RENEWABLE FUELS ASSOCIATION

July 5, 2023

Attention: Docket ID No. EPA-HQ-OAR-2022-0829

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

Via: www.regulations.gov

Re: Comments on EPA's Proposed Rule "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles" (88 Fed. Reg. 29184; May 5, 2023)

Dear Administrator Regan,

The Renewable Fuels Association (RFA) appreciates the opportunity to submit the attached comments regarding the U.S. Environmental Protection Agency's (EPA's) Proposed Rule "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles."

RFA is the leading trade association for America's ethanol industry. Its mission is to advance the development, production, and use of fuel ethanol by strengthening America's ethanol industry and raising awareness about the benefits of renewable fuels. Consistent with our mission, RFA supports action by EPA to address the effects of climate change and we urge EPA to do so by adopting a technology-neutral approach that accounts for all lifecycle emissions of the vehicles it regulates. As detailed in the attached comments, a technology-neutral rule that embraces multiple decarbonization options will not only avoid some of the legal issues EPA's current proposal will face, but it is also the quickest and most economical way for EPA to achieve its ambitious emissions reduction goals.

Unfortunately, EPA's proposal would effectively force automakers to produce more battery electric vehicles (BEVs) and strongly discourage them from pursuing other technologies that could achieve the same—or even better—environmental performance at a lower cost to American consumers. By allowing BEV manufacturers to use a zero grams CO_2 per mile value for the purposes of complying with the standards, EPA is falsely assuming that BEVs have no carbon impact whatsoever. EPA's proposed approach

ignores the significant upstream emissions related to electricity generation, as well as the substantial emissions involved in battery mineral extraction and processing.

As described more fully in the attached comments, RFA recommends that EPA make the following improvements to the rule before finalization:

- Discontinue the use of the zero-gram CO_2 per mile compliance value for EVs, as it provides an inaccurate picture of the true climate impacts of EVs and was meant to be a temporary measure;
- Adopt a full lifecycle GHG analysis approach that includes upstream emissions for all vehicle and fuel options;
- Restructure the regulations to equally incentivize all low-carbon transportation options, including renewable fuels like ethanol;
- If EPA insists on maintaining its zero gram per mile incentive for EVs, it must also consider similar carbon accounting treatment and incentives for other low-carbon vehicle/fuel options;
- Re-evaluate marketplace realities and barriers to rapid adoption of EVs; and
- Move ahead with a separate rulemaking to address particulate matter emissions using fuel property controls.

If our nation is to reach its goal of net-zero GHG emissions by mid-century, we will need cleaner, more efficient cars *and* cleaner, more efficient fuels. And, we will need to account for their emissions honestly using a full lifecycle approach. Focusing only on emissions from the vehicle—while ignoring emissions related to the extraction and production of the fuel used to power the vehicle—will almost certainly result in falling far short of the administration's overall climate goals.

Thank you for considering our comments on the proposed rule and we look forward to continuing our work together with EPA to increase vehicle efficiency, reduce greenhouse gas emissions, and decrease emissions of harmful criteria pollutants.

Sincerely,

Geoff Cooper
President and CEO

COMMENTS OF THE

RENEWABLE FUELS ASSOCIATION (RFA)

IN RESPONSE TO

MULTI-POLLUTANT EMISSIONS STANDARDS FOR MODEL YEARS 2027 AND LATER LIGHT-DUTY AND MEDIUM-DUTY VEHICLES: PROPOSED RULE

DOCKET ID NO. EPA-HQ-OAR-2022-0829

The Renewable Fuels Association (RFA) submits the comments below in response to the U.S. Environmental Protection Agency's (EPA's) Proposed Rule "Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles." (88 Federal Register 29184; May 5, 2023).

I. Executive Summary

EPA's proposed tailpipe emissions standards for 2027 and later years set extremely aggressive goals for reducing vehicular greenhouse gas (GHG) and criteria pollutant emissions. Achieving these goals would require dramatic changes not only in vehicle design, but also in the entire transportation energy supply chain. In addition, meeting the proposed emissions standards in the manner envisioned by EPA would require a massive and rapid shift in the vehicle purchasing and refueling behavior of American consumers. Indeed, if the rule is finalized as proposed, EPA projects that electric vehicles (EVs) "could account for 67% of new light-duty vehicle sales and 46% of new medium-duty vehicle sales in MY 2032."[1] By comparison, EVs accounted for just 5.8% of new light-duty vehicle sales in 2022 and accounted for just 1% of total registered light-duty vehicles.[2]

While EVs are likely to play an important role in achieving emissions reductions goals, the growth in EVs projected by EPA would require enormous investment and rapid expansion in many global industrial sectors. Such a transition would require immediate and dramatic growth in the mining and processing of critical minerals, a massive increase in the generation and distribution of lower-carbon electricity, and the rapid buildout of a nationwide infrastructure network for recharging EVs.

It would be naïve and unrealistic to believe that such extraordinary changes in the marketplace can be achieved smoothly and quickly. There are numerous obstacles involved in a transition of this scale, including geopolitical and national security concerns;

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[1] U.S. Environmental Protection Agency. "Biden-Harris Administration Proposed Strongest-Ever Pollution Standards for Cars and Trucks to Accelerate Transition to a Clean-Transportation Future." April 12, 2023. https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars-and

[2] Kelly Blue Book. "America Splits Into Thirds on Electric Cars." (March 22, 2023). https://www.kbb.com/car-news/america-splits-into-thirds-on-electric-cars/

long lead times in permitting, material supply, design, and manufacturing; substantial capital investments; safety considerations; and unprecedented changes in consumer behavior and purchasing habits.

To achieve the Agency's ambitious emissions reduction goals in the most robust, rapid, and affordable way, EPA should use this rulemaking to encourage multiple additional solutions that can decarbonize light- and medium duty transportation. EPA must also recognize that vehicles and fuels operate as integrated systems. Focusing only on emissions from the vehicle—while ignoring emissions related to the extraction and production of the fuel used to power the vehicle—will almost certainly result in falling far short of the administration's overall climate goals.

Low-carbon liquid fuels like ethanol have a unique and vital role to play in the administration's efforts to combat climate change and reduce overall emissions from the transportation sector—both immediately and in the long term. Fuels such as E15 (15% ethanol) are compatible with nearly all vehicles on the road today, and thus offer immediate emissions benefits on a much larger scale than changes to only new vehicles. In addition, E85 (51-83% ethanol) used in flexible fuel vehicles (FFVs) can substantially reduce GHG emissions from the light-duty vehicle sector. More than 25 million FFVs are already on the road today and FFV production can be ramped up quickly by automakers at no additional cost to the consumer. In the longer term, low-carbon or zero-carbon liquid fuels used in FFVs or plug-in hybrid electric FFVs can offer emissions solutions for market segments and customers that may not be well served by battery electric vehicles (BEVs).

To foster a vibrant and competitive landscape of multiple low-carbon solutions, it is critical for EPA to set performance-based and technology-neutral emissions standards. Unfortunately, the proposed rule falls short of this ideal by focusing narrowly on one technology and only one segment of the GHG emissions lifecycle (i.e., tailpipe emissions). It is essential that EPA look beyond tailpipe emissions; the Agency should use a full lifecycle[3] analysis to fairly and accurately compare the climate impacts of all current and future transportation options.

II. The Proposed Rule Uses Inappropriate GHG Accounting Gimmicks to Create a De Facto Mandate for Battery Electric Vehicles

For light-duty vehicles, EPA is proposing an industry-wide average GHG emissions target of 82 grams CO_2/mile (g/mile) in model year (MY) 2032. This represents a drastic 56% reduction from the MY 2026 target of 186 g/mile and a 63% reduction from the MY 2022 target of 224 g/mile. Notably, the estimated industrywide average GHG emissions rate

[3] Throughout these comments, the terms "full lifecycle analysis" refer to a complete "well-to-wheel" analysis as defined by Argonne National Laboratory.

has exceeded the annual standard each year since 2016, requiring automakers to use banked credits and other adjustments to comply.[4]

For the purposes of calculating fleet-average GHG emissions, EPA is proposing to allow auto manufacturers to use a compliance value of 0 g/mile for BEVs, fuel cell electric vehicles (FCEVs), and the electric-only portion of operation for plug-in hybrid EVs (PHEVs). As EPA acknowledges, a compliance value of 0 g/mile for EVs ignores the upstream emissions associated with battery production and electricity generation (i.e., the "fuel" for EVs).

Given the stringency of the proposed standards (and the inability of most internal combustion engine (ICE) vehicles to meet them), EPA expects auto manufacturers will be strongly compelled to substantially increase EV production in order to benefit from the 0 g/mile assumption when calculating fleet-wide average emissions. According to EPA's own analysis, it is highly unlikely that automakers will be able to meet EPA's proposed emissions standards for 2027-2032 without dramatically increasing the production of EVs and reducing the production of ICE vehicles. The proposal's forced push toward EVs would be exacerbated by EPA's proposal to eliminate the "multiplier incentive" that allows automakers to count one BEV as more than one "zero emissions vehicle" in compliance calculations. In this way, EPA is essentially forcing auto manufacturers to increase production of EVs, and in turn forcing the entire transportation supply chain to undergo a massive shift toward electrification.

While significantly increasing the production of EVs may help automakers comply with the proposed future emissions standards, such a transition certainly does not guarantee that real-world GHG emissions associated with the full transportation supply chain will be meaningfully reduced. In fact, depending on the sources of electricity used to power EVs and the practices used for extraction and refining of critical battery minerals, EPA's proposal to force increased EV production could fall far short of accomplishing the administration's climate objectives. Thus, EPA's tailpipe emissions standards could perversely incentivize the production and sale of more expensive vehicles that, in reality, have little practical impact on reducing overall emissions.

a. BEVs are *Not* "Zero Emissions Vehicles." Counting Only Tailpipe Emissions Results in a Flawed and Incomplete Assessment of the True Climate Impacts of BEVs

EPA's proposal to assign a value of 0 g/mile to BEVs ignores the fact that significant CO_2 emissions result from the extraction and processing of the critical minerals for EV batteries, as well as the production of electricity for BEVs. Some lifecycle analysis studies show that certain BEVs (using coal-generated electricity and battery minerals from

[4] Congressional Budget Office. "Emissions of Carbon Dioxide in the Transportation Sector." December 2022. https://www.cbo.gov/publication/58861

intensive mining practices) may have a larger carbon footprint than conventional vehicles using liquid fuels in internal combustion engines.[5,6]

On average basis, a recent comprehensive analysis by Argonne National Laboratory (in cooperation with automotive and energy industry experts) found that the full lifecycle GHG emissions associated with a typical 400-mile range BEV are approximately 253 g/mile.[7] This estimate takes into account the upstream emissions associated with the EV battery and production of the electricity used to power the vehicle. While the 253 g/mile figure represents a roughly 40% reduction in GHG emissions compared to a gasoline-powered ICE vehicle, it is far from "zero emissions." At the same time, the Argonne study found that using today's average E85 in an ICE FFV resulted in lifecycle GHG emissions of approximately 255 g/mile—generally the same as the 400-mile BEV.

EPA's proposed approach of assigning a 0 g/mile value to BEVs essentially assumes that the electricity and battery minerals powering the BEV are 100% renewable and free of any CO_2 emissions impacts in every instance. Of course, we know this is not the case. Today, more than 60% of U.S. electricity generation comes from fossil fuels that contribute significant CO_2 emissions (19.5% coal, 40% natural gas, 1% petroleum and other).[8] Wind and solar provide only 13.6% of the nation's electricity, with hydropower providing another 6.2%. Nuclear accounts for 18% of U.S. electric power generation. Overall, electric power generation is the second largest source of GHG emissions in the United States, accounting for 25% of total emissions (trailing only the transportation sector, which is responsible for 28% of U.S. emissions).[9]

To ensure the final tailpipe standards have the desired effect of truly reducing GHG emissions from transportation, RFA strongly urges EPA to adopt a full lifecycle GHG accounting approach for all vehicles in the final rule.

III. EPA Admits its GHG Accounting Loophole for BEVs is Not Rooted in Science and is Instead Meant to Incentivize Production of BEVs

In the proposal, EPA readily acknowledges that operation of an EV is directly responsible for some amount of upstream GHG emissions related to electricity generation. Yet, the Agency proposes to ignore these emissions and continue the use of a scientifically dubious assumption that operation of an EV is entirely free of any GHG impacts. Indeed,

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[5] See, for example, Paul Leinert. "Analysis: When do electric vehicles become cleaner than gasoline cars?" Reuters. July 7, 2021. https://www.reuters.com/business/autos-transportation/when-do-electric-vehicles-become-cleaner-than-gasoline-cars-2021-06-29/

[6] International Energy Agency. "The Role of Critical Minerals in Clean Energy Transitions." May 2021. https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

[7] Kelly et al., "Cradle-to-Grave Lifecycle Analysis of U.S. Light-Duty Vehicle-Fuel Pathways: A Greenhouse Gas Emissions and Economic Assessment of Current (2020) and Future (2030-2035) Technologies", report ANL-22/27, June 2022. https://www.osti.gov/biblio/1875764

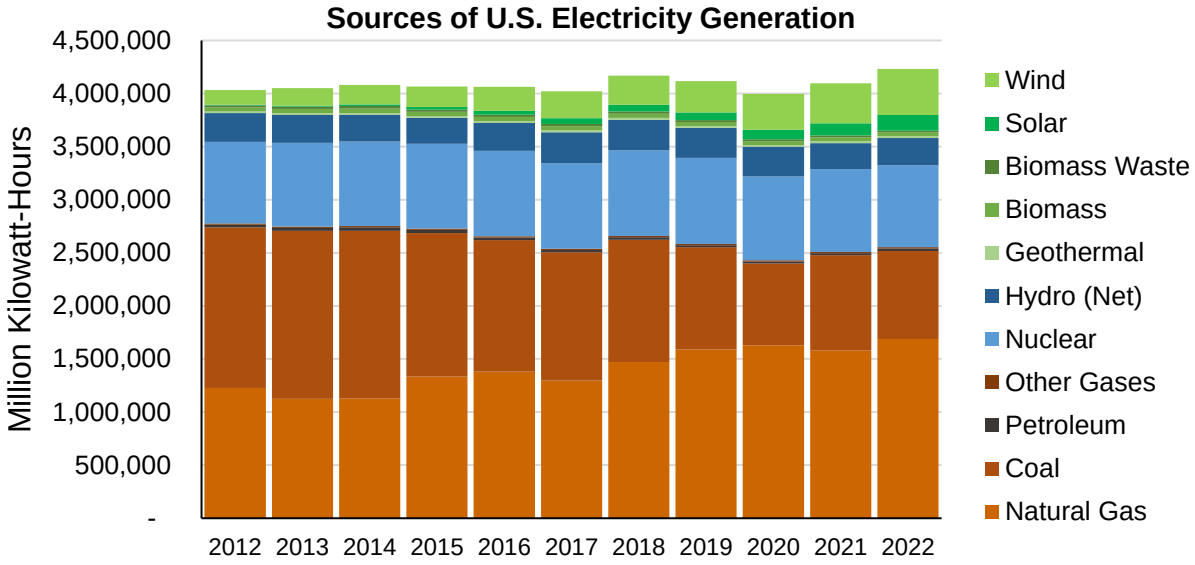
[8] U.S. Energy Information Administration. "What is U.S. electricity generation by energy source?" March 2023. https://www.eia.gov/tools/faqs/faq.php?id=427&t=3

[9] U.S. Environmental Protection Agency. "Sources of Greenhouse Gas Emissions." Accessed June 17, 2023. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

EPA says it is proposing to continue the 0 g/mile compliance value for BEVs strictly as a means of "encouraging the continued development and introduction of electric vehicle technology."[10] In other words, EPA proposes to use the 0 g/mile compliance value as a veiled subsidy to compel the production of a specific technology to the exclusion of other technologies that could deliver similar levels of emissions reduction.

The Agency's reasoning for maintaining the 0 g/mile compliance value for BEVs is highly questionable. EPA says it is continuing the 0 g/mile assumption because in 2020, "power sector emissions were declining and the trend was projected to continue."[11] Yet, EPA also reports that "[i]n 2021, the electric power sector was the *second largest source* of U.S. greenhouse gas emissions, accounting for 25% of the U.S. total."[12] EPA data show the electric power sector emitted nearly 1.6 billion metric tons of GHG emissions in 2021, yet the Agency's proposal effectively assumes those emissions don't exist and have no bearing on the climate impacts of EVs.

Additionally, according to the U.S. Energy Information Administration (EIA), "CO_2 emissions created in the U.S. electric power sector *rose by 7%* in 2021 (102 MMmt) as a result of changes in both electricity usage and fuel mix."[13] The 7% increase in electric power sector emissions was more than double the 3% increase in electric power generation, as the use of coal and petroleum both increased in 2021. EIA reports that these changes "led to a 4% increase in the carbon intensity of electricity" in 2021.[14]



Source: EIA

[10] 88 Fed. Reg. 29252 (May 5, 2023)
[11] *Id.*
[12] U.S. Environmental Protection Agency. "Sources of Greenhouse Gas Emissions." Accessed July 1, 2023. https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#electricity (emphasis added)
[13] U.S. Energy Information Administration. "U.S. Energy Related Carbon Dioxide Emissions 2021." Accessed May 20, 2023.https://www.eia.gov/environment/emissions/carbon/#:~:text=Commercial%20sector%20emissions%20increased%20by,in%20the%20electricity%20fuel%20mix. (emphasis added)
[14] *Id.*

While the use of coal for electricity declined in 2022 versus 2021, the use of both petroleum and natural gas for electricity in 2022 increased over 2021 levels, meaning total fossil fuel use for electricity continued to increase in 2022.[15] Clearly, it is not safe to simply assume that electric power sector emissions will steadily decline over time, especially as electricity demand increases as a result of expanded EV sales and other factors.

Notwithstanding the fact that RFA favors a full lifecycle GHG analysis and recommends against the use of the 0 g/mile compliance value for EVs, if EPA intends to use g/mile compliance values as policy incentives to stimulate the production of lower-carbon vehicles, it should be equitable in doing so. If the Agency believes it has the authority to compel greater production of lower-carbon vehicle technologies using GHG compliance values that always assume the best-case technology and energy mix, then it should do so fairly across the full portfolio of lower-carbon fuel and vehicle options.

IV. EPA Should Discontinue the Use of its Zero Gram per Mile Emissions Assumption for BEVs

EPA's proposal solicits comment on the "proposed treatment of electrified vehicles in manufacturer compliance calculations" (i.e., the use of a 0 g/mile compliance value).[16] For the reasons described throughout these comments, RFA strongly recommends that EPA discontinue the use of its 0 g/mile compliance value for BEVs. The 0 g/mile value unfairly compels automakers to produce one specific technology type, while also providing an inaccurate and incomplete picture of the true climate impacts of EVs.

Importantly, the 0 g/mile measure was also meant to be temporary. EPA previously finalized regulations that would phase down and ultimately eliminate the 0 g/mile compliance value for EVs. In response to public comments on EPA's 2012 proposed rule for MY 2017 and later light-duty vehicle GHG standards, the Agency finalized an approach that would have required automakers to account for upstream electricity emissions for all MY 2022 and later EVs. However, in the 2020 vehicle GHG emissions standards rule, EPA reversed this approach and instead extended the use of the 0 g/mile compliance value through MY2026, with no phasedown. Now, defying the original temporary intent of the 0 g/mile value, EPA proposes to make the 0 g/mile assumption permanent for EVs.

RFA believes the 0 g/mile compliance value for EVs should be discontinued with MY2026 or sooner, as this "incentive" results in inaccurate accounting of emissions related to BEVs and it is no longer necessary to spur production of EVs. As EPA acknowledges, the 0 g/mile "functioned as intended" to stimulate increased production in EVs, which are "now

[15] U.S. Energy Information Administration. "Monthly Energy Review." Table 7.2a Electricity Net Generation. Accessed July 1, 2023. https://www.eia.gov/totalenergy/data/monthly/pdf/sec7_5.pdf
[16] 88 Fed. Reg. 29252 (May 5, 2023)

coming into the mainstream."[17] As stated by EPA, automakers have already committed enormous investments toward EVs, and increased production of EVs is strongly incentivized under state policies and other federal programs like the Inflation Reduction Act. Thus, no additional incentive is needed under the tailpipe emissions regulation.

It is time for EPA to eliminate the use of the 0 g/mile compliance value for EVs and adopt a full lifecycle approach for determining GHG values.

V. The Proposed Rule Ignores the GHG Reduction Benefits of Ethanol and Other Renewable Liquid Fuels

Renewable fuels like ethanol offer an effective and immediate solution for decarbonizing liquid fuels and ICE vehicles across all segments of the transportation sector. Ethanol has a vital role to play in reducing GHG emissions from the transportation sector, but EPA's proposed emissions standards regrettably fail to provide any mechanisms for capturing these benefits or encouraging greater production and sale of vehicles that can operate on higher levels of low-carbon liquid fuel.

Today's corn starch ethanol already reduces GHG emissions by roughly half, on average, compared to gasoline. According to the Department of Energy's Argonne National Laboratory, typical corn ethanol provides a 44% GHG savings compared to gasoline, even when unverifiable emissions from direct and indirect changes in land cover/land use are included.[18] When corn ethanol is compared directly to gasoline (i.e., no indirect emissions included for either fuel), Argonne National Laboratory finds that corn ethanol reduces GHG emissions by 52%, on average, versus gasoline. Similarly, researchers affiliated with Harvard University, MIT, and Tufts University concluded that today's corn ethanol offers an average GHG reduction of 46% versus gasoline, including land use change emissions.[19]

In addition, the California Air Resources Board (CARB) has conducted extensive lifecycle analysis and certified that ethanol produced from the cellulosic biomass found in corn generally reduces GHG emissions by 70-80% compared to gasoline; more than 140 million gallons of ethanol from corn-based cellulosic biomass were used in California in 2021, reducing GHG emissions by nearly 800,000 MT CO2e.[20] Overall, CARB found that from 2011 to 2021, the use of ethanol from all feedstocks cut GHG emissions from the California transportation sector by 31 million MT CO2e, more than any other fuel used to meet the state's Low Carbon Fuel Standard (LCFS) requirements.[21] All liquid biofuels—

[17] *Id*.
[18] Lee, U., Kwon, H., Wu, M. and Wang, M. (2021), Retrospective analysis of the U.S. corn ethanol industry for 2005–2019: implications for greenhouse gas emission reductions. Biofuels, Bioprod. Bioref., 15: 1318- 1331. https://doi.org/10.1002/bbb.2225
[19] Melissa J Scully et al (2021), Carbon intensity of corn ethanol in the United States: state of the science. Environ. Res. Lett. 16 043001. https://iopscience.iop.org/article/10.1088/1748-9326/abde08
[20] CARB. "LCFS Pathway Certified Carbon Intensities." Viewed Feb. 7, 2023. https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities
[21] CARB. "Low Carbon Fuel Standard Reporting Tool Quarterly Summaries." Viewed Jan. 20, 2023. https://ww2.arb.ca.gov/resources/documents/low-carbon-fuel-standard-reporting-tool-quarterlysummaries

including ethanol, renewable diesel, and biodiesel—accounted for 74% of the carbon reductions delivered under the LCFS from 2011 through 2021.[22] Similarly, ethanol has generated 45% of the carbon reductions achieved under Oregon's Clean Fuel Program (CFP) since its inception 2016.[23] When combined with biodiesel and renewable diesel, liquid biofuels have accounted for 87% of total GHG reductions under the Oregon CFP.[24]

With the rapid emergence of new technologies and more efficient practices, even greater GHG reductions are coming to the corn ethanol sector. In fact, analysis by the U.S. Department of Agriculture found that some biorefineries are likely already producing corn starch ethanol that offers a 70% GHG reduction versus gasoline.[25] Indeed, the U.S. ethanol industry is well on its way to producing corn ethanol that is fully carbon neutral. With the adoption of CCUS, biogas and renewable electricity substitution, and climate-smart farming practices, corn ethanol is expected to achieve net zero emissions, on average, by 2050 or sooner.

A landmark 2022 study examined numerous technology pathways for corn ethanol producers to achieve net zero emissions, concluding that "…ethanol producers can achieve extremely low corn ethanol emissions and fill a critical need in tomorrow's zero-carbon economy."[26] The study found that the corn ethanol industry is likely to meet its goals of producing net-zero ethanol, on average, well before 2050. In fact, RFA's member companies are so confident about the promise of carbon neutral ethanol that they adopted a resolution in 2021 to achieve a net-zero carbon footprint, on average, for ethanol by 2050 or sooner. This pledge was memorialized in a letter to President Biden in July 2021.

It is important to note that the expansion of low-carbon ethanol production in the United States has not resulted in cropland expansion or conversion of native lands (e.g., forest or grassland) to agriculture. As part of the Renewable Fuel Standard (RFS) program, EPA conducts an annual analysis of U.S. agricultural land area to ensure that the RFS has not caused cropland to expand beyond 2007 levels. Each year, EPA's analysis continues to show that the amount of land engaged in agricultural production is well below the level in 2007 when the RFS was extended and expanded by Congress. Over the last 10 years, the U.S. agricultural land area has averaged 380 million acres, which is 22 million acres less than the agricultural land area in 2007, according to EPA.

In addition to its environmental benefits, ethanol also makes a vital contribution to our nation's economy. The 199 ethanol biorefineries across the country serve as crucial drivers of employment and income in the communities in which they operate. Even as

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[22] *Id*.
[23] Oregon DEQ. "Quarterly Data Summaries." Viewed Feb. 8, 2023. https://www.oregon.gov/deq/ghgp/cfp/Pages/Quarterly-Data-Summaries.aspx
[24] *Id*.
[25] Jan Lewandrowski, Jeffrey Rosenfeld, Diana Pape, Tommy Hendrickson, Kirsten Jaglo & Katrin Moffroid (2020). "The greenhouse gas benefits of corn ethanol – assessing recent evidence," Biofuels, 11:3, 361-375, DOI: 10.1080/17597269.2018.1546488 https://www.tandfonline.com/doi/full/10.1080/17597269.2018.1546488
[26] Emery, Isaac. Informed Sustainability Consulting (2022). "Pathways to Net-Zero Ethanol: Scenarios for Ethanol Producers to Achieve Carbon Neutrality by 2050." Prepared for the Renewable Fuels Association. https://d35t1syewk4d42.cloudfront.net/file/2146/Pathways%20to%20Net%20Zero%20Ethanol%20Feb%202022.pdf

Russia's invasion of Ukraine caused a global energy crisis in 2022, and even as abnormally high inflation rates impacted the U.S. economy, the production of 15.4 billion gallons of ethanol directly employed nearly 79,000 American workers in the manufacturing and agriculture sectors. In addition, the ethanol industry supported 343,000 indirect and induced jobs across all sectors of the economy. Meanwhile, the industry generated $35 billion in household income and contributed $57 billion to the national Gross Domestic Product (GDP) in 2022.[27] These significant employment impacts and economic contributions should be taken into consideration by EPA as it examines potential future energy and climate regulatory actions that may impact the biofuels sector.

VI. EPA Should Adopt a Full Lifecycle Analysis Approach for All Vehicle Options that Includes Upstream GHG Emissions Associated with Vehicle Fuel/Energy Use

Vehicles and fuels operate together as integrated systems. This is true whether the system is a battery electric vehicle operating on electricity, or an ICE vehicle operating on liquid fuel. To effectively regulate emissions associated with the operation of light- and medium-duty vehicles, EPA must adopt approaches that most accurately assess the overall climate impacts of various transportation options. Specifically, EPA should examine the full scope of lifecycle GHG emissions associated with each vehicle/fuel system and allow automakers to use g/mile compliance values that reflect the overall GHG impacts of various vehicle/fuel options.

In the proposal, EPA requests comments on its proposed treatment of electrified vehicles in manufacturer compliance calculations (i.e., the use of a 0 g/mile compliance value for EVs). As part of its rationale for proposing to maintain the 0 g/mile value for EVs, the Agency states that "[i]f EPA deviated from this tailpipe emissions approach [i.e., using 0 g/mile] by including upstream accounting, it would appear appropriate to do so for all vehicles, including gasoline-fueled vehicles."[28]

RFA agrees with this statement by EPA and recommends that the Agency should indeed adopt an approach that accounts for full lifecycle emissions for *all* fuel and vehicle combinations. In fact, this is the only scientifically defensible approach for regulating emissions from light- and medium-duty vehicles. Implementing an approach that accounts for all lifecycle emissions would not only open the automotive market to greater competition and lower costs for consumers, but it would stimulate investment in lower-carbon technologies and practices across the entire fuel/vehicle supply chain.

RFA believes the final rule should take a market-based approach that sets clear and predictable annual full lifecycle GHG reduction requirements for automakers (in g/mile

[27] J.M. Urbanchuk (ABF Economics). "Contribution of the Ethanol Industry to the Economy of the United States in 2022." (February 2023).
[28] 88 Fed. Reg. 29252 (May 5, 2023)

values), then allows the marketplace to determine the most cost-effective means for achieving the reductions.

Robust, peer-reviewed methodologies already exist for conducting full lifecycle emissions analysis for current and future vehicle and fuel options. Specifically, EPA should use the Department of Energy Argonne National Laboratory GREET model, which is accepted worldwide as the most robust and authoritative tool for lifecycle GHG accounting for a wide array of transportation fuels. The GREET model is also updated annually to incorporate the latest data.

VII. If EPA Maintains its Zero Gram per Mile Incentive for EV Production, the Agency Should Allow for a Similar Incentive for FFV Production

For the reasons described in detail above, RFA objects to the continued use of a 0 g/mile compliance value for EVs for the purposes of calculating fleet averages. However, if EPA ultimately finalizes a permanent incentive of 0 g/mile for EVs, then it must consider applying a similar incentive for other low-carbon vehicle technologies, including FFVs that can operate on E85 and other higher ethanol blends.

EPA's proposed approach for BEVs (i.e., using a value of 0 grams/mile) essentially assumes every BEV produced by automakers will only use zero-carbon renewable electricity over the entire lifespan of the vehicle. In other words, EPA's proposal credits *all* BEVs for their maximum potential CO_2 benefit, *without requiring any evidence that such a benefit is actually achieved*.

In order to create an equitable opportunity for biofuels to contribute to the effort to decarbonize light-duty transportation, EPA should institute a CO_2 emissions compliance value that similarly recognizes the potential carbon benefits of light-duty vehicles designed to operate on liquid fuels containing high levels of renewable ethanol.

EPA's final rule should adopt an assumption that FFVs operate on E85 *all the time*, just as the proposed 0 g/mile value effectively assumes BEVs operate on zero-carbon electricity all the time. Automakers who manufacture FFVs should be allowed to use a CO_2 emissions compliance value that reflects the lifecycle CO_2 savings from using E85.

According to the latest Argonne National Laboratory GREET model results, E85 made with average corn ethanol reduces full lifecycle CO_2-equivalent GHG emissions by 31% per mile compared to gasoline.[29] This estimate includes hypothetical/potential emissions from direct and indirect land use changes. Accordingly, for the purposes of calculating fleet averages, EPA should allow automakers to use a CO_2 compliance value for an FFV that is 31% lower than the compliance value for a corresponding non-FFV model. As an example, if a non-FFV car is determined by the automaker to have a CO_2 value of 181

[29] The GREET2022 model shows that E0 gasoline results in fleet average full lifecycle GHG emissions of 421 g/mile, compared to fleet average emissions of 291 g/mile for the use of E85 in an FFV. Results verified via personal communication between RFA and Longwen Ou of Argonne National Laboratory.

g/mile, the automaker should be allowed to use a compliance value of 125 g/mile for an FFV version of that same car.

This approach to incentivizing FFVs would be no different than the approach EPA has used historically, and is proposing to continue, for incentivizing EV production. This FFV mechanism would create a more level playing field for low-carbon liquid fuels and would provide a meaningful incentive for automakers to manufacture FFVs in addition to BEVs. Increased production of FFVs would unlock increased use of lower-carbon liquid fuel blends containing higher levels of ethanol, such as E85 and E30.

Alternatively, EPA could allow auto manufacturers to use the same 0 g/mile compliance value for ethanol's portion of FFV operation, given that the ethanol-related "tailpipe" CO_2 emissions from an FFV are biogenic in nature and fully offset by atmospheric CO_2 removal by the biomass feedstock at the beginning of the lifecycle. That is, if EPA remains committed to focusing only on tailpipe emissions (and ignoring upstream fuel production and supply chain emissions), then biofuels like ethanol should be treated as "zero emissions" fuels because CO_2 emissions from the vehicle are fully offset by CO_2 uptake by the feedstock.

VIII. EPA Lacks Legal Authority to Force Electrification of the U.S. Transportation Fleet

Because of its emphasis on promoting EVs, EPA's proposed rule exceeds the scope of its statutory powers, which do not include authority to set GHG emission standards that effectively mandate electric vehicles. Indeed, Congress directly precluded EPA from using Section 202(a) of the Clean Air Act to phase out internal combustion vehicles. Section 202(a) requires EPA to set standards for emissions from any class or classes of new motor vehicles or new motor vehicle engines which cause or contribute to potentially harmful air pollution. If EPA maintains its assumption that electric vehicles do not emit any CO_2 or other air pollution—which is inaccurate, as explained throughout these comments—it may only set standards for internal combustion vehicles.

In addition, EPA must have clear congressional authorization to promulgate electrification-forcing regulations, and it does not have that authorization here. The Supreme Court has made clear in recent decisions that an agency must have clear congressional authorization in order to exercise significant powers.[30] EPA's attempt to shift the U.S. transportation fleet to EVs is analogous to the shift in energy policy that EPA directed in the clean power plan, which was rejected by the Supreme Court in *West Virginia v. EPA*. EPA also projects its standards will result in enormous compliance costs, indicating that the rule is economically significant and therefore likely to fall within the Supreme Court's "major question" doctrine.

[30] See *Alabama Ass'n of Realtors v. HHS*, 141 S. Ct. 2485, 2489 (2021); *West Virginia v. EPA*, 142 S. Ct. 2587, 2609 (2022).

EPA's proposed rule is also arbitrary and capricious because it fails to accurately account for the GHG emissions reductions achieved by both EVs and biofuels. EPA should use the best available science to accurately account for the lifecycle carbon intensity associated with particular fuels and technologies, but its proposed approach ignores the upstream emissions and emissions from electricity generation associated with EVs. Specifically, EPA proposes to assign a value of 0 grams/mile to EVs, which in effect assumes that electricity and battery minerals powering EVs are always 100% renewable and free of any CO_2 emissions impacts. This assumption is flawed because the CO_2 emissions associated with producing and transmitting electricity, as well as the emissions linked to critical mineral extraction and battery production, are significant. Indeed, lifecycle analysis studies show that some EVs (using coal-generated electricity and battery minerals from intensive mining practices) may have a larger carbon footprint than conventional vehicles using internal combustion engines. At the same time, EPA's proposal fails to recognize or account for the meaningful CO_2 emissions savings that can be achieved through greater use of low-carbon ethanol in vehicles designed to accommodate higher blends (e.g., flex fuel vehicles).

In sum, we urge EPA to revise its proposal to create a technology neutral rule that accounts for all lifecycle emissions of the vehicles it regulates. A technology neutral rule will not only avoid some of the legal issues EPA's current proposal will face, but incentivizing multiple technologies is also the best way for EPA to achieve its ambitious goals.

IX. EPA's Proposed Rule Ignores Marketplace Realities and Underestimates Barriers to the Adoption of Battery Electric Vehicles

The challenges associated with electrifying the light- and medium-duty fleet are significant. The speed at which the Agency appears to anticipate the market and consumers will transition to electric vehicles is divorced from our assessment of reality. The proposed rule does not appear to appreciate the market obstacles associated with such a massive transition in vehicle technology, energy infrastructure, or consumer behavior. Several of the most pressing challenges are further discussed below.

a. Slow turnover of the vehicle fleet

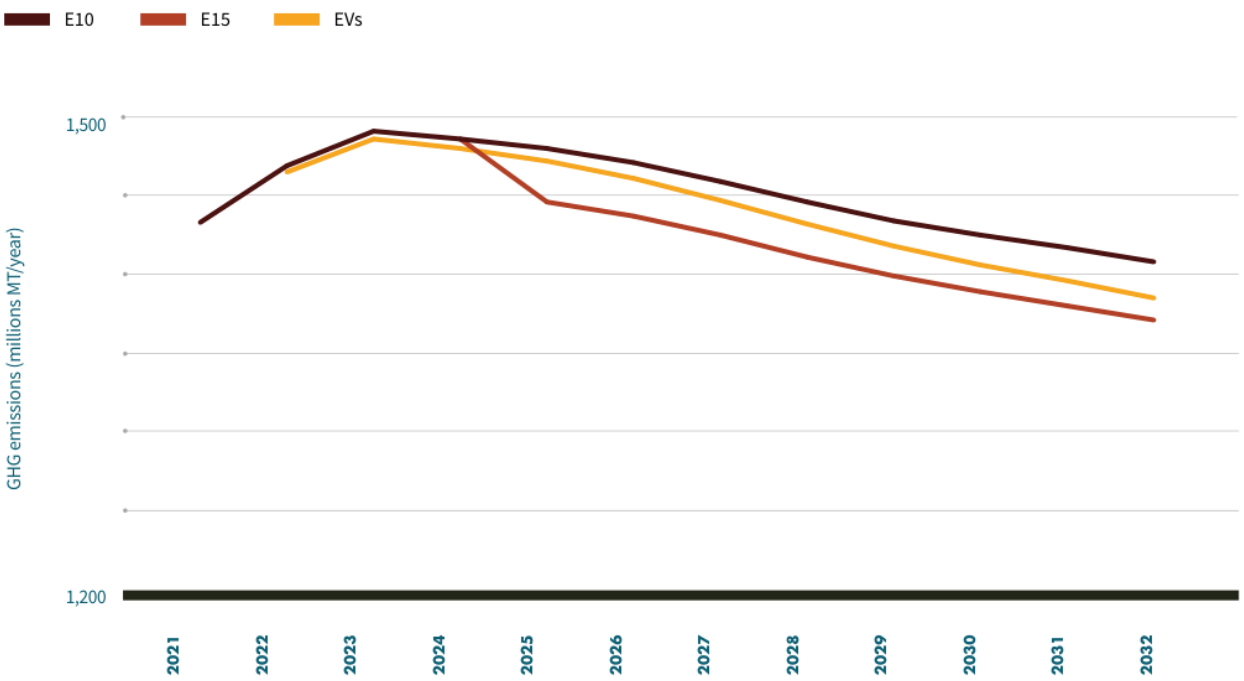
Sales of new vehicles displace a small fraction of the existing vehicle fleet each year. EPA estimates that 67% of new vehicles sales will be battery electric in 2032, but clearly large numbers of new ICE vehicles that use liquid fuels will continue to be produced for many years, and those vehicles will remain on the road for many additional years. According to data from Oak Ridge National Lab, 16% of passenger cars and 32% of light-duty trucks remain on the road for more than 20 years.[31] The Oak Ridge data also show that the average age of vehicles on the road is approximately 15 years. If new EVs are

[31] Davis and Boundy, "Transportation Energy Data Book: Edition 40", Oak Ridge National Laboratory report ORNL/TM-2022/2376, February 2022; https://tedb.ornl.gov/wp-content/uploads/2022/03/TEDB_Ed_40.pdf

more expensive or less attractive to consumers, older liquid-fueled vehicles will remain on the road even longer.

Low-carbon liquid fuels in existing vehicles can achieve GHG reductions faster than new electric vehicles can displace the existing fleet. As shown in the figure below from a recent Fuels Institute report, a relatively simple change such as replacing E10 (10% ethanol) with E15 (15% ethanol) can offer greater GHG reductions than the phase-in of battery electric vehicles, because it can immediately affect a large fleet of vehicles that are already in use.[32]

FIGURE 21. LIGHT- AND MEDIUM DUTY VEHICLE ANNUAL GHG EMISSIONS REDUCTION SCENARIO (2022-2032)



Source: Stillwater assessment using 2022 GREET and EIA AEO 2022 Reference Case

b. Lifetime cost of the vehicle versus GHG reduction

The proposed rulemaking would not allow other vehicle/fuel pathways to compete with BEVs. By regulating only tailpipe emissions, and ignoring the rich literature of lifecycle analysis, EPA would create artificial incentives for auto manufacturers to pursue only BEVs. This could have disastrous effects on both the cost and the GHG emissions of future vehicles. As shown in the figure below from Argonne National Laboratory, the cost and GHG emissions of a BEV are strongly affected by the driving range. A BEV with 400-mile range is dramatically more expensive than one with 200-mile range, and its lifetime

[32] Fuels Institute. "Decarbonizing Combustion Vehicles: A Portfolio Approach to GHG Reductions." June 2023.

GHG emissions are substantially worse. In fact, a BEV with 400-mile range has only a slight GHG benefit compared to a hybrid EV or an FFV operating on E85. But the proposed rule would count all BEVs as "zero emissions," regardless of battery size – and regardless of vehicle size and weight.

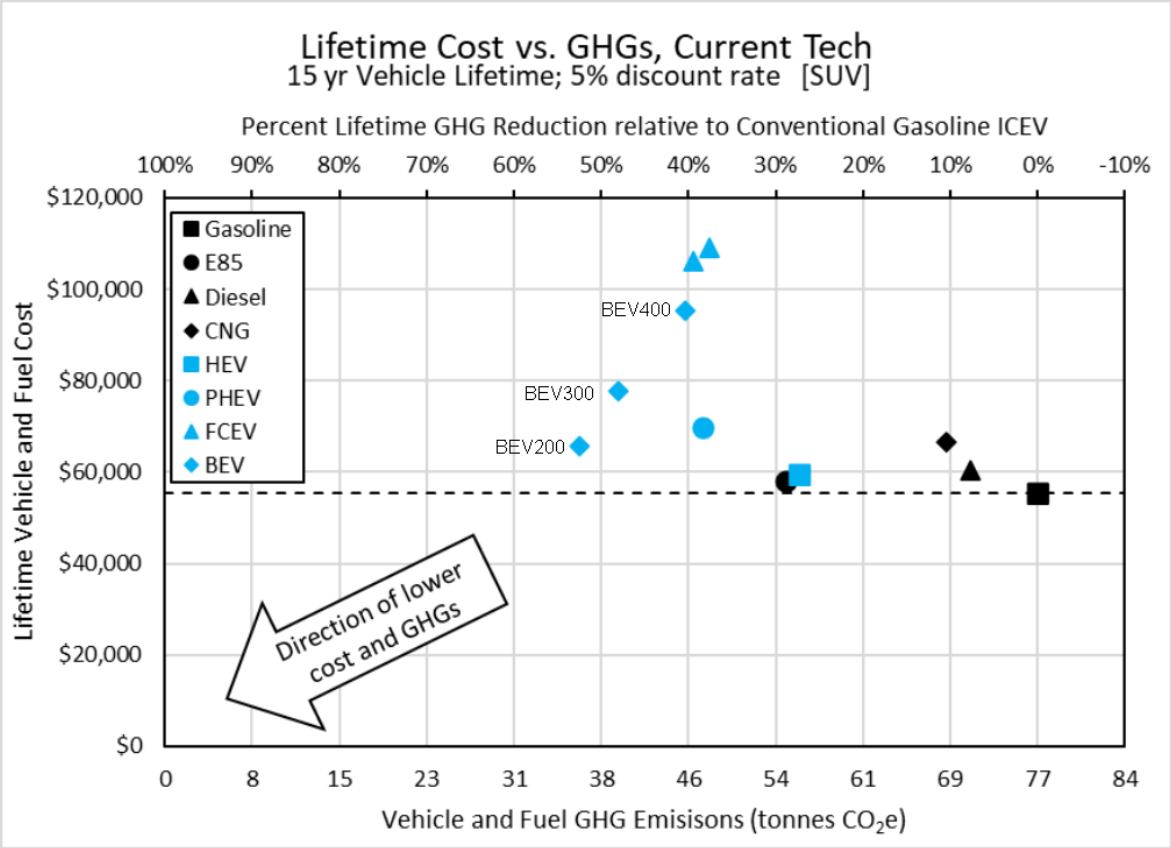
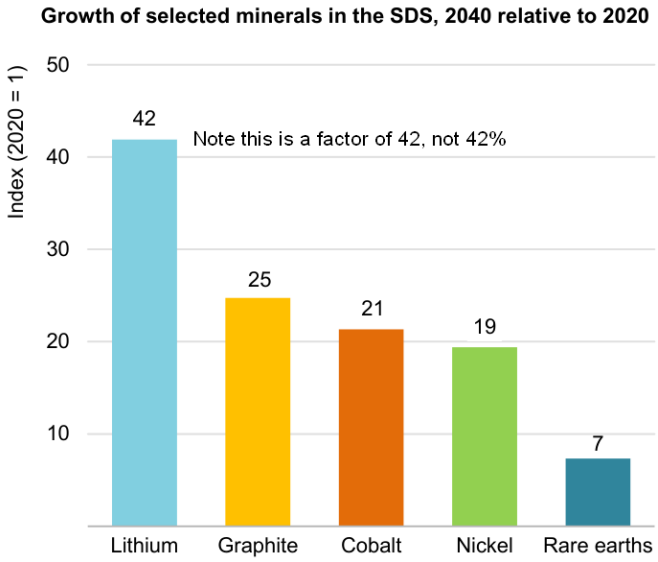


Figure 37. Lifetime costs versus GHG emissions by vehicle-fuel pathway for the CURRENT TECHNOLOGY small SUV case for the CURRENT TECHNOLOGY case over its lifetime

c. Supply of critical minerals for EV batteries

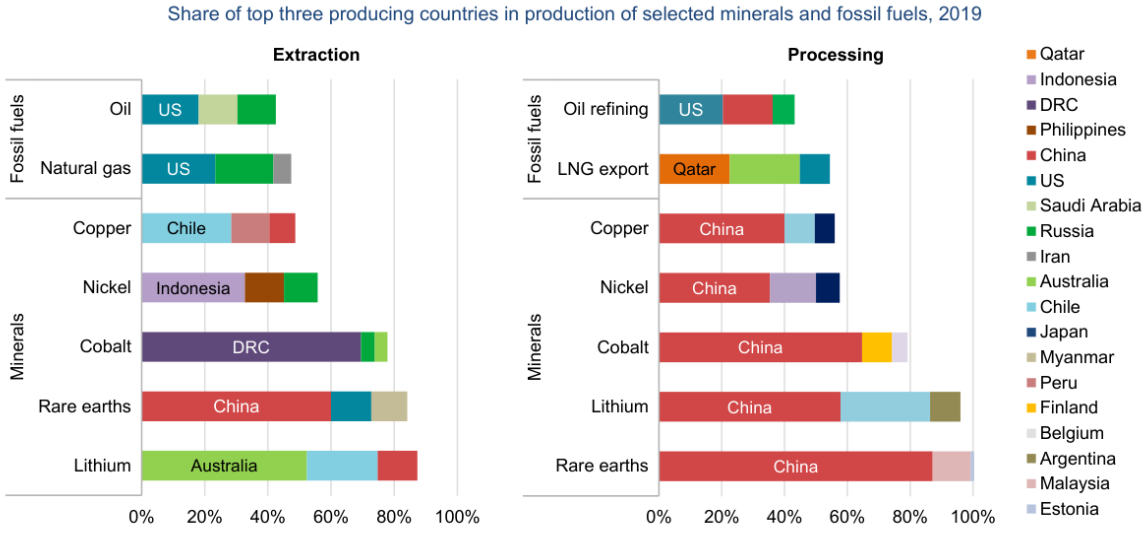
Other concerns with BEVs are related to the supply of critical minerals for batteries. A report by the International Energy Agency (IEA) says "mineral demand for use in EVs and battery storage is a major force," with supplies needing to grow "at least thirty times to 2040." The report notes that "…it has taken on average over 16 years to move mining projects from discovery to first production."[33] These long lead times raise serious questions about the ability of suppliers to ramp up the output of critical minerals.

[33] International Energy Agency, "The Role of Critical Minerals in Clean Energy Transitions", 2021; https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions



In addition, there are national security and human rights concerns associated with the mining of critical minerals needed for EV batteries. According to IEA, the Democratic Republic of the Congo (DRC) and People's Republic of China were responsible for some 70% and 60% of global production of cobalt and rare earth elements, respectively, in 2019. The level of concentration is even higher for mineral processing operations. China's market share of global refining capacity is around 35% for nickel, 50-70% for lithium and cobalt, and nearly 90% for rare earth elements.

Production of many energy transition minerals today is more geographically concentrated than that of oil or natural gas



According to IEA, “High levels of concentration, compounded by complex supply chains, increase the risks that could arise from physical disruption, trade restrictions or other developments in major producing countries…Production and processing of mineral resources gives rise to a variety of environmental and social issues that, if poorly managed, can harm local communities and disrupt supply.”[34]

Toyota[35] and others[36] have argued for a balanced approach to emissions reductions using BEVs *and* other technologies, saying “perfect should not be the enemy of the good.” The battery size[37] for a BEV is about 6 times larger than a PHEV (~75-145kWh vs. ~12-18kWh), and about 60 times larger than a HEV (~1.3-1.9kWh). Given the limited supply of battery materials, a large number of HEVs and PHEVs can clearly achieve substantially better GHG reductions than a small number of BEVs.

d. Vehicle weight: Safety concerns and increased PM emissions

Another concern with BEVs is increased vehicle weight. The chair of the National Transportation Safety Board testified that “the Ford F-150 Lightning is between 2,000 and 3,000 pounds heavier than the non-electric version. The Mustang Mach-E, Volvo XC40 EV, and RAV4 EV are all roughly 33% heavier. That has a significant impact on safety for all road users.”[38] EPA should not artificially incentivize heavy BEVs by counting them as “zero emissions,” when lighter weight solutions can provide similar GHG emissions benefits and better safety.

It is also well known that higher vehicle weight increases wear and tear on vehicle tires, which causes higher particulate emissions.[39] EPA has regulated tailpipe particulate emissions for many years, but there is abundant evidence that wear particles from tires and brakes are at least as important as tailpipe emissions.[40] According to one study, “battery weight can result in tire emissions that are almost 400 times greater than real-world tailpipe emissions.”[41] But the proposed emissions standards fail to address the large and growing problem of particulate emissions from tires, and instead focus on more stringent tailpipe particulate standards which will add cost without significantly improving air quality. Again, EPA needs to look beyond the tailpipe and create holistic standards that incentivize real improvements.

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[34] *Id.*
[35] Gill Pratt, Toyota Motor Corporation’s Chief Scientist, open letter posted on Medium, August 2021; https://medium.com/toyotaresearch/more-straight-talk-about-toyotas-electric-vehicle-strategy-f0aba4be40
[36] Foster, Koszewnik, Wade, and Winer, "Pathways to More Rapidly Reduce Transportation's Climate Change Impact." Issues in Science and Technology, November 17, 2022; https://issues.org/reduce-vehicle-transportation-emissions-foster-koszewnik-wade-winer/
[37] https://insideevs.com/reviews/344001/compare-evs/
[38] https://www.ntsb.gov/Advocacy/Activities/Pages/Homendy-20230111.aspx
[39] Stanard et al., "Brake and Tire Wear Emissions Project 17RD016: Final Report, Revision 2", prepared for CARB, February 11, 2021; https://ww2.arb.ca.gov/sites/default/files/2021-04/17RD016.pdf
[40] Wang et al., "Evidence of non-tailpipe emission contributions to $PM_{2.5}$ and PM_{10} near southern California highways" Environmental Pollution Volume 317, 15 January 2023; https://doi.org/10.1016/j.envpol.2022.120691
[41] Emissions Analytics, "Gaining Traction, Losing Tread"; https://www.emissionsanalytics.com/news/gaining-traction-losing-tread

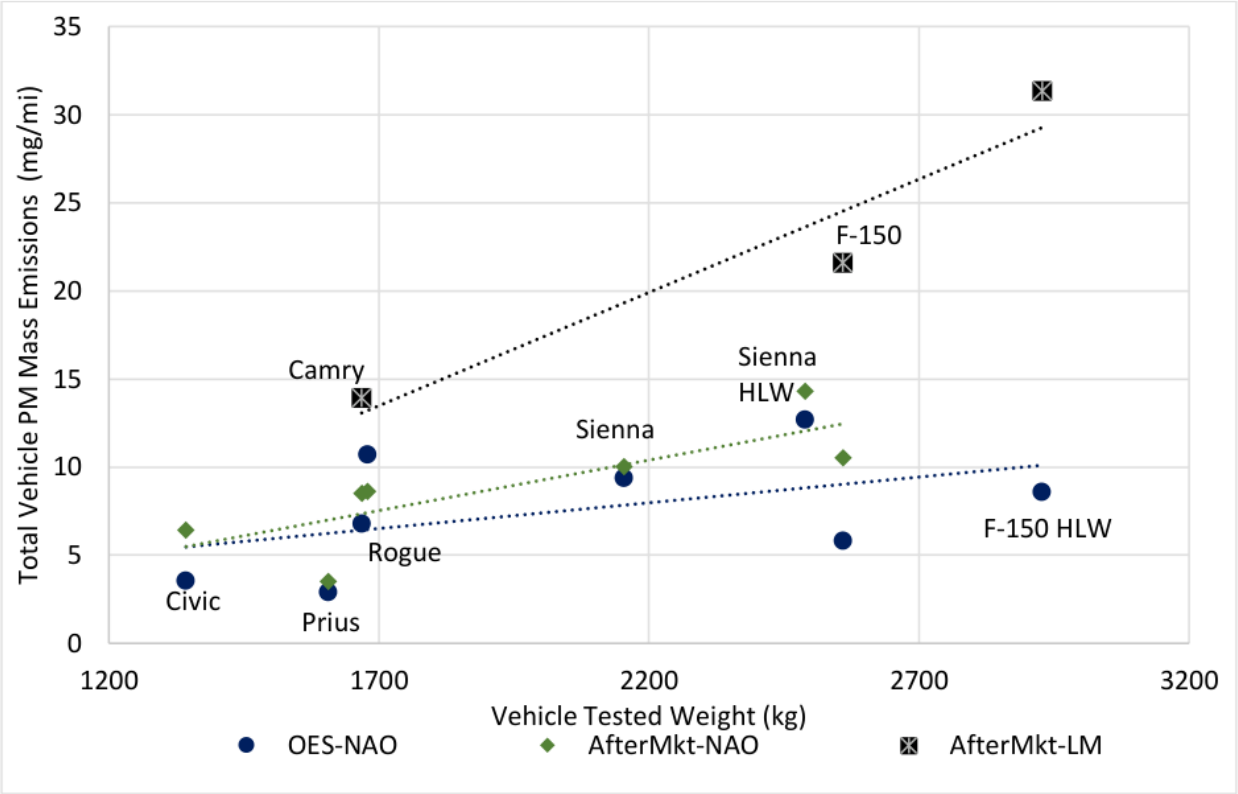


Figure 56. Total vehicle test cycle PM mass emissions vs simulated vehicle test weight, categorized by pad material.

Source: Stanard et al.

X. Criteria Pollutant Emissions

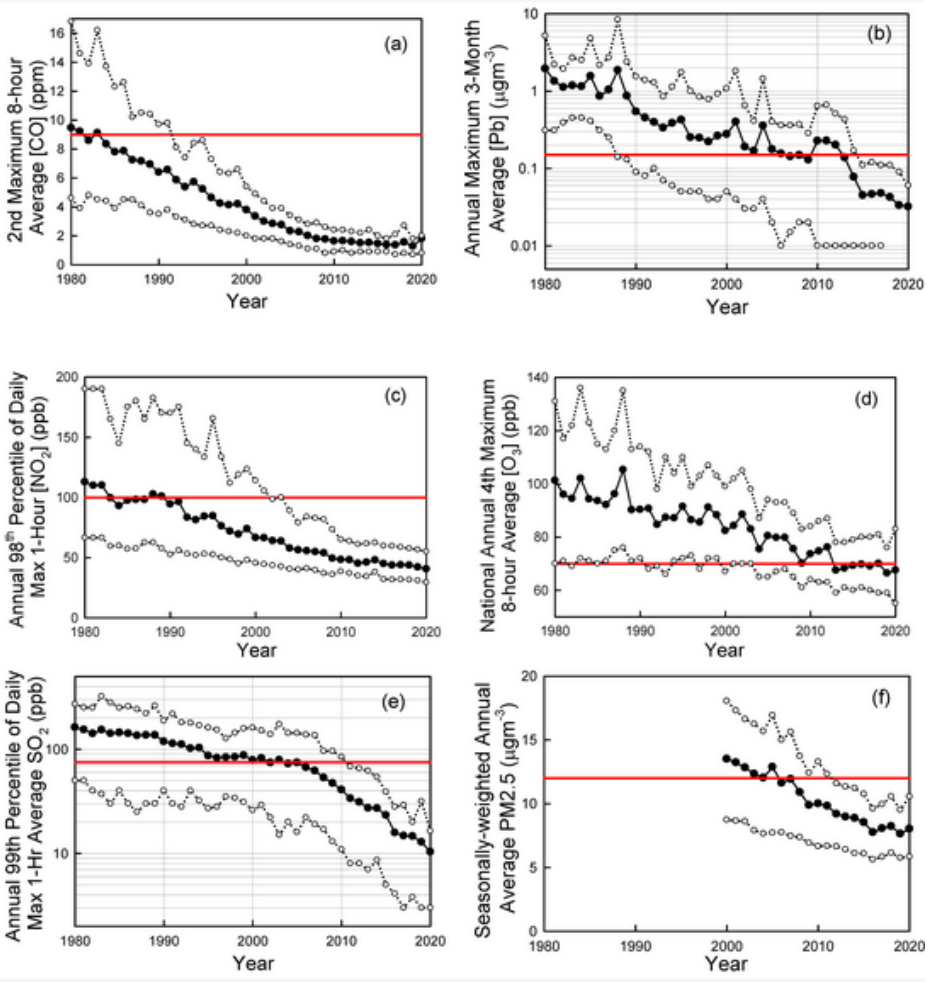
Sustained efforts to reduce emissions from vehicles and other sources have been highly successful in improving the air quality of cities throughout the U.S., as shown below in plots based on CARB and EPA data.[42] Ambient levels of all major pollutants have gone down dramatically, despite large increases in population and GDP. The average values (and in most cases the 90th percentile values) now meet the National Ambient Air Quality Standards.

EPA is proposing new NMOG+NOx standards that are 60% stricter than the 2025 standards. However, vehicles meeting the 2025 standards are already so clean that they do not make any meaningful contribution to air quality problems. Thus, additional reductions required beyond the 2025 levels are unlikely to yield significant air quality benefits but would come at an excessive cost to automakers and ultimately consumers.

[42] Wallington et al., "Vehicle Emissions and Urban Air Quality: 60 Years of Progress", Atmosphere 2022; https://doi.org/10.3390/atmos13050650

A Ford study concluded that “ICE vehicle emissions may be approaching a ZEV-equivalent level...Future vehicle emission-reduction efforts might be more profitably targeted on reducing the effect of gross emitters, which represents 2–5% of the fleet but can produce up to half the emissions.” [43]

Figure 6. Trends in CO (**a**), lead (Pb) (**b**), NO_2 (**c**), ozone (**d**), SO_2 (**e**), and PM2.5 (**f**) in ambient urban air updated from Wallington et al. [45]. Solid symbols are averages, open symbols are 10th and 90th percentiles. The red horizontal lines are the primary National Ambient Air Quality Standards (NAAQS). Data were taken from the EPA Air Trends site [53] accessed in 2022 and 2019.



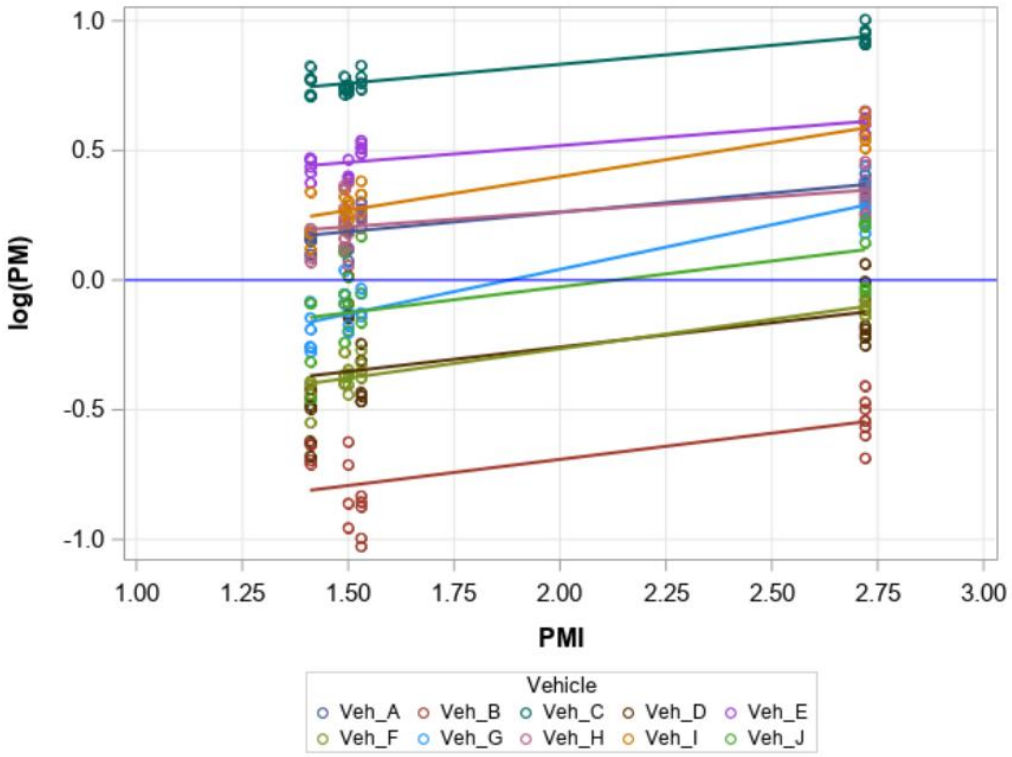
Further tightening of criteria emissions standards on new vehicles is not only ineffective at improving air quality, it also potentially discourages changes that can help meet GHG emissions reductions goals. For example, FFVs are a key enabler for allowing low-carbon E85 to displace gasoline in some applications. But overly restrictive criteria emissions standards may make it more difficult to design engines, cold start strategies, and catalytic aftertreatment that can handle the wide range of fuel properties required for FFVs.

[43] Winkler et al., "Vehicle criteria pollutant (PM, NOx, CO, HCs) emissions: how low should we go?" Climate and Atmospheric Science (2018); https://doi.org/10.1038/s41612-018-0037-5

XI. Potential Fuel Property Controls to Address Particulate Matter Emissions

EPA's proposed rule requests comment on "potential future gasoline fuel property standards aimed at further reducing PM emissions, for consideration in a possible subsequent rulemaking." A major advantage of fuel property standards is that they can reduce emissions from all vehicles on the road today – not just new vehicles. Therefore, emissions benefits can be achieved much more quickly than with standards that only apply to new vehicles.

It is well established that particulate (PM) emissions are a strong function of aromatic fuel components with a high double bond equivalent value and low vapor pressure, and the particulate forming potential is accurately represented by the "PMI" metric developed by Honda.[44] The PMI metric has been validated in many other studies, including from the joint auto-oil Coordinating Research Council[45] and the EPA.[46]



Source: EPA

PMI and particulate emissions can be decreased by altering refinery processes to reduce the heavy aromatic content of the fuel. As EPA recognizes, reducing heavy aromatics

[44] Aikawa, Sakurai, and Jetter, "Development of a Predictive Model for Gasoline Vehicle Particulate Matter Emissions", SAE paper 2010-01-2115, 2010; https://doi.org/10.4271/2010-01-2115

[45] Coordinating Research Council, "Evaluation and Investigation of Fuel Effects on Gaseous and Particulate Emissions on SIDI In-Use Vehicles," Report No. E-94-2, March 2016; http://crcsite.wpengine.com/wp-content/uploads/2019/05/CRC_2017-3-21_03-20955_E94-2FinalReport-Rev1b.pdf

[46] US Environmental Protection Agency, "Exhaust Emission Impacts of Replacing Heavy Aromatic Hydrocarbons in Gasoline with Alternate Octane Sources", report EPA-420-R-23-008, April 2023

typically requires other refinery changes in order to achieve fuel octane requirements, and those changes generally increase cost and the energy intensity of refining. As an alternative, larger volumes of ethanol can be added to the fuel, which simultaneously reduces PMI and increases octane.

Emissions studies that use "splash blends" (i.e., a constant hydrocarbon base fuel blended with varying levels of ethanol), invariably show lower PM emissions with higher ethanol content. Studies which use "match blends" sometimes show higher PM emissions with higher ethanol content, because the hydrocarbon portion of the fuel was modified in an attempt to hold other properties (such as distillation curve) constant.[47] Perhaps the most credible and comprehensive study on this topic was recently published by the University of California Center for Environmental Research and Technology,[48] showing statistically significant 16-54% reductions in PM emissions for E15 (15% ethanol) compared to E10 (10% ethanol).

Via a future rulemaking, EPA should adopt standards to limit PMI of both finished fuels *and* the hydrocarbon blendstocks used for E10, E15, and other ethanol blends. Limiting PMI of hydrocarbon blendstocks will ensure that the particulate emissions benefits of ethanol are not offset by negative changes at refineries. The standards should also be designed to incentivize improved pipeline practices to minimize contamination of gasoline with diesel and jet fuel. Alternatively, EPA could consider instituting a volumetric cap (per gallon of gasoline) on the allowable content of the heavy aromatics most closely linked to PM formation.

Improved fuel property standards should be a high priority because they can achieve significantly lower particulate emissions *and* dramatically lower GHG emissions. As EPA considers undertaking future rulemaking to address fuel properties, RFA strongly encourages the Agency to include a higher minimum octane standard (e.g., 95-98 RON) as part of the discussion.

High-octane low-carbon fuels are a key enabler for continued GHG emissions improvements in the tens of millions of liquid-fueled vehicles that will be produced in the decades ahead, as documented by the U.S. Department of Energy Co-Optimization of Fuels & Engines initiative[49] and in numerous other studies, e.g. by MIT[50] and by automakers.[51] A detailed blueprint for a future high-octane low-carbon fuel program exists in the Next Generation Fuels Act, and EPA has the statutory authority to make these changes without waiting for Congress to act.

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[47] Anderson, Wallington, Stein, and Studzinski, "Issues with T50 and T90 as Match Criteria for Ethanol-Gasoline Blends", SAE paper 2014-01-9080, 2014, https://doi.org/10.4271/2014-01-9080

[48] Tang et al., "Expanding the ethanol blend wall in California: Emissions comparison between E10 and E15", Fuel, June 2023; https://doi.org/10.1016/j.fuel.2023.128836

[49] Farrell, Wagner, Gaspar and Moen, "Co-Optimization of Fuels & Engines: 2018 Year in Review", https://www.energy.gov/sites/prod/files/2019/06/f64/Co-Optima_YIR2018_FINAL_LOWRES%20190619_0.pdf

[50] Speth et al., "Economic and Environmental Benefits of Higher-Octane Gasoline", Environ. Sci. Technol., 2014, https://doi.org/10.1021/es405557p

[51] Leone et al., "The Effect of Compression Ratio, Fuel Octane Rating, and Ethanol Content on Spark-Ignition Engine Efficiency", Environ. Sci. Technol., 2015, https://doi.org/10.1021/acs.est.5b01420