., Medium- and Heavy-Duty Behicle Electrification: Challenges, Policy Solutions, and Open Research Questions (May 3, 2023), https://www.rff.org/publications/reports/medium-and-heavy-duty-vehicle-electrification-challenges-policy-solutions-and-open-research-questions/ ("The current available range for electric trucks is less than 200 miles on a single charge—much shorter than the range of comparable diesel vehicles, which . . . can go 2,000 miles without refueling.").

[116] *Id.* ("The high density of batteries generally makes an MHDEV heavier than its diesel equivalent, and the payload may need to be reduced to compensate for the extra weight (Phadke et al. 2021). The extent to which the payload needs to be reduced is unclear, however, and likely depends on several factors, such as fleet operations and vehicle type.").

Figure 3: Metal intensity – ICE vs. EV



The intensity of other critical minerals in the manufacturing of EVs is driven by the chemistry used in batteries. New battery chemistries and types (e.g., solid-state batteries) could reduce the risk exposure to these critical minerals in the future, but none appear to be commercially viable before MY 2032. However, even if a new, less critical mineral-intense, battery technology emerges, EVs would still have critical reliance on sufficient copper availability for mass production of vehicles, and expansion of the grid.

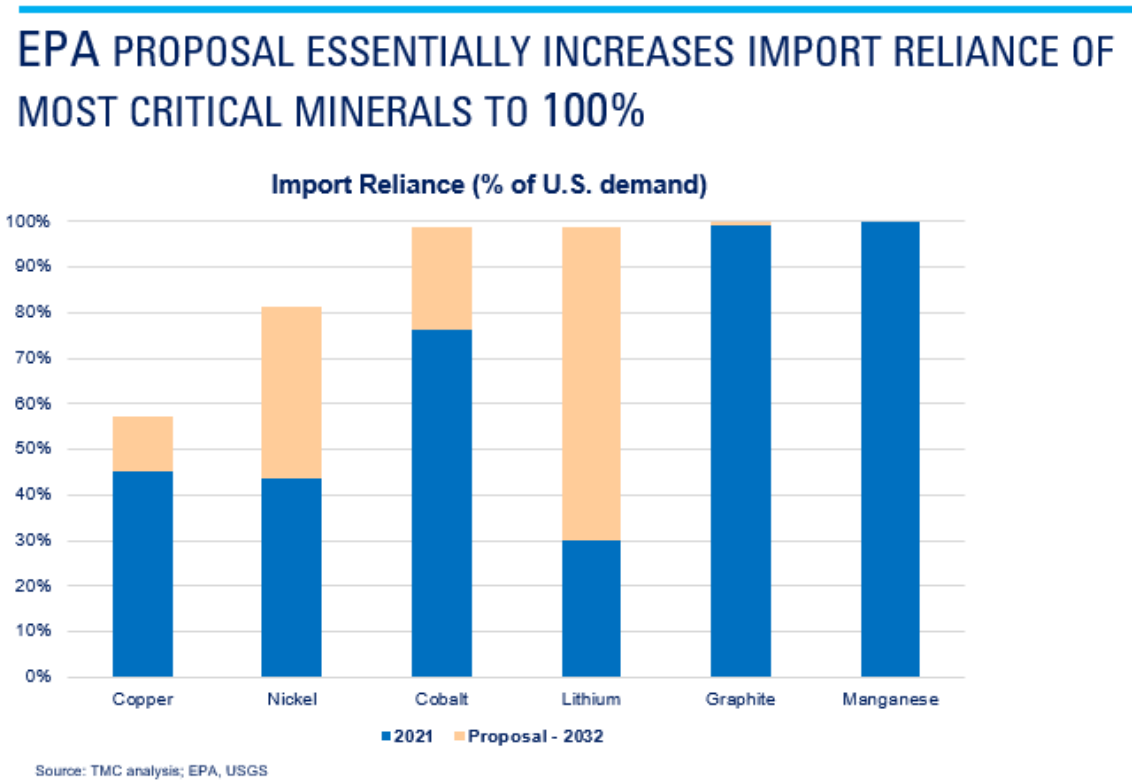
These minerals are essential to many components of a lower-carbon energy system beyond EV batteries, such as solar photovoltaic cells, wind turbines, and hydrogen electrolyzers. In addition, these minerals have multiple traditional uses, such as military defense systems, aerospace, mobile phones, computers, fiber-optic cables, semi-conductors, medical applications, and even bank notes. Without substantial increases in new mining capacity (or massive shifts toward recycling), competition for these minerals will materially stiffen with increased electrification and the shift in underlying grid energy mix. An acceleration in demand for these key minerals could result in price volatility stemming from supply disruptions and/or geopolitical pressures. By contrast, the U.S. is much less reliant on foreign sources of petroleum energy sources. In fact, the U.S. has been a net exporter of gasoline and diesel since late 2009.

The supply chain necessary to support new technologies contemplated by the Proposed Rule is far from assured and is likely to increase dependence on critical minerals from foreign

sources.[117] In the event of supply disruption, the US is highly exposed as it already relies on imports to satisfy domestic demand in each of these critical minerals. **Figure 4** puts this import dependence in perspective. By 2032 the EPA Proposed Rule alone would raise import dependence to 100% of U.S. demand for every mineral but nickel and copper, which would be more than 50% for each. EPA's relatively small increase in the incremental cost of manufacturing a rule-compliant vehicle (Table 13-54 of the DRIA provides a 6-year average of $1,199) is based, in part, on the assumption battery manufacturers are eligible for the IRA's ten percent Production Tax Credit for modules manufactured in the U.S. However, EPA does not assess the likelihood that either battery raw materials will be mined in the U.S. or available for import from credit-qualifying countries. Although the incremental vehicle manufacturing cost in EPA's High Battery Cost sensitivity is higher (Table 13-107 of the DRIA provides a 6-year average of $1,632) than the Proposed Rule, EPA does not quantify how much of the increase in incremental cost is due to battery raw material prices. Except for copper, the U.S. does not mine significant quantities of these critical minerals. And, despite the U.S. having substantial domestic copper mining, it still relies on imports to meet 45% of U.S. demand.

[117] *See, e.g.*, Shelley Challis, Post Register, "Jervois shuts down Idaho Cobalt mine" (Apr. 7, 2023), *available at* https://www.postregister.com/messenger/news/jervois-shuts-down-idaho-cobalt-mine/article_efd97f32-d015-11ed-9424-bfb28220210c.html (describing Jervois's decision to halt construction at the Idaho Cobalt Operations mine due to low cobalt prices, inflation, and the mine's remote location despite Jervois's beneficial support from federal grants—including a not-yet-approved $15 million award from the U.S. Department of Defense—for additional drilling and to pay for studies to assess the possibility of constructing a cobalt refinery in the U.S.).

Figure 4: U.S. importance reliance of several critical minerals



This new demand for foreign-sourced materials will upset the decades of progress the U.S. has made in energy security where we are currently a net exporter of petroleum and petroleum products and undermine the security provided by the domestic refining industry. Sourcing critical minerals and building a secure, North American supply chain for ZEVs is not guaranteed as foreign production and processing of critical minerals have an established, large market share and competitive advantage today. And unlike passenger vehicles, the clean commercial vehicle credits in the IRA do not have a domestic manufacturing sourcing requirement.

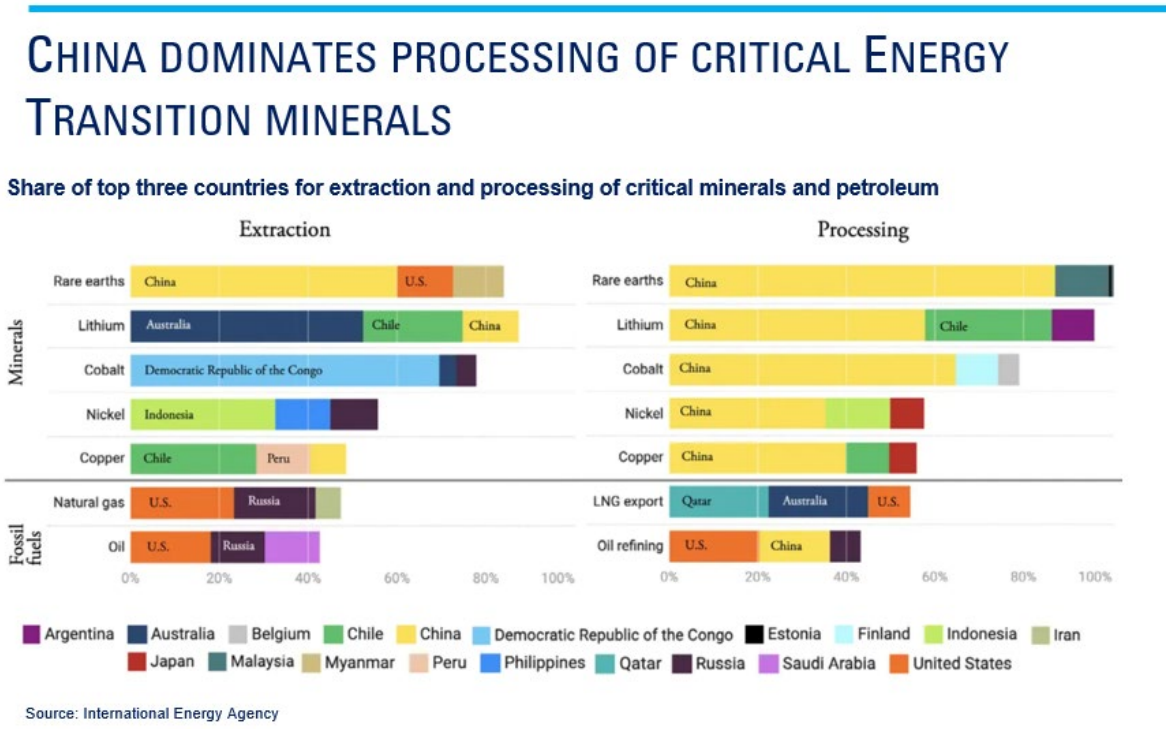
EPA severely overestimates both the availability of minerals and /processing infrastructure and capabilities in the U.S. EPA's position in the DRIA that "ZEV production in the U.S. need not be heavily reliant on foreign manufacture of battery cells or packs as ZEV penetration increases and domestic mineral and cell production comes online" is unfounded.[118]

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 as summarized in **Figure 5** below. Australia, Chile, and China account for nearly 90 percent of the global market. Of the foreign nations that produce cobalt, molybdenum, and other minerals

[118] DRIA at 31.

needed to produce BEVs, China has disproportionate influence. While 70% of global cobalt production comes from the Democratic Republic of Congo,[119] 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.[120] The U.S. imports most of its manganese from Gabon, a less geopolitically stable country, providing 65 percent of the United States' supply.[121]

Figure 5: U.S. lack of critical mineral extraction or processing capacity



In contrast to oil, which has a lower global market concentration than the critical minerals required for ZEVs, **Figure 6** below shows that the most critical materials for BEVs are also in less politically stable jurisdictions. Other than lithium production which is dominated by Australia (52%), all other critical BEV minerals have a political stability index less than oil. As demand for these commodities grow, the market concentration (and ability to exert power over pricing) swings

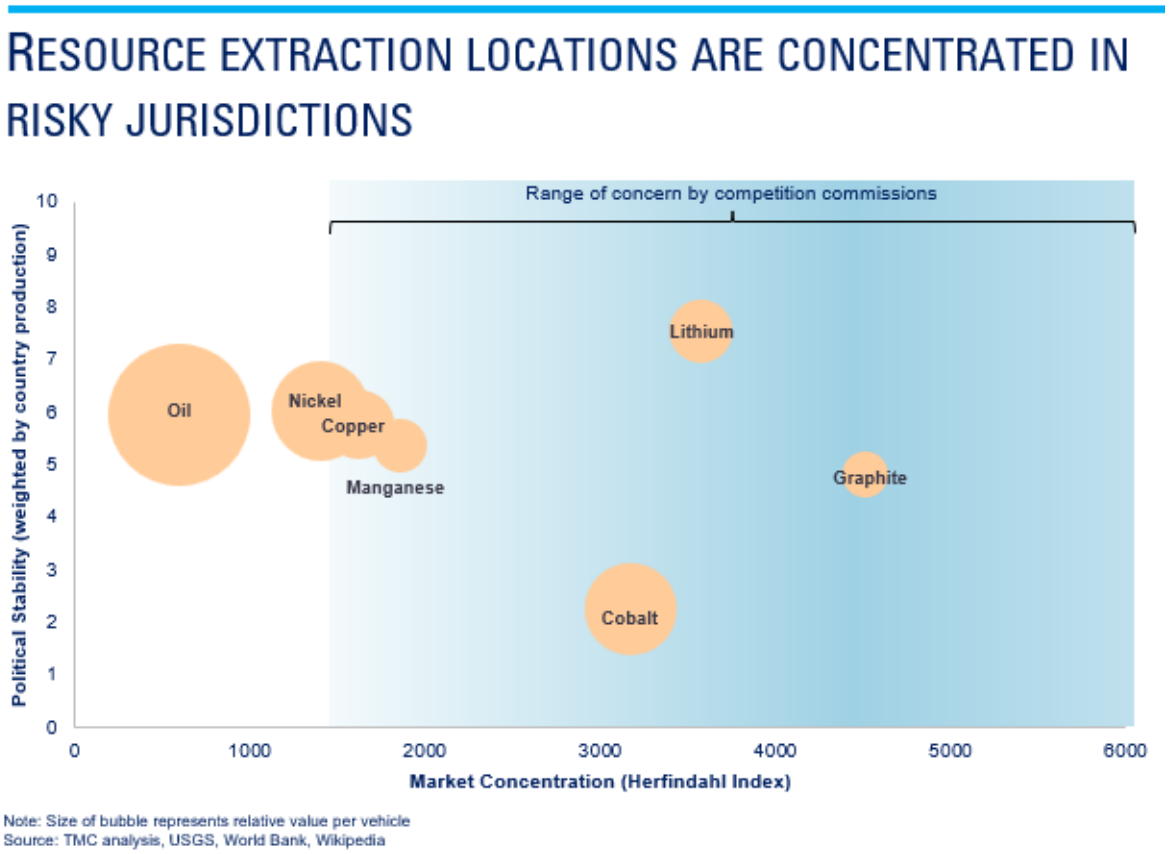
[119] International Energy Agency, *The Role of Critical Minerals in Clean Energy Transitions* (March 2022), *available at* https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

[120] Robinson, G.R., Jr., Hammarstrom, J.M., and Olson, D.W., 2017, Graphite, chap. J of Schulz, K.J., DeYoung, J.H., Jr., Seal, R.R., II, and Bradley, D.C., eds., Critical mineral resources of the United States—Economic and environmental geology and prospects for future supply: U.S. Geological Survey Professional Paper 1802, p. J1–J24, https://doi.org/10.3133/pp1802J.

[121] OEC, "Manganese Ore in the United States" (Mar. 2023) *available at* https://oec.world/en/profile/bilateral-product/manganese-ore/reporter/usa.

towards producers in less politically stable countries. Producer countries having market power have the potential to impact not only price, but the ability for consumer countries to influence other issues, such as sanctity of commercial contracts, labor and/or human rights, and environmental standards in the producing jurisdictions.

Figure 6: U.S. risk exposure to critical energy resources



The invasion of Ukraine reminds governments and businesses of the importance of assessing, planning, and mitigating risks. As we have seen with Europe shifting to several new natural gas supplies (mostly through LNG receipts), supply diversification is an important way to mitigate risk. The key tenet of risk mitigation is not about removing the likelihood of a risk but about reducing its impact to an acceptable level; this is the primary justification for the U.S. holding a Strategic Petroleum Reserve. Exposing U.S. mobility to the risk of critical mineral supply availability raises an energy security question: How best does the U.S. trade risks it can mitigate for risks it cannot?

Beyond the BEV itself, 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.[122] China possesses over half of the entire world's aluminum smelting capacity. EPA's evaluation of the sourcing of critical minerals and building a secure supply chain for clean vehicles does not consider the demand for copper. For example, EPA's conclusions regarding copper appear to ignore altogether the latest data that concludes sourcing copper for electric infrastructure (e.g., charging stations and storage) needed to accommodate increased electrical demand will be challenging.[123] The Proposed Rule fails to even consider that copper demand is expected to rise by 53% when supply is expected to rise by only 16%.[124] Indeed, by 2030, the expected supply from existing mines and projects under construction is estimated to meet only 80% of copper needs by 2030[125]—not considering the increased reliance on ZEV in transportation as anticipated by EPA's Proposed Rule.

In the DRIA, EPA states "according to analyses by Department of Energy's Li-Bridge, no shortage of cathode active material or lithium chemical supply 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 and brine projects do not deliver as expected, some critical minerals could face shortages as early as next year.[126] The options for mitigating supply chain risks are increasingly limited. At current production rates, the world exhausts the minable reserves of copper, cobalt, and nickel in the 2030s. This is accelerated with the anticipated greater production needed under the Proposed Rule.

b. The Proposed Rule over-estimates the ability for the U.S. to source materials and fabricate batteries domestically.

The Proposed Rule fails to fully account for the challenges associated with creating and sustaining a viable domestic supply chain that can deliver the production-ready batteries necessary to meet the Rule's assumed pace of electrification. Notably, the Rule does not properly consider the impediments to a viable domestic supply chain as a result of mineral availability, mineral processing and manufacturing, and overall costs.

Domestic production of critical minerals required for battery production is insufficient to meet the projected demands. According to a review of multiple sources, there is a six-fold demand growth expectation by 2030 and approximately 15 times by 2040. This growth rate

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[122] INTERNATIONAL ENERGY AGENCY, *The Role of Critical Minerals in Clean Energy Transitions* (March 2022), *available at* https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

[123] *Id.*

[124] BLOOMBERGNEF, *Copper Miners Eye M&A as Clean Energy Drives Supply* (Aug. 30, 2022), *available at* https://about.bnef.com/blog/coppers-miners-eye-ma-as-clean-energy-drives-supply-gap/#:~:text=Copper%20demand%20is%20set%20to,and%20difficulty%20developing%20greenfield%20mines.

[125] INTERNATIONAL ENERGY AGENCY, *The Role of Critical Minerals in Clean Energy Transitions* (March 2022), *available at* https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf [hereinafter IEA Report 2022].

[126] Lilly Lee, ENERGY INTELLIGENCE, *Mining the Gap to a Net-Zero Future* (May 15, 2023) *available at* https://www.energyintel.com/00000188-1e5f-d806-ad9f-5edfeb1d0000?utm_campaign=website&utm_source=sendgrid.com&utm_medium=email.

outpaces the market's ability to supply such minerals. These minerals are not available today, mining capacity cannot be increased as quickly as required to meet the rate of production required under the Proposed Rule, and at-scale recycling capabilities will not be available in the foreseeable future (see Chart 1 of supply/demand gap relating to lithium). EPA fails to appreciate these limitations, rendering its Proposed Rule arbitrary and factually unsupported.

The development of natural resources projects, like critical mineral mining and processing, can easily require over a decade. Increasing supply is not merely a matter of increasing current production. "The ability for the miners to quickly ramp up production of key ores is limited by regulatory hurdles and capital investment." Globally, it takes on average over 16 years to move mining projects from first discovery to production.[127] 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.

Establishing new mines, particularly in the United States, also requires a substantial amount of time just to obtain necessary permits and authorizations. As a case in point, the Resolution copper deposit in Arizona was discovered in 1995. This world-class resource has been trying to acquire the necessary regulatory approvals for over 27 years. As recently as May 19, 2023, the U.S. Forest Service told a federal court it was suspending approval of a land swap between the project (owned by Rio Tinto and BHP) and several Native American groups.[128] The land swap was approved by the U.S. Congress in 2014, but the completed environmental report was blocked by the Biden Administration in March 2021.

Even with the requisite authorizations in hand, mine development and production can take years. For an open pit mine, it takes about 7 to 8 years from discovery to first ore; for a subsurface mine the timeframe is more like 10 to 12 years. Extracting critical minerals is challenging too because most critical mineral ores exist in relatively low concentrations and the quality of the ore grade is declining. For example, the average ore grade for copper discoveries has decreased by over 25% in the last 15 years. In that same period, total energy consumption increased 46% – more than the increase in copper production, which was only 30 percent. Extraction (*i.e.*, mining and processing) of metal content from lower-grade ores requires removing more overburden to access the ore body, which requires more energy, exerting upward pressure on production costs, greenhouse gas emissions and waste volumes. And once the raw material is mined, it must be qualified. Lead times to qualification of battery-grade materials go through a very rigorous, staged approach. For example, lithium requires up to 2 years of testing from a new resource before it will be qualified by a cathode producer or battery manufacturer. This is not a mine-to-producer scenario. It is a specialty chemical that must be tested at different stages for safety, consistency of product output, and performance before it can be qualified for use in battery/BEV manufacturing. Careful attention to putting up projects the scale of raw material resource extraction and gigafactories requires both time, careful consideration, and intensive safety

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[127] INTERNATIONAL ENERGY AGENCY, *The Role of Critical Minerals in Clean Energy Transitions* (March 2022), *available at* https://iea.blob.core.windows.net/assets/ffd2a83b-8c30-4e9d-980a-52b6d9a86fdc/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf.

[128] Ernest Scheyder, Reuters, "U.S. Forest Service pauses timeline for Rio Tinto Arizona copper mine" (May 19, 2023) *available at* https://www.reuters.com/legal/us-forest-service-pauses-timeline-rio-tinto-arizona-copper-mine-2023-05-19/.

precautions. Accelerating the buildup of a domestic battery value chain should not overstep aspects of safe project development.

EPA suggests that improvements in recycling rates and enhancing recovery technologies at mines will reduce the need to develop new sources of critical minerals. But this statement is misplaced. Recycling technologies for EV batteries remain nascent and cannot scale at a rate fast enough to alleviate supply shortages within the timeframe of the Proposed Rule. Moreover, even if those technologies develop at a faster than expected pace and commercial scale facilities are fully permitted, litigated, and constructed, there will not be enough batteries to recycle to make the slightest dent in the quantity of critical minerals needed to build out EPA's projected battery demand.

In light of the above, the Proposed Rule creates a multi-year dependence on foreign mineral production and this, coupled with domestic limitations in battery manufacturing capabilities, will make it impossible to sustain the viable domestic supply chain that EPA envisions. While EPA acknowledges that "much of the supply chain supporting the manufacture of ZEVs is located outside of the U.S.,"[129] it arbitrarily underplays this consequence by claiming 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." Battery cell production, however, is just a piece of the value chain, and it cannot grow absent a stable supply of refined critical minerals and precursors. Even assuming critical minerals are available, a viable supply chain requires sufficient capacity of midstream mineral refining operations prior to battery cell production. Such capacity does not exist. For instance, BMI foresees a 77 percent deficit in domestic available cathode active material to meet 2035 demands in North America (N.A.). And this estimate was done *prior* to the EPA proposal.

While Congress and the Administration have taken steps to accelerate the supply chain, it has not done enough to fully support the rate of production required by the Proposed Rule. For example, U.S. supply of battery anode material is supported by the IRA and BIL, but the production of raw materials supply that feeds the production of battery anode material is not supported. Currently, Chinese battery firms are the most advanced and the majority of raw material mining and processing goes through Chinese entities. Thus, it will be difficult for many OEMs to meet the requirements for IRA credits in the near term. As the EPA states "at present, there are few manufacturing plants for HD vehicle batteries in the United States, which means that few batteries would qualify for (any of) the tax credit now."[130] Without a domestic solution to this value chain, reliance on imports will only add to cost to the battery pack.[131]

EPA mistakenly assumes that this will only be a short-term problem until domestic production capabilities ramp-up, drastically under-estimating the time and expense required for domestic facilities to achieve necessary production rates and mistakenly assuming that advertised battery "capacity" translates into actual battery production. EPA notes that many OEMs (mostly light-duty vehicle) and battery manufacturers have announced plans to build gigafactories in North America in light of the government incentives such as the IRA. But these are highly complex projects that will take many years to materialize, even if they do at all. In the DRIA, EPA states

[129] DRIA at 31.

[130] DRIA at 172.

[131] Benchmark Minerals Intelligence, BMI (*see* Chart 2, 3 & 4).

"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."[132] But EPA fails to consider other sources more bearish on potential capacity. For instance, Wood Mackenzie projects U.S. capacity of less than half that level, at 422 GWh/ year in 2030.[133]

Regardless of the purported capacity, it is unlikely that these factories will *operate* beyond 50 percent capacity for a number of years. Mature battery factories today rarely operate above 80 percent utilization rates. For example, in 2022, there was 1,036 GWh of global battery production capacity, but only resulted in 450 GWh of actual production. Failed batteries are the main reason for the operational inefficiency. Benchmark Minerals Intelligence forecast total global supply of lithium-ion batteries to reach 4.5 TWh by 2031 with factories operating around 64 percent utilization rate; by contrast there is approximately 7 TWh of forecast battery capacity planned as of September 2022.[134] This step in the value chain could potentially create a critical bottleneck. In stark contrast to EPA's assumed 998 GWh capacity by 2030, 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.

Ignoring these potential supply chain shortfalls leads to further deficiencies in EPA's analysis. Indeed, limited supplies and constrained supply chains risk production downtime and inventory backlogs—and this is just for production of the ZEVs.[135] The Daimler Truck Group ("Daimler"), for example, has been and is likely to continue to be "acutely affected by an ongoing global shortage of semiconductors, which must be purchased on the global market."[136] And with the "rapidly rising demand for certain new technologies, such as electrified powertrains," Daimler anticipates higher product costs, supply bottlenecks, and long-term increases in demand for battery cells, semiconductors, and certain critical materials, such as lithium." Taken together, Daimler anticipates these supply chain concerns would limit its "ability to meet demand for its *current* generation of vehicles (including its vehicles with conventional combustion engines) or commercialize its new [ZEVs] profitably (or at all)."[137] Daimler, of course, is not alone in these conclusions and yet EPA's Proposed Rule appears to reject outright any realistic assessment of future supply chains.

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[132] DRIA at 31.

[133] Wood Mackenzie, "The EPA plans to rev up US EV sales," (April 14, 2023), *available at* https://www.woodmac.com/news/opinion/the-epa-plans-to-rev-up-us-ev-sales/.

[134] BENCHMARK SOURCE, "Ambition versus reality: why battery production capacity does not equal supply" (Sept. 2, 2022) at Charts 5, 6, *available at* https://source.benchmarkminerals.com/article/ambition-versus-reality-why-battery-production-capacity-does-not-equal-supply.

[135] *See* Daimler Truck Group, *Annual Report 2022*, 141 *available at* https://www.daimlertruck.com/fileadmin/user_upload/documents/investors/reports/annual-reports/2022/daimler-truck-ir-annual-report-2022-incl-combined-management-report-dth-ag.pdf (describing Daimler Truck Group's reliance on certain commodities, like steel, copper, and precious metals that are usually sourced from individual suppliers, meaning that a single supplier's inability to fulfill delivery obligations can have detrimental effects for an entire production line).

[136] *Id.*

[137] Id.

Finally comes the issue of cost and long-term affordability of battery production. 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."[138] This analysis misses the mark. Between January 2021 and March 2022, the cost of lithium increased by 738%.[139] While prices have since declined, price volatility should be expected to continue. Despite these very public findings, EPA asserts that "the cost to manufacture lithium-ion batteries (the single most expensive component of a BEV) has dropped significantly in the past eight years, and that cost is projected to continue to fall during this decade, all while the performance of the batteries (in terms of energy density) improves."[140] Yet future lithium-ion battery production will be heavily subsidized if the BIL and IRA remain in place, which likely serves as an impediment to actually reducing the cost of the battery. Moreover, 2022 battery costs were $153 per kWh,[141] and cost reduction curves have already begun to flatten out. Indeed, battery costs rose 7 percent in 2022.

Even so, EPA projects battery costs of $111 per kWh in 2032.[142] However, EPA fails to analyze the costs of different battery chemistries that are applicable to HDV batteries. For example, there is a trend toward OEMs leveraging cheaper lithium iron phosphate batteries in LDV. However, these batteries are heavier and offer shorter range than lithium-nickel-cadmium and other battery chemistries. EPA cannot cite trends of cheaper batteries (lithium iron phosphate) that cannot be used in HDVs as the basis for mandating electrification of HDVs if those batteries cannot be used for on-road HDV.

Further complicating the projection of future battery prices is the fact that battery raw materials are not commodities, they are classified as specialty chemicals. As such pricing will not follow traditional commodity pricing structures, especially given where these supplies are geographically concentrated in areas with geopolitical instabilities. Each OEM, cathode or anode producer, and battery manufacturer have their own specifications for the materials, and thus the raw materials must be refined and tested to meet their bespoke specification. Spot markets for battery materials are virtually non-existent and unlikely to develop in the near term. For example, most lithium contracts are written as long-term agreements, which are based on Fastmarkets lithium index + a discount, and sometimes with a floor/ceiling mechanism to hedge against pricing volatility.

Though EPA mentions that OEMs are taking steps to secure domestically sourced minerals and related commodities to supply production for these plants, many of those offtake agreements are with projects yet to be permitted, built, or commercialized at scale. OEM,

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[138] DRIA at 32.

[139] *See* Canada Energy Regulator, "Market Snapshot: Critical Minerals are Key to the Global Transition" (Jan. 18, 2023), *available at* https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2023/market-snapshot-critical-minerals-key-global-energy-transition.html.

[140] Proposed Rule at 25,930.

[141] Dept. of Energy, "Electric Vehicle Battery Pack Costs in 2022 Are Nearly 90% Lower than in 2008, according to DOE Estimates," (Jan. 9, 2023) *available at* https://www.energy.gov/eere/vehicles/articles/fotw-1272-january-9-2023-electric-vehicle-battery-pack-costs-2022-are-nearly.

[142] *Id.* at 25,981.

cathode or anode producers, and battery manufacturers are internally assessing their raw material offtake agreements and expect that some projects will not materialize to fruition. BEVs are projected to take approximately 90% of lithium demand by 2030, so, contrary to the assumption in the DRIA, switching chemistries for other uses will not reduce the burden or price on lithium.

Ultimately, the volatility of material pricing will have a direct effect on whether or not certain battery projects even materialize. And if they do, OEMs will need to increase their prices to ensure a steady supply. Morgan Stanley estimates BEV makers will need to increase prices by 25 percent to account for rising battery prices.[143]

As EPA considers the technological feasibility of its proposal, it should further explore whether OEMs are likely to possess adequate resources to adapt to these stringent requirements, especially in light of increasing global supply chain issues and price increases associated with battery demand. EPA's proposal will require an unprecedented rate of vehicle technology change that the nation and OEMs have never experienced before.

* * *

In sum, AFPM urges EPA to rescind the Proposed Rule because EPA has no Congressional authority to redefine the transportation system by mandating electrification under the guise of more stringent GHG standards. At the very least, EPA should reconsider the Proposed Rule considering these comments and the significant challenges facing electrification that were left unanalyzed and severely underestimated by EPA. We thank you for your consideration of these comments and are available for future discussion should you have questions.

[143]James Thornhill, Bloomberg, "Morgan Stanly Flags EV Demand destruction as Lithium Soars" (Mar. 24, 2022), Chart 7, *available at* https://www.bloomberg.com/news/articles/2022-03-25/morgan-stanley-flags-ev-demand-destruction-as-lithium-soars#xj4y7vzkg.

Appendix I

Table 5.3 (Updated June 2022)
New Retail Truck Sales by Gross Vehicle Weight, 1970–2021[a]
(thousands)

Calendar year	Class 1 6,000 lb or less	Class 2 6,001–10,000 lb	Class 3 10,001–14,000 lb	Class 4 14,001–16,000 lb	Class 5 16,001–19,500 lb	Class 6 19,501–26,000 lb	Class 7 26,001–33,000 lb	Class 8 33,001 lb and over	Total
Domestic sales (import data are not available)									
1970[b]	1,049	408	6	12	58	133	36	89	1,791
1975	1,101	952	23	1	9	159	23	83	2,351
1980	985	975	4	[c]	2	90	58	117	2,231
1981	896	850	1	[c]	2	72	51	100	1,972
1982	1,102	961	1	[c]	1	44	62	76	2,248
1983	1,314	1,207	[c]	[c]	1	47	59	82	2,710
1984	2,031	1,224	6	[c]	5	55	78	138	3,538
1985	2,408	1,280	11	[c]	5	48	97	134	3,983
Domestic and import sales									
1986	3,380	1,214	12	[c]	6	45	101	113	4,870
1990	3,451	1,097	21	27	5	38	85	121	4,846
1995	4,422	1,631	40	53	4	23	107	201	6,481
1996	4,829	1,690	52	59	7	19	104	170	6,930
1997	5,085	1,712	53	57	9	18	114	179	7,226
1998	5,263	2,036	102	43	25	32	115	209	7,826
1999	5,707	2,366	122	49	30	48	130	262	8,716
2000	5,965	2,421	117	47	29	51	123	212	8,965
2001	6,073	2,525	102	52	24	42	92	140	9,050
2002	6,068	2,565	80	38	24	45	69	146	9,035
2003	6,267	2,671	91	40	29	51	67	142	9,357
2004	6,458	2,796	107	47	36	70	75	203	9,793
2005	6,586	2,528	167	49	46	60	89	253	9,777
2006	6,136	2,438	150	50	49	70	91	284	9,268
2007	5,682	2,623	166	51	45	54	70	151	8,842
2008	4,358	1,888	135	36	40	39	49	133	6,680
2009	3,528	1,306	112	20	24	22	39	95	5,145
2010	4,245	1,513	161	12	31	29	38	107	6,137
2011	4,714	1,735	195	10	42	41	41	171	6,951
2012	5,164	1,811	223	9	55	40	47	195	7,544
2013	5,615	2,077	254	12	60	47	48	185	8,298
2014	6,209	2,275	264	13	67	52	54	220	9,154
2015	7,161	2,417	283	14	72	55	59	249	10,310
2016	7,724	2,572	296	14	72	62	60	193	10,993
2017	8,102	2,637	317	19	79	63	62	192	11,470
2018	8,881	2,728	301	21	81	72	64	251	12,398
2019	9,091	2,819	327	22	85	78	66	276	12,765
2020	8,195	2,526	349	22	93	52	51	192	11,480
2021	8,805	2,415	380	28	102	61	48	222	12,059
Average annual percentage change									
1970-2021	4.3%	3.5%	8.5%	1.7%	1.1%	-1.5%	0.6%	1.8%	3.8%
1986-2021	2.8%	2.0%	10.4%	8.1%	8.4%	0.9%	-2.1%	1.9%	2.6%
2011-2021	6.4%	3.4%	6.9%	11.0%[d]	9.3%	4.1%	1.6%	2.6%	5.7%

Table 5.4
Diesel Share of Medium and Heavy Truck Sales by Gross Vehicle Weight, 1995–2020[a]

Calendar year	Class 4 14,001–16,000 lb	Class 5 16,001–19,500 lb	Class 6 19,501–26,000 lb	Class 7 26,001–33,000 lb	Class 8 33,001 lb and over	Total (Class 4 - Class 8)
1995	68%	87%	70%	74%	100%	87%
1996	66%	92%	69%	68%	100%	85%
1997	61%	90%	82%	70%	100%	85%
1998	72%	91%	88%	72%	100%	88%
1999	62%	86%	90%	74%	100%	88%
2000	62%	93%	54%	68%	100%	83%
2001	91%	90%	70%	59%	100%	84%
2002	68%	93%	66%	54%	100%	82%
2003	74%	92%	77%	47%	100%	83%
2004	71%	92%	76%	54%	100%	85%
2005	74%	92%	73%	56%	100%	87%
2006	76%	92%	75%	59%	100%	88%
2007	78%	92%	52%	50%	100%	81%
2008	81%	92%	58%	50%	100%	84%
2009	87%	91%	56%	36%	100%	80%
2010	94%	93%	92%	39%	100%	87%
2011	82%	80%	95%	49%	100%	91%
2012	14%	79%	95%	49%	100%	89%
2013	39%	80%	96%	46%	100%	88%
2014	32%	80%	91%	45%	100%	88%
2015	24%	80%	98%	48%	100%	89%
2016	21%	54%	89%	45%	100%	78%
2017	16%	52%	87%	45%	100%	75%
2018	18%	53%	87%	50%	100%	80%
2019	27%	58%	90%	45%	100%	82%
2020	25%	60%	90%	100%	99%	82%

The figure below shows the distribution of annual travel the two types of Class 7 and 8 vehicles–combination units (separate tractor and trailer) and single units (tractor and trailer on a single chassis). This information is for all trucks and trucks two years old or less. Combination trucks, dominated by box-type trailers, display the greatest amount of annual travel of all heavy vehicle types, as is evidenced both by the range of annual use. Most of the single-unit trucks in the survey travel 40,000 miles per year or less.

Figure 5.2. Distribution of Trucks over 26,000 lb by Vehicle-Miles Traveled, 2002