Analysis of EPA's Proposed Repeal of Greenhouse Gas Standards for Light-, Medium-, and Heavy-Duty Vehicles

Kenneth Gillingham & Alan Jenn

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Authorship Attribution. Kenneth Gillingham is primary author of sections IV, V, and VI. Alan Jenn is primary author of section II and a contributor to section IV. All other sections are attributed to both Kenneth Gillingham and Alan Jenn.

Author Bios

Kenneth Gillingham is the Grinstein Class of 1954 Professor of Environmental and Energy Economics at Yale University, with appointments in the School of Forestry & Environmental Studies, Department of Economics, School of Management, and Jackson School of Global Affairs. He is also a faculty research fellow at the National Bureau of Economic Research. In 2015-2016 he served as the Senior Economist for Energy & the Environment at the White House Council of Economic Advisers and in 2005 he served as a Fellow for Energy & the Environment at the White House Council of Economic Advisers. He is an energy and environmental economist, with research in transportation, energy efficiency, and the adoption of new technologies.

He has published over 60 articles, including in top journals in economics, science, and business. Many of these publications focus on the economics of fuel economy standards and related issues, including the rebound effect. He has presented this work at top universities both in the United States and internationally. In 2007, he was a Fulbright Fellow in New Zealand and he has held visiting positions at the University of Chicago, Stanford University, Indiana University, and University of California-Berkeley. He holds a PhD from Stanford University in Management Science & Engineering and Economics, an MS in Statistics and an MS in Management Science & Engineering from Stanford, and an AB in Economics and Environmental Studies from Dartmouth College.

This comment is based on his expertise in modeling vehicle greenhouse gas standards and the associated issues relating to standards. This comment was also informed by conversations with colleagues who also work on fuel economy standards, including Arthur van Benthem of the University of Pennsylvania, Mark Jacobsen of the University of California-San Diego, Josh Linn of the University of Maryland, and Ben Leard at the University of Tennessee.

Alan Jenn is an associate professor in the Civil and Environmental Engineering department and chair of the Energy Systems Graduate Group at the University of California, Davis. He is also an active researcher with the Institute of Transportation Studies as part of both the Electric Vehicle Research Center and the Energy Futures Center and an affiliate researcher at the Lawrence Berkeley National Laboratory. In 2022-2023, he served as a Intergovernment Personnel Act Visiting Scholar with the Office of the Secretary at the United States Department of Transportation and within the Joint Office of Energy and Transportation.

Dr. Jenn's research at the University of California, Davis, primarily focuses on the intersection of energy and transportation, with a special emphasis on electric vehicles (EVs) and their integration with the energy grid. His work critically evaluates the lifecycle emissions of EVs, considering factors like electricity generation and vehicle usage patterns. A significant portion of his research is dedicated to the strategic deployment of EV charging infrastructure, addressing challenges in urban planning and grid capacity. He has been instrumental in shaping sustainable transportation strategies and informing policy discussions at various legislative bodies (California, Oregon, Washington) and regulatory agencies (California Air Resources Board, California Energy Commission, California Public Utilities Commission, California Department of Transportation, US Environmental Protection Agency, US Department of Energy, US Department of Transportation). He holds a PhD from Carnegie Mellon University in Engineering and Public Policy.

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Executive Summary

EPA's Notice of Proposed Rulemaking (the Proposal) seeks to repeal existing greenhouse gas (GHG) vehicle standards, citing three principal rationales: "GHG emission standards harm public health and welfare by increasing prices, decreasing consumer choice, and slowing the replacement of older vehicles that are less safe and emit a greater volume and variety of air pollutants than new motor vehicles and engines."[1] Our comment focuses directly on these three pillars, demonstrating that using each to support the rollback of GHG vehicle standards is unsupported by credible evidence and contradicts market data and EPA's own prior analyses.

On affordability, although the Proposal itself identifies no data or analysis on vehicle prices, the associated Draft Regulatory Impact Analysis (DRIA)[2] focuses on the price of electric vehicles (EVs). There, EPA relies on outdated assumptions of battery and vehicle costs that substantially overstate the relative cost of electric vehicles. Real-world evidence shows battery costs have already fallen far below EPA's projections from its 2024 rulemakings, with further declines expected, and automakers are introducing a rapidly expanding set of affordable models across multiple vehicle classes. Transaction data now show EVs beginning to achieve price parity with, and in some cases undercutting, comparable internal combustion engine (ICE) vehicles, a trend that is projected to continue by industry analysts. At the same time, in the DRIA EPA arbitrarily discounts projected gasoline prices by $1 per gallon, an assumption without any analytical support that distorts the cost-benefit balance and ignores the real effect of the rollback in raising gasoline prices for all consumers.

On consumer choice, the Proposal claims that standards restrict options, but the evidence demonstrates the reverse. Total model availability has remained stable while the diversity of powertrain types has grown and owners have reported high satisfaction with and strong likelihood of repurchase of electric vehicles. The DRIA also discusses surveys that suggest that consumers are becoming less interested in EVs. However, point-in-time surveys, such as the ones being discussed in the DRIA, are not uniform in their findings and those that appear to show declining willingness to purchase EVs are contradicted by longitudinal real-world sales data, which reveal steadily increasing adoption.

On fleet turnover, the Proposal repeats arguments previously advanced in the "SAFE II" rule,[3] while disregarding EPA's own peer-reviewed studies. The best available evidence shows that

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[1] *Reconsideration of 2009 Endangerment Finding and Greenhouse Gas Vehicle Standards*, 90 Fed. Reg. 36,288, 36,291 (Aug. 1, 2025) (Proposal).

[2] Reconsideration of 2009 Endangerment Finding and Greenhouse Gas Vehicle Standards: Draft Regulatory Impact Analysis (July 2025), EPA-420-D-25-003, https://www.epa.gov/system/files/documents/2025-07/420d25003.pdf (DRIA).

[3] *The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for MY2021-2026 Passenger Cars & Light Trucks*, 85 Fed. Reg. 24,174 (Apr. 30, 2020) (SAFE II Rule).

vehicle demand is relatively inelastic, with only modest sales effects from price increases. EPA's own analysis for the 2024 Multipollutant Rule[4] found that even under conservative assumptions, the effect of standards on fleet turnover is very small. For every older vehicle that might remain on the road longer, hundreds of new cleaner vehicles enter the fleet, and these hundreds of newer vehicles lead to a net reduction in emissions. The Proposal's claim that standards have negative net effects on air pollution by slowing the replacement of older polluting vehicles is contradicted by EPA's own models and published research.

Beyond the three principal rationales cited in the Proposal itself, our comment addresses several additional salient flaws in the accompanying DRIA. While the Proposal states it did not rely on any analysis presented in the DRIA as justification for the Proposal, EPA specifically requested comment on the analysis and whether it is an "appropriate and lawful basis for repealing the Endangerment Finding and/or resulting Vehicle Standards."[5] Notwithstanding EPA's disclaimer, the DRIA purports to provide additional analytical support for the Proposal. Instead, the DRIA introduces assumptions and methodologies that are not only disconnected from the central claims in the Proposal, but also lack grounding. The DRIA misapplies economic theory by assuming consumers value only 21% of future fuel savings, a conclusion that both misunderstands the literature and directly contradicts the evidence on consumer undervaluation. It also imports noncredible methodology from a 2020 Council of Economic Advisers report, using only two data points to construct a cost curve and ignoring technological change and market structure. Finally, it abandons EPA's long-standing use of detailed Integrated Planning Model analysis of the power sector in favor of a non-peer-reviewed working paper that assumes implausibly high renewable costs and exaggerated EV electricity demand. These flaws are substantial and undermine any claim that the DRIA provides a credible economic foundation for the Proposal.

[4] Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 89 Fed. Reg. 27,842 (Apr. 18, 2024) (2024 Multipollutant Rule).
[5] 90 Fed. Reg. at 36,325.

I. Vertical Affordability

EPA's Proposal and the accompanying draft RIA rely on inaccurate cost estimates due to outdated assumptions of electric vehicle costs.

Battery costs have decreased more rapidly than EPA has accounted for.

In the Proposal, EPA asserts that the 2024 Multipollutant Rule will increase costs for consumers and prevent them from purchasing newer more efficient vehicles.[6] However, the Proposal provides no new information or analyses demonstrating what has changed since finalizing the 2024 Multipollutant Rule to justify this claim. While the Proposal claims it did not rely on any analysis in the DRIA as justification, this is the only place where EPA provides any updated information on or substantive discussion of vehicle costs. The DRIA states that the analytical results presented are "estimated using the same assumptions, methods and tools as used in the analyses for the" 2024 Multipollutant Rule and Phase 3 HD Rule,[7] "including projections of vehicles, technologies, emission estimates, and fuel prices."[8] While EPA asserts that it updated the 2024 Multipollutant Rule's assumptions of future gasoline and diesel prices to make them appropriate for rulemaking in 2025, it made no updates to assumptions for battery manufacture costs, a key cost driver for vehicles with electrified powertrains. As a result, EPA's outdated vehicle cost estimates—combined with inaccurate and biased analyses of gasoline and diesel prices—yield inaccurate cost-benefit results.

EPA's Proposal and the accompanying DRIA ignore recent declines in electric vehicle battery costs. The 2024 Multipollutant Rule estimated 2025 battery costs of $147/kWh in its central case, and included a 15 percent low battery cost sensitivity as part of the 2024 Multipollutant Rule RIA,[9] each with cost curves that decrease over time due to assumed improvements in battery manufacturing, pack design, and cell construction.[10] In 2025, due to advances in battery manufacturing and technologies, industry estimates indicate that lithium-ion battery costs have already fallen to $112/kWh.[11] This is 24% below the 2024 Multipollutant Rule's central case assumption and well below the low battery cost sensitivity scenario. Battery makers expect 2025

[6] 90 Fed. Reg. at 36,312.
[7] Greenhouse Gas Emission Standards for Heavy-Duty Vehicles – Phase 3, 89 Fed. Reg. 29,440 (Apr. 22, 2024) (Phase 3 HD Rule).
[8] DRIA at 26.
[9] Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles: Regulatory Impact Analysis (Mar. 2024), EPA-420-R-24-004, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1019VPM.pdf (2024 Multipollutant Rule RIA).
[10] 89 Fed. Reg. at 27,997, Table 68 - Difference in Battery Cost Per kWh from NPRM to FRM, 100-kWh Battery Example. Prices reported in constant 2022 dollars per Table 66, and adjusted here to constant 2024 dollars using consumer price index (CPI) values of 292.625 for 2022 and 313.698 for 2024, based on annual averages from the U.S. Bureau of Labor Statistics (BLS). (*See* Federal Reserve Bank of St. Louis, Consumer Price Index for All Urban Consumers: All Items in U.S. City Average (accessed August 2025), https://fred.stlouisfed.org/series/CPIAUCSL.) For example: $147 = $137 * (313.698/292.625).
[11] BloombergNEF, *Electric Vehicle Outlook 2025*, Table 193 Lithium-ion battery pack price outlook, https://about.bnef.com/insights/clean-transport/electric-vehicle-outlook.

to close with prices below $100/kWh,[12] and market analysts expect further significant drops, with Goldman Sachs projecting battery costs of $80/kWh[13] in 2026. A BNEF market survey found that the passenger electric vehicle sector had average lithium-ion battery costs of $97/kWh by the end of 2024.[14] All of this has transpired even before the period covered by this Proposal. Furthermore, in the DRIA, EPA notes that scenarios 2, 3, 4, and 5 exclude the Inflation Reduction Act (IRA) 45X incentive for battery manufacturing, though it remains in place.[15] EPA provides no justification for the exclusion.

Table 1: Electric Vehicle Battery Costs ($/kWh)

	EPA 2024 Multipollutant Rule Central Case[16]	**EPA 2024 15% Low Battery Cost Sensitivity[17]**	**BNEF[18] (2025 near-term observed; 2030-2035 projected)[19]**	**Goldman Sachs (projected)**
2025	$147	$125	$112	$80[20] (2026)
2030	$108	$92	$69	$60[21]
2035	$89	$76	$54	

All prices in constant 2024 dollars[22]

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[12] BSLBATT Lithium, *How Lithium Battery Prices Are Changing in 2025*, BSLBATT (June 20, 2025), https://bslbatt.com/blogs/lithium-battery-price-2025-current-costs-trends-and-changes.
[13] Goldman Sachs, *Electric vehicle battery prices are expected to fall almost 50% by 2026* (October 2024), https://www.goldmansachs.com/insights/articles/electric-vehicle-battery-prices-are-expected-to-fall-almost-50-percent-by-2025.
[14] BloombergNEF, *2024 Lithium-Ion Battery Price Survey* at Figure 22 (December 10, 2024), https://www.bnef.com/insights/35513/view.
[15] DRIA at 27.
[16] 89 Fed. Reg. at 27,997, Table 68 - Difference in Battery Cost Per kWh from NPRM to FRM, 100-kWh Battery Example.
[17] *Id.*
[18] BloombergNEF, *Electric Vehicle Outlook 2025*, Table 193 Lithium-ion battery pack price outlook, https://about.bnef.com/insights/clean-transport/electric-vehicle-outlook.
[19] BNEF's "near-term" figure is based on current data on the impact of raw material prices in 2025, while the long-term projections use an experience curve approach based on historically observed rates of learning. *Ibid*. page 132
[20] Goldman Sachs, *Electric vehicle battery prices are expected to fall almost 50% by 2026* (October 2024), https://www.goldmansachs.com/insights/articles/electric-vehicle-battery-prices-are-expected-to-fall-almost-50-percent-by-2025.
[21] Mobility Portal, *Goldman Sachs: Battery Prices to Fall Below $60/kWh by 2030* (May 2025), https://mobilityportal.eu/goldman-sachs-battery-prices-fall/.
[22] 89 Fed. Reg. at 27,997, Table 68: Difference in Battery Cost Per kWh from NPRM to FRM, 100-kWh Battery Example Table. Prices reported in constant 2022 dollars per Table 66, and adjusted here to constant 2024 dollars using CPI values of 292.625 for 2022 and 313.698 for 2024, based on annual averages from the U.S. BLS. (*See* Federal Reserve Bank of St. Louis, Consumer Price Index for All Urban Consumers: All Items in U.S. City Average (accessed August 2025), https://fred.stlouisfed.org/series/CPIAUCSL.) For example: $147 = $137 * (313.698/292.625).

For the 2024 Multipollutant Rule RIA, EPA used the Optimization Model for reducing Emissions of Greenhouse Gases from Automobiles (OMEGA) model. Within OMEGA, battery price helps determine electric vehicle price, which determines the least-cost path for automakers and consumers to comply with standards.[23] Declining battery costs result in declining vehicle manufacturing costs. Battery costs represent as much as 40% of an electric vehicle's total cost, though the share decreases as battery prices do.[24] Because EPA fails to account for recent declines in battery costs, it cannot rely on the cost-benefit estimates from the 2024 Multipollutant Rule that it uses for scenarios 1-5 of its DRIA. These scenarios assume electric vehicle costs that are already known to be too high relative to the best estimates we have today. Updated estimates of battery electric vehicle MSRPs using actual 2025 battery costs and BNEF projections show they are on track to reach parity with combustion engine counterparts over the regulatory period even absent federal consumer subsidies.[25] This would mean that even without accounting for fuel and maintenance savings, over the regulatory period in question light-duty electric vehicles will have lower upfront costs than comparable combustion engine vehicles, undercutting EPA's arguments about increased costs burdening consumers and decreasing fleet turnover. EPA has arbitrarily neglected to update its vehicle cost model to reflect changes in this key input price.

Table 2: Estimated Timeline of Electric and Combustion Engine Vehicle MSRP Parity across Light Duty Vehicle Classes

Vehicle Class	Year of Parity (BNEF costs)	Year of Parity (Goldman Sachs costs)
Compact	2027	2026
Midsize	2028	2026
Small SUV	2029	2027
Midsize SUV	2030	2028
Pickup	2031	--

EPA has not accounted for expansion of the lower cost electric vehicle market.

As manufacturing costs decrease, it is important to note that final vehicle transaction prices can also be impacted by factors such as automaker pricing strategies, market maturity, and levels of

[23] *Omega2 Documentation* (version 2.5.0), Read the Docs (Mar. 19, 2024), https://omega2.readthedocs.io/en/2.5.0/.
[24] Deloitte, *Study: The key role of battery costs in automotive* (October 2023), https://www.deloitte.com/de/de/Industries/automotive/research/study-key-role-of-battery-costs-in-automotive.html.
[25] TechScape (AMBER Beta 2025) Data, Argonne National Laboratory (accessed August 2025). The analysis covered the period from 2025-2035 and compared MSRPs of battery electric vehicles with 300-mile range to those of identical vehicles operating on a conventional spark ignition turbo powertrain. Vehicles were base trim models in a low-technology progress setting, with battery price data from BNEF's 2025 EV Outlook and an additional sensitivity using press reports of Goldman Sachs 2025 and 2030 battery price projections.

competition. For decades, automakers that dominate the U.S. battery electric vehicle market have pursued a strategy of "starting with high-end models to build ... brand image on the one hand and raising funds to build models for the masses on the other."[26] Elon Musk memorably summarized Tesla's strategy as, "Build [a] sports car. Use that money to build an affordable car. Use *that* money to build an even more affordable car."[27] Other automakers and new market entrants such as Rivian and Lucid adopted similar roadmaps, first learning to build premium electric vehicles on a small scale before developing more affordable, high-volume models, resulting in an early market skewed towards more expensive offerings. [28, 29]

Neither EPA's Proposal nor the DRIA accounts for how the market has matured since its 2024 Multipollutant Rule, with many automakers recently debuting new affordable, mass-market electric vehicle models as they move into their next phase. Table 3 presents a selected list of announcements and planned releases of new models, making it clear that battery savings will be passed on to consumers in final vehicle price. At the time the 2024 Multipollutant Rule was finalized, automakers offered 19 battery electric vehicle models at a starting price below $50,000.[30] The vehicles listed below, along with the seven models added in 2025, represent a 142% increase in the number of offerings in this price category.[31]

To give just one example, both the Slate and Ford pickup trucks—expected in 2026 and 2027 respectively—are slated to be offered at starting prices below the 2025 generic ICE pickup truck MSRP of $34,830.[32] These vehicles will offer price parity even earlier than expected by

[26] Zhengyuan Zhou, *Tesla Marketing Analysis*, 5(2) Academic Journal of Business & Management 171-177 (2023), https://doi.org/10.25236/AJBM.2023.050225.

[27] Elon Musk, *The Secret Tesla Motors Master Plan* (August 2006), https://www.tesla.com/secret-master-plan.

[28] *See* Nilay Patel, *Rivian CEO RJ Scaringe says too many carmakers are copying Tesla*, The Verge (June 22, 2024), https://www.theverge.com/24201749/rivian-ceo-rj-scaringe-ev-electric-truck-r1-tesla-model-y-competition-decoder-interview (Rivian CEO RJ Scaringe: "We think of [R1 vehicles] as very premium vehicles… So the R1 product has always been thought of as our flagship vehicle, so it's going to be our highest-price vehicle…If we can take the success we've had at price points … north of $70,000 and translate that to price points north of $40,000 … we hope that will translate to significant volume."). *See also* Joann Muller, *The family SUV is finally going electric*, (September 9, 2022), https://www.axios.com/2022/09/09/chevy-equinox-electric (GM CEO Mary Barra: "We are at a turning point where EVs will be the mainstream choice for the next generation of customers, and [the $30,000 base price MY 2024] Equinox EV will lead this charge for us." GM first introduced electric models of the luxury Cadillac Lyriq and GMC Hummer in model year 2022.).

[29] Kenneth T. Gillingham, Arthur A. van Benthem, Stephanie Weber, Mohamed Ali Saafi and Xin He, "Has Consumer Acceptance of Electric Vehicles Been Increasing? Evidence from Microdata on Every New Vehicle Sale in the United States," 113 *AEA Papers and Proceedings* 329–35 (2023), https://doi.org/10.1257/pandp.20231065.

[30] FuelEconomy.gov, "PowerSearch Results for 2024 Electric Vehicles under $50,000," U.S. Department of Energy and the U.S. Environmental Protection Agency (accessed August 2025), https://www.fueleconomy.gov/feg/PowerSearch.do.

[31] FuelEconomy.gov, "PowerSearch Results for 2025 Electric Vehicles under $50,000," U.S. Department of Energy and the U.S. Environmental Protection Agency (accessed August 2025), https://www.fueleconomy.gov/feg/PowerSearch.do.

[32] TechScape (AMBER Beta 2025) Data, Argonne National Laboratory, MSRP of 2025 Conventional SI Turbo Pickup, base trim, low technology progress. Outputs generated in 2023 dollars and converted to 2024 dollars using CPIs of 304.7 (2023) and 313.7 (2024) per Minneapolis Federal Reserve "Consumer Price Index, 1913-", https://www.minneapolisfed.org/about-us/monetary-policy/inflation-calculator/consumer-price-index-1913- (accessed August 2025).

modeling using updated battery costs. This highlights the importance of incorporating current market information. To remain globally competitive, automakers must develop the ability to build cost-competitive electric vehicles in all classes, and even absent federal support they are investing tens of billions of dollars in that capacity.[33, 34, 35, 36] Furthermore, recent evidence from abroad shows that upon removal of government subsidies for electric vehicles, automakers demonstrate a remarkable ability to cut prices.[37] As the deadline for IRA tax credits approaches, analysts have noted transaction price data indicating that thanks to automaker discounts the average EV is selling for less than the average ICE vehicle for the first time in the U.S.[38] This has been heralded as an early sign of a potential "price war" between producers of electric vehicles, which would further drive down prices.[39]

EPA relies on outdated assumptions of battery electric vehicle costs and fails to account for the increase in electric vehicle offerings, especially in more affordable market segments. As a result, it presents inaccurate cost estimates in the DRIA and lacks evidence to support the Proposal's assertion of GHG standards' increased prices burdening consumers and delaying fleet turnover.

Table 3: Recently Announced Mass Market Electric Vehicle Models

Automaker	Model(s)	Timeline	Est. Starting Price Point
Chevrolet	Bolt (re-introduction)[40]	2027	$30,000-$35,000

[33] *See* Pras Subramanian, *Ford's EV ambitions shift to big trucks and small cars after 'seismic change' in the market*, Yahoo!Finance (February 8, 2024), https://finance.yahoo.com/news/fords-ev-ambitions-shift-to-big-trucks-and-small-cars-after-seismic-change-in-the-market-152143995.html (Ford CEO John Farley: "All of our EV teams are ruthlessly focused on cost and efficiency in our EV products because the ultimate competition is going to be the affordable Tesla and the Chinese OEMs.").
[34] *See also* Eric Walz, *Toyota investing $1.3B for EV production in Kentucky*, Automotive Dive (February 8, 2024), https://www.automotivedive.com/news/toyota-investing-kentucky-plant-billion-produce-evs/706745/ (Toyota investing $70 billion to electrify its vehicles, including 70% of US sales, by 2030).
[35] *See also* Eric Walz, *Hyundai boosts US investments to $26B through 2028*, Automotive Dive (August 27, 2025), https://www.automotivedive.com/news/hyundai-boosts-us-invetments-26B-billion-vehicle-production-robotics-steel-plant/758649/ (Hyundai committing to invest $26 billion into US manufacturing from 2025-2028, with a goal of expanding its EV output).
[36] *See also Global automakers step up US investments*, JustAuto (July 1, 2025), https://www.just-auto.com/features/global-automakers-step-up-us-investments/ (BMW investing $1.7 billion in the capacity to assemble "at least" six BEV models in the US by 2030, and VW investing $2 billion to produce battery-powered and hybrid vehicles by 2027).
[37] "China's EV Industry Braced for Shakeout as Prices Plunge," *Financial Times* (May 13, 2023), https://www.ft.com/content/4aab9565-0bec-4243-bcfd-1f9a7845eef0.
[38] Andrew J. Hawkins, *EVs Are Getting a Temporary Trump Bump Thanks to Expiring Incentives*, The Verge (August 27, 2025), https://www.theverge.com/electric-cars/766609/ev-sales-increase-trump-tax-credit-expire.
[39] *Id.* "'Yet, like Cinderella's magic, this brilliance faces a deadline — when the clock strikes midnight on Oct. 1, the $7,500 federal support vanishes, threatening to turn this inventory into costly pumpkins for automakers and dealers,' [Tyson Jominy, senior VP of data and analytics at JD Power] says. At that point, automakers may need to ramp up the discounts in order to move their suddenly more costly EV inventory."
[40] *2027 Chevrolet Bolt*, Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/chevrolet/bolt-2027.

	Camaro (electric)[41]	2027	$36,000
Ford[42]	"Project T3" – midsize electric pickup truck	Production begins 2027	$30,000
	Additional models (not yet specified)	—	"affordable"
Honda	0 Series (entry model)[43]	As early as 2026	Under $30,000
	0 Series Saloon[44]	2026	$50,000
	0 Series SUV[45]	2027	$50,000
Kia	EV3[46]	2026	$35,000
	EV4[47]	2026	$35,000-$38,000
Lucid	Earth[48]	Production begins 2026	$48,000
	Unnamed sedan[49]	—	Under $50,000
Rivian	R2[50]	2026	$45,000
	R3[51]	2027	$37,000

[41] Billy Rehbock, *The Chevy Camaro's Coming Back—But Not How You Remember It*, MotorTrend (Aug. 11, 2025), https://www.motortrend.com/news/2027-chevrolet-camaro-ev-future-cars.
[42] *Ford's New EV Platform Will Spawn a $30,000 Mid-Size Electric Truck.* Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/news/a65653978/ford-affordable-platform-ev-truck/.
[43] *Japan's Honda Eyes Launching Sub-$30,000 EV in North America, Nikkei Says*, Reuters (Jan. 28, 2025), https://www.reuters.com/business/autos-transportation/japans-honda-eyes-launching-sub-30000-ev-north-america-nikkei-says-2025-01-28/.
[44] *Honda 0 Series Saloon*, Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/honda/saloon.
[45] *Honda 0 Series SUV*, Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/honda/0-series-suv.
[46] *Kia EV3*, Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/kia/ev3.
[47] *2026 Kia EV4 Preview – Homing in on the Affordable EV Market*, U.S. News & World Report (accessed August 27, 2025), https://cars.usnews.com/cars-trucks/advice/2026-kia-ev4-preview-homing-in-on-the-affordable-ev-market.
[48] *2028 Lucid Earth*, Car and Driver (accessed September 21, 2025), https://www.caranddriver.com/lucid-motors/earth.
[49] *Is Lucid Ready to Deliver on Its 2026 Midsize EV Launch?*, Zacks Equity Research (accessed August 27, 2025), https://www.zacks.com/stock/news/2707740/is-lucid-ready-to-deliver-on-its-2026-midsize-ev-launch
[50] Larry Avila, *Rivian Readies for Next Evolution with R2 Launch*, Automotive Dive (August 26, 2025), https://www.automotivedive.com/news/rivian-supply-chain-manufacturing-scaling-r2-production/757493/.
[51] *Rivian R3*, Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/rivian/r3.

Slate	Truck/SUV (modular design)[52]	2026	$27,000
Stellantis	Jeep Renegade (electric)[53]	2027	Under $25,000
Subaru	Unchartered[54]	2026	$34,000
	Trailseeker[55]	2026	$45,000
Tesla	Model Y (lower-cost version)[56]	2025	$35,000-$45,000
Toyota	C-HR (electric)[57]	2026	$35,000
Vinfast	VF Wild[58]	2026	$45,000

EPA's future fuel price assumptions are unreasonable and unsupported.

In the Proposal, EPA obliquely acknowledges that vehicle affordability is not simply a matter of purchase prices, but also the total cost of ownership, which "involves many factors, including, for example, not only vehicle price, but also owning and operating costs (*e.g.,* service and maintenance costs and fuel costs)."[59] The DRIA credibly projects that the Proposal will result in lost fuel savings, as compliance with GHG standards generally results in significantly lower fuel costs for drivers. The 2024 Multipollutant Rule projected, for example, $46 billion in annualized pre-tax fuel savings from the light- and medium-duty standards.[60] In the Proposal, EPA notes that the 2024 Multipollutant Rule relied on assumptions that EPA no longer believes are appropriate. Specifically, "due to changes in Administration policy since 2024," EPA no longer believes the

[52] Alex Leanse and Brian Vance, *2027 Slate Truck First Look: The $27,000 Pickup Ready for DIY Dreams*, MotorTrend (accessed August 27, 2025), https://www.motortrend.com/news/2027-slate-truck-electric-first-look-review.

[53] *2027 Jeep Renegade EV Confirmed, Will Be Priced under $25K*, Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/news/a61095817/2027-jeep-renegade-ev-confirmed-price/.

[54] *2026 Subaru Uncharted: What We Know So Far*, Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/subaru/uncharted.

[55] *2026 Subaru Trailseeker Is Like the Solterra but Bigger and More SUV-Like*, Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/news/a64442428/2026-subaru-trailseeker-revealed/.

[56] Shrawan Raja, *Tesla's 'Affordable' Model Y Rendered Ahead of Its Q4 2025 Release*, TopElectricSUV (August 15, 2025), https://topelectricsuv.com/news/tesla/tesla-model-y-affordable-q4-launch/.

[57] *2026 Toyota C-HR: What We Know So Far*, Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/toyota/c-hr.

[58] *2026 VinFast VF Wild*, Car and Driver (accessed August 27, 2025), https://www.caranddriver.com/vinfast/vf-wild.

[59] 90 Fed. Reg. at 36,312.

[60] 89 Fed Reg. at 27,860, Table 8.

2024 Multipollutant Rule's assumptions regarding future gasoline and diesel prices are appropriate.[61]

While EPA provides no other justification in the Proposal justifying why prior fuel price assumptions are invalid, the DRIA provides an analysis that uses unreasonable and unsupported fuel price projections. EPA explains that for its cost-benefit assessment, it subtracts $1 per gallon from the U.S. Energy Information Administration's (EIA) Annual Energy Outlook (AEO) 2023 reference case fuel price projections.[62] EPA attempts to justify this assumption simply by saying that "it does not appear that AEO 2025 took into account the policies being implemented by President Trump that are intended to drive down the price of gasoline and diesel."[63] However, EPA makes no attempt to specify which policies it is referring to or by what mechanism they would lower future gasoline prices, nor does it perform any quantitative estimate of the price impact of such policies. Moreover, independent analysts expect the existing energy-related Executive Orders by President Trump to have a limited effect, if any, on gasoline prices.[64]

Comparing EPA's artificially low future gasoline price projection with historical data demonstrates the unrealistic nature of the constant $1 reduction in per gallon gasoline price assumption, as seen in Figure 1. EPA assumes future gasoline prices for *every year for the next 20 years* will be lower than even the lowest inflation-adjusted *single year since 2000*. This is a dramatically lower price forecast than what EPA used in the 2024 Multipollutant Rule and requires more justification than simply pointing at unspecified "changes in Administration policies." If EPA intended this to be only a sensitivity analysis, then logic would dictate that EPA assess both a lower-than-expected gasoline price scenario *and* a higher-than-expected gasoline price scenario for a comprehensive assessment. To the extent EPA intends to use these lower fuel costs not as a sensitivity analysis, but rather as its new baseline, that new baseline is entirely unsubstantiated and highly unlikely.

[61] 90 Fed. Reg. at 36,326.
[62] DRIA at 10.
[63] *Id.* at 9.
[64] *See* Sydney Casey, *Trump's New Executive Orders: What They Mean for Your Fuel Prices*, Mansfield Energy (February 4, 2025), https://mansfield.energy/2025/02/04/trumps-new-executive-orders-what-they-mean-for-your-fuel-prices/ ("Overall, fuel prices may see minor fluctuations, but the broader market fundamentals—global supply and demand, refinery utilization, and geopolitical events—will remain the key drivers of pricing trends."); Shuting Pomerleau, *What Do President Trump's Executive Orders Mean for the U.S. Oil and Gas Market?* American Action Forum (March 19, 2025), https://www.americanactionforum.org/insight/what-do-president-trumps-executive-orders-mean-for-the-u-s-oil-and-gas-market/ ("The executive orders will likely have limited immediate impact on U.S. oil and gas production, as many of the policies must be enacted through legislation or agency rulemaking; moreover, it is demand and return on investment that are the main drivers of U.S. oil and gas production, not deregulation.")

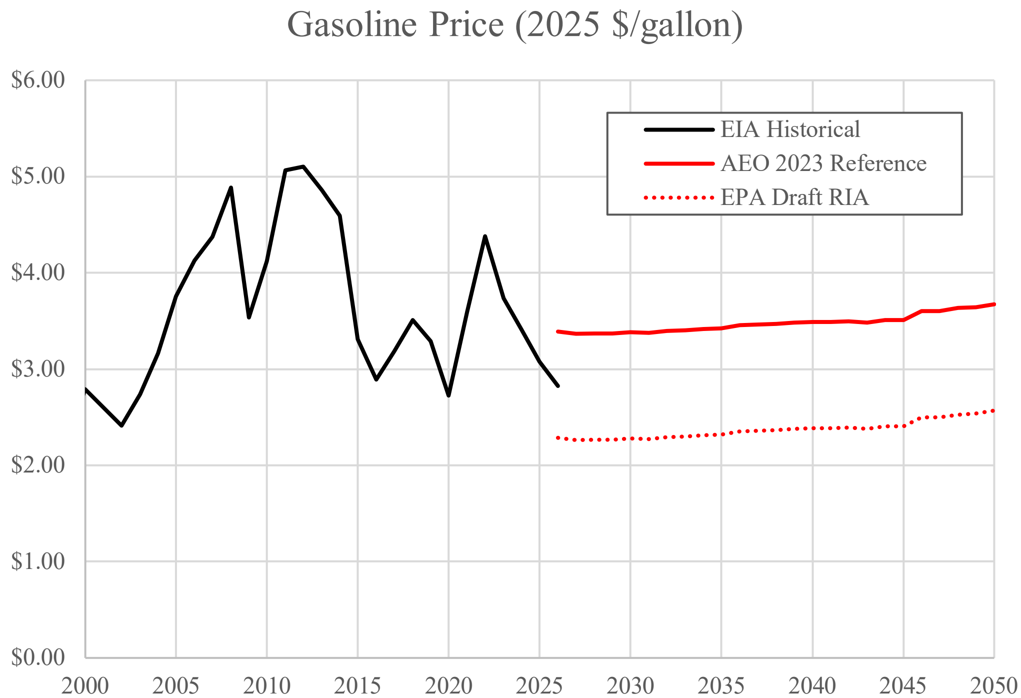

Figure 1: Historical and future projected real gasoline prices[65]

EPA ignores the evidence that increasing demand for gasoline raises gasoline prices

Not only are EPA's projected gasoline prices arbitrarily low, EPA also ignores its own evidence that the combination of the Proposal along with the removal of the 30D and 45W tax credits in H.R. 1[66] will significantly *raise* gas prices through increased demand for gasoline. EPA clearly recognizes this, as the DRIA contains a figure that compares modeled gasoline prices in a scenario that maintains the 2024 Multipollutant Rule and Phase 3 HD Rule to one that removes these rules, as reproduced below.[67]

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[65] Data from: EIA, *Short Term Energy Outlook*, Real Prices Viewer (Aug. 7, 2025), https://www.eia.gov/outlooks/steo/realprices/; EIA, *Annual Energy Outlook 2023*, Table 12, Petroleum and Other Liquids Prices, Reference Case, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=12-AEO2023&cases=ref2023&sourcekey=0. Prices were inflated from 2022 dollar-year values to real 2025 dollar-year using the Consumer Price Index values provided by EIA in the Real Prices Viewer of 2.926 for 2022 and 3.222 for 2025. EPA does not specify in what inflation-adjusted dollar-year the assumed $1 reduction in gasoline price is denominated. For this figure, the AEO 2023 values in 2022 dollar-year are reduced by $1 and then adjusted to 2025 dollar-year above to generate the "EPA Draft RIA" data series.

[66] Pub. L. No. 119-21 (2025).

[67] DRIA at 9.

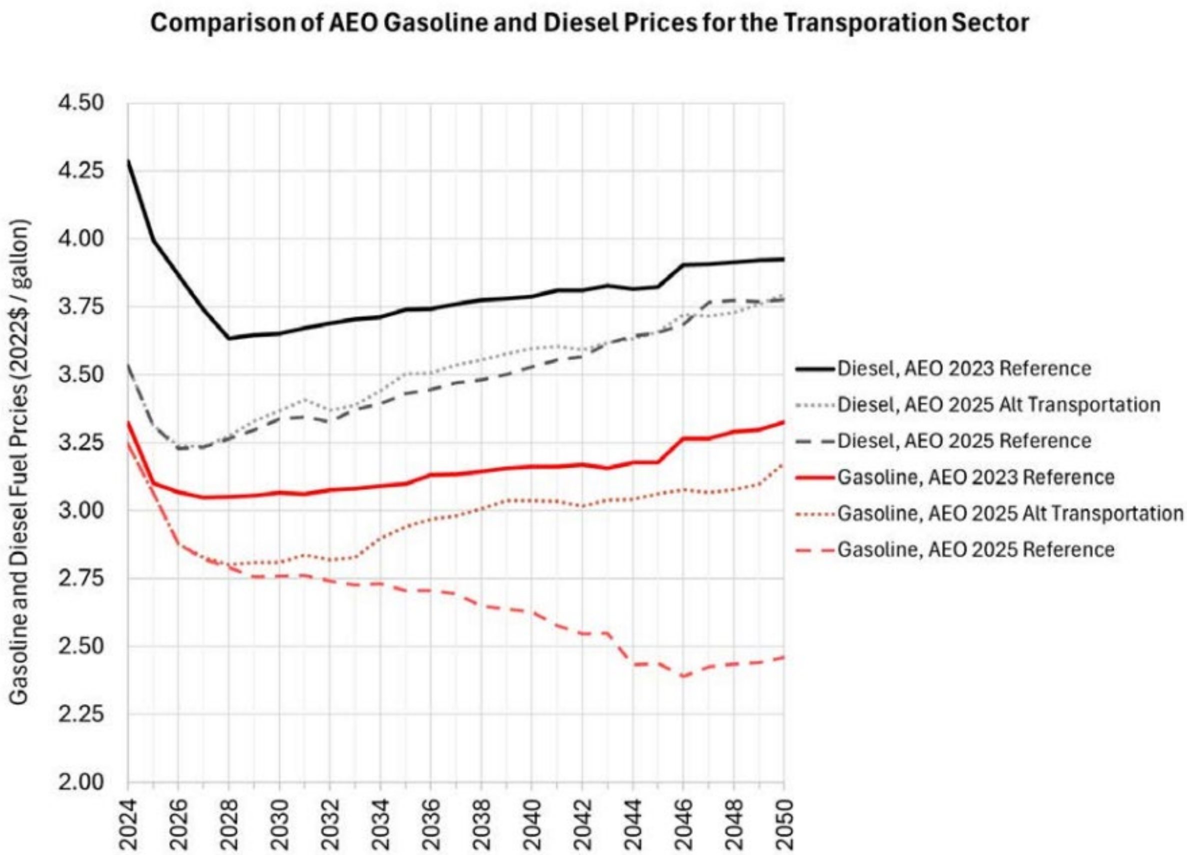

Figure 2: Gasoline price forecasts from the EIA AEO Reference and Alt Transportation Scenarios

The figure shows modeled gasoline prices (in red) from the AEO 2025 for two scenarios: the "Reference" case, which maintains the 2024 Multipollutant Rule and 2024 Phase 3 HD Rule (dashed line), and the "Alt Transportation," case which removes those rules among other vehicle policy changes (dotted line). [68] As is clear from the figure, removal of both 2024 rules results in a steady increase in gasoline prices from 2028 through 2050, rather than a decline of gasoline prices as EPA assumed in the Reference case. The increase in gasoline prices grows over time from 1.8% in 2030 to 29% in 2050, as reported in Table 4 below.

[68] The analysis makes clear that removal of the standards increases gasoline demand and gasoline costs. Both scenarios include IRA EV tax credit incentives that were in place when the analysis was published—if the EV tax credits were removed, the net effect would be an even greater increase in gasoline demand. Additional policies and assumptions changed in the Alternative Transportation scenario include removal of National Highway Transit Safety Administration (NHTSA) Corporate Average Fuel Economy (CAFE) standards for model year 2027+, removal of the California Advanced Clean Truck rule, reduced assumed investments in EV manufacturing and charging infrastructure, and reduced assumed eligibility for 30D credits. For complete scenario descriptions see: EIA, *Annual Energy Outlook 2025: Case Descriptions* at 9 (April 2025), https://www.eia.gov/outlooks/aeo/assumptions/pdf/case_descriptions.pdf.

Table 4: Modeled gasoline prices ($2024 per gallon)[69]

Scenario	2030	2040	2050
Reference	$2.93	$2.97	$2.61
Alt. Transportation.	$2.98	$3.23	$3.37
Difference	$0.05	$0.44	$0.76
Percent Increase	1.8%	16%	29%

The above analysis only considers the impact of regulatory rollback but keeps the tax credits in place. Additional independent analyses demonstrate that repeal of the EV tax credits alone raises gasoline prices. The Rhodium Group assessed the impact of H.R. 1 and determined that "[b]ecause there are fewer EVs on the road, motor gasoline consumption increases by 4-11% in 2035, driving up gasoline prices by 1-3%."[70] Combined with a scenario approximating the Proposal, the effects are magnified: "Under the rollbacks + repeal pathway, retail gasoline prices are 6-15% higher in 2035 compared to current policy. This translates to a $0.20 to $0.37 per gallon increase in 2035, equivalent to more than doubling or even tripling the federal gas tax."[71] EPA needs to consider the impact of these specific, modeled policies on raising gasoline prices, rather than only assuming unspecified policies lead to lower gasoline prices.

Nor can EPA point to the possibility that H.R. 1 will raise electricity prices as well as gasoline prices as a reason to ignore the impact of H.R. 1 and the proposal on gasoline prices. First, assessments indicate that the impact of H.R. 1 and regulatory rollbacks will impact gasoline prices more than they will impact electricity prices. Resources for the Future estimated that H.R. 1 combined with EPA's Proposed Repeal of Greenhouse Gas Emissions Standards for Fossil Fuel-Fired Electric Generating Units[72] would cause sustained net annual increases in electricity prices of 2.1 to 3.3% from now though 2050.[73] Rhodium Group also finds that H.R. 1 will

[69] EIA *Annual Energy Outlook 2025*, Table 12, Petroleum and Other Liquids Prices, https://www.eia.gov/outlooks/aeo/excel/aeotab12.xlsx.

[70] Ben King et al., *What Passage of the "One Big Beautiful Bill" Means for US Energy and the Economy*, Rhodium Group (Jul. 11, 2025), https://rhg.com/research/assessing-the-impacts-of-the-final-one-big-beautiful-bill/.

[71] Ben King et al., *Trump 2.0: What's in Store for US Energy and Climate?*, Rhodium Group (Dec. 17, 2024), https://rhg.com/research/trump-2-0-whats-in-store-for-us-energy-and-climate/.

[72] 90 Fed. Reg. 25,752 (Jun. 17, 2025).

[73] Nicholas Roy and Karen Palmer, *Hidden Costs of Repealing EPA's Carbon Pollution Standards: Consequences for the Environment, Households, and Society*, Resources for the Future (Aug. 6, 2025), https://www.rff.org/publications/issue-briefs/hidden-costs-of-repealing-epas-carbon-pollution-standards-consequences-for-the-environment-households-and-society/.

increase electricity prices 2-4% by 2035.[74] This is significantly less than the 6-15% increase in gasoline prices by 2035.[75] Second, due to electric vehicles' inherent efficiency advantage over ICE vehicles, an equivalent increase in electricity and gasoline prices would disproportionately increase fuel costs for ICE vehicles over EVs.[76] As an illustrative example, if we compare the impact of a 5% increase in both electricity and gasoline prices on total fuel costs from 2035-2037 for representative mid-sized EV and ICE vehicles, with all other factors (e.g. annual miles traveled) held constant, we find a $74 increase in fuel costs for the EV and a $200 increase in fuel costs for the ICE vehicle.[77] In such a scenario, the electric vehicle retains significant fuel cost and total cost of ownership advantages over its ICE counterpart, undercutting EPA's stated affordability rationale.

EPA ignores the cost of the Proposal on raising gasoline prices for all consumers

In addition to failing to consider the effect of increased demand for gasoline on the price of gasoline paid by consumers of new ICE vehicles, EPA ignores the overall larger societal cost of its proposed action. As demonstrated in EPA's own figure in the DRIA (reproduced as Figure 2 above) the Proposal is likely to increase gasoline prices due to the increased demand for gasoline. Any increase in gasoline prices affect all gasoline consumers. As an illustrative example, the societal cost of the suite of transportation actions modeled by EIA in the "Alternative Transportation" scenario – which includes the rollback of the 2024 Multipollutant and Phase 3 HD Rules included in the Proposal – increases total domestic societal expenditure on gasoline by amounts ranging from $684 billion (7% net present value) to $1,368 billion (3%

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[74] Ben King et al., *What Passage of the "One Big Beautiful Bill" Means for US Energy and the Economy*, Rhodium Group (Jul. 11, 2025), https://rhg.com/research/assessing-the-impacts-of-the-final-one-big-beautiful-bill/.
[75] *Id.*
[76] Mark Singer et al., *Electric Vehicle Efficiency Ratios for Light-Duty Vehicles Registered in the United States*, National Renewable Energy Laboratory at v (Mar. 2023), https://docs.nrel.gov/docs/fy23osti/84631.pdf ("The overall [electric vehicle efficiency ratio] in the United States was calculated as 4.4, meaning that the average EV travels 4.4 times farther on a given amount of energy than the average gasoline vehicle.")
[77] TechScape (AMBER Beta 2025) Data, Argonne National Laboratory (accessed August 2025). The analysis compared the fuel costs of battery electric vehicles with 300-mile range to the fuel costs of identical vehicles operating on a conventional spark ignition turbo powertrain in the year 2035. Vehicles were base trim models in a low-technology progress setting, with baseline fuel and electricity costs from the AEO 2023 reference case (*see* EIA, *Annual Energy Outlook 2023*, Table 8, Electricity Supply, Disposition, Prices, and Emissions, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=8-AEO2023&cases=ref2023&sourcekey=0;Table 57, Components of Selected Petroleum Product Prices, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=70-AEO2023&sourcekey=0), and a comparison that increased end use fuel prices by 5% for each, an assumed service time of 3 years, and vehicle miles traveled (VMT) estimates for cars, SUVs, and pickups that vary by year in line with the 2020 VMT profiles in the SAFE Regulatory Impact Analysis. (*See* NHTSA, The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for MY2021 – 2026 Passenger Cars and Light Trucks: Regulatory Impact Analysis (Mar. 2020), https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/final_safe_fria_web_version_200330.pdf). Total fuel cost results were drawn from TechScape's total cost of ownership module, with results showing a midsize BEV facing a $72 fuel cost increase and a midsize combustion vehicle facing a $194 fuel cost increase in constant 2023 dollars, with all other vehicle and usage characteristics held constant. Using CPI values of 304.704 for 2023 and 313.698 for 2024, based on annual averages from the U.S. BLS (*see* Federal Reserve Bank of St. Louis, Consumer Price Index for All Urban Consumers: All Items in U.S. City Average (accessed August, 2025), https://fred.stlouisfed.org/series/CPIAUCSL#), we arrive at figures of $74 for the BEV and $200 for the combustion engine vehicle in constant 2024 dollars. For example: $199.72 = $194 * (313.698/304.704).

net present value) from 2025 through 2050.[78] Even if EPA chooses not to consider these expenditures in its cost benefit analysis as transfer payments, EPA must account for these costs in evaluating costs to consumers which EPA has consistently included as a category of analysis in evaluating vehicle standards—particularly when it relies on affordability as a key rationale for its proposed action.[79]

The bottom line is that the Proposal is very unlikely to improve vehicle affordability and may even decrease affordability in the longer run by hampering the adoption of more cost-efficient electric vehicles, and furthermore will decrease the affordability of running ICE vehicles on the road by increasing gasoline prices.

[78] The illustrative example was calculated using data provided by EIA's Annual Energy Outlook 2025. Annual modeled gasoline price for both the "Reference" and "Alternative Transportation" scenarios reported in Table 12 were multiplied by annual motor gasoline usage for "Light-Duty Vehicles", "Commercial Light Trucks", and "Freight Trucks" in Table 36 to determine total gasoline expenditures. Consumption in trillion Btus were converted to gallons using the "Motor Gasoline Average MMBtu per barrel" conversion provided in Table 69. (*See* EIA, *Annual Energy Outlook 2025*, Table 12, Petroleum and Other Liquids Prices, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=13-AEO2025&cases=ref2025&sourcekey=0; Table 36, Transportation Sector Energy Use by Fuel Type Within a Mode, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=46-AEO2025&cases=ref2025&sourcekey=0; Table 69, Conversion Factors, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=20-AEO2025&cases=ref2025&sourcekey=0.) Annual increases in gasoline expenditures were determined by subtracting the "Reference" from the "Alternative Transportation" annual expenditures. The net present value of the resultant annual series of expenditure increases from 2025 to 2050 was calculated using 3% and 7% discount rates.

[79] *See* examples of EPA assessing consumer impacts of rules including: 2024 Multipollutant Rule RIA at 4-40; Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles: Phase 3: Regulatory Impact Analysis (Mar. 2024), EPA-420-R-24-006, at 497, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P101A93R.pdf (Phase 3 HD Rule RIA).

II. Consumer Choice

Vehicle choices have not decreased as a result of electric vehicles

In the Proposal, EPA asserts that "GHG emission standards harm public health and welfare by increasing prices, decreasing consumer choice, and slowing the replacement of older vehicles that are less safe and emit a greater volume and variety of air pollutants than new motor vehicles and engines."[80] Here we focus on the assertion that vehicle GHG standards reduce consumer choice.

In the economic literature, "consumer choice" is generally understood as the set of options available to buyers in a market, i.e., the "choice set."." Reduced consumer choice would therefore mean a contraction in the number or variety of products that consumers can select from when making a purchase. EPA provides no evidence that GHG standards have led to such a contraction. To the contrary, both the total number of light-duty vehicle (LDV) models and the diversity of available powertrains have been stable or expanding over the period in which GHG standards have tightened.

Data from 2015 onward show that consumers consistently had access to an average of 1,298 LDV models across all technology types (see 3). The stability in the overall number of models occurred even as GHG standards became more stringent, particularly from model years 2021 through 2025. More importantly, the composition of those models has diversified. Rather than constraining consumer choice, the introduction of GHG standards coincided with an increase in the availability of multiple powertrain options that consumers value. Consumers today can choose among gasoline vehicles, hybrids, plug-in hybrids, and battery electric vehicles, with model offerings expanding across nearly every vehicle class.[81] For example, in MY 2020 the overwhelming majority (85%) of models available were ICE powertrain vehicles (gasoline, diesel, and flex-fuel vehicles) and only a small minority (15%) used an electrified powertrain (hybrid, plug-in hybrid, electric, and fuel cell vehicles). This distribution has shifted significantly to MY 2025 with the availability of electrified powertrains expanding more than threefold.[82]

[80] 90 Fed. Reg. at 36,291.

[81] *See also* Jack Ewing, *Used E.V. Sales Take Off as Prices Plummet*, NY Times (Sept. 13, 2025), https://www.nytimes.com/2025/09/13/business/used-electric-vehciles.html.

[82] *See Download Fuel Economy Data* (accessed Sept. 2, 2025), https://www.fueleconomy.gov/feg/download.shtml.

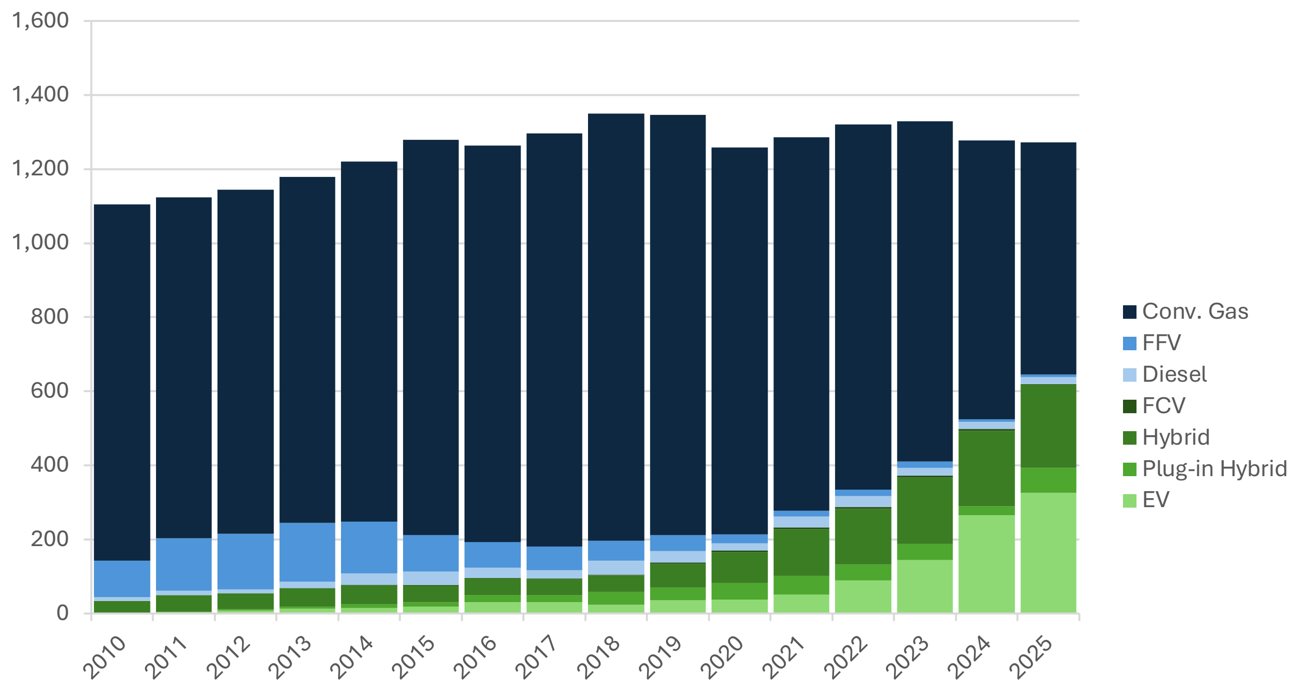

Figure 3: Models available by technology type from 2010 through 2025, categorized by fuel type including gasoline, flex-fuel vehicle (FFV), diesel, fuel cell vehicles (FCV), hybrids, plug-in hybrids, and electric vehicles). Data from fueleconomy.gov.

Concurrently, the introduction of a greater number of models using electrified powertrains has not significantly affected the availability of vehicles by class. **Figure 4** presents the same set of model availability by model year as presented in Figure 3, but categorizes the models by vehicle type. The overall trend beginning in 2015 of shifting from other primarily car classes (green) to SUVs (dark blue) and large trucks (light blue) is clear.

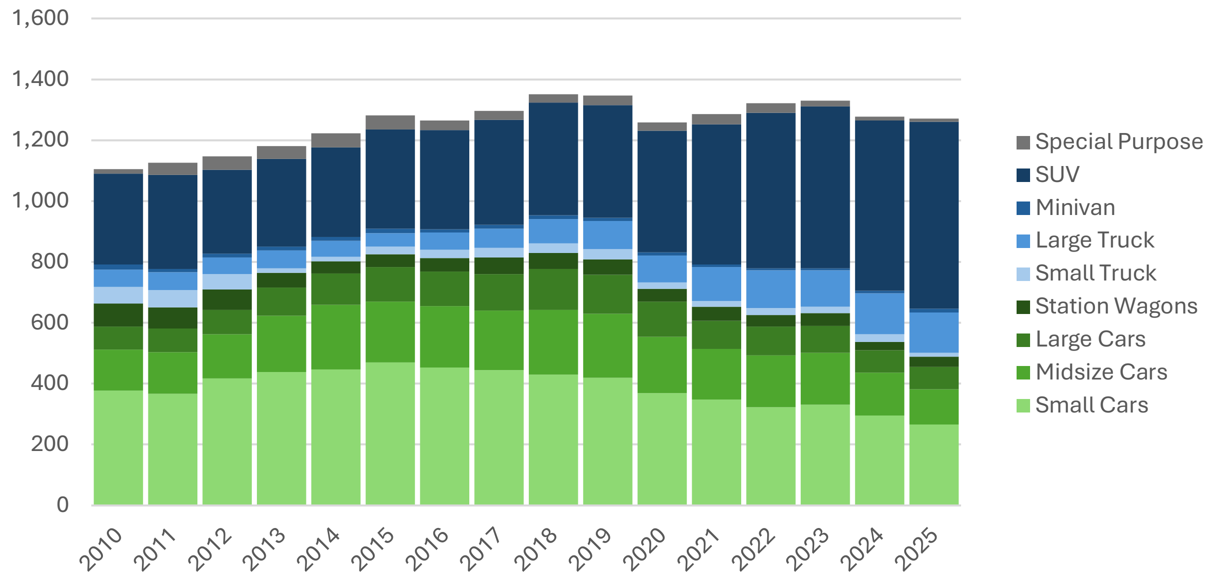

Figure 4: Number of models available by model year, categorized by vehicle class. Data from fueleconomy.gov.[83]

However, the increasing availability of electrified powertrain technology vehicles has not significantly altered the availability of vehicle class. Figure 5 below compares the fraction of total models available for MY 2020 to MY 2025 by both vehicle technology type and vehicle class. The shift from primarily cars to primarily SUVs and trucks is clearly present in both conventional and electrified technology vehicles. Otherwise, the proportion and diversity of vehicle classes available for electrified technology vehicles generally follow those for conventional vehicles. This trend implies that vehicle standards incentivizing new technologies has not altered consumer choice of vehicle class as assessed by availability.

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[83] *Id.* Certain vehicle classes were aggregated for ease of readability and due to changes in class definitions for MY prior to MY 2013. Vehicle classes with aggregated classes are: Small Cars (including compact cars, subcompact cars, minicompact cars, and two seaters), Station Wagons (both midsize and large station wagons), Minivans (both 2WD and 4WD), Small Truck (small pickup trucks including both 2WD and 4WD), Large Truck (including Standard Pickup Trucks and 2WD and 4WD), SUV (including small and standard sport utility vehicles, and both 2WD and 4WD), and Special Purpose Vehicles (including all vans and special purpose vehicles and 2WD and 4WD).

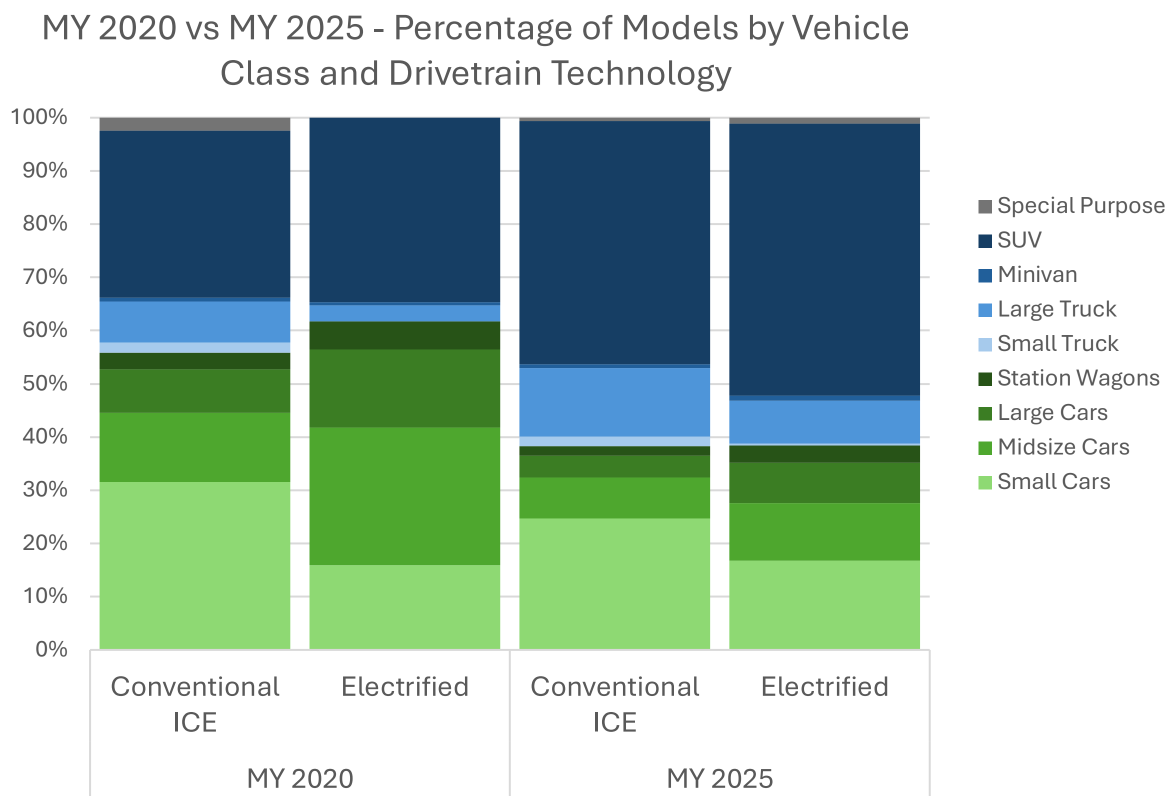


Figure 5: Percentages of models for MY 2020 and MY 2025, categorized by vehicle drivetrain technology and vehicle class. Data from fueleconomy.gov.[84]

These trends reflect that automakers have responded to standards not by eliminating models, but by broadening their product portfolios. EPA's claim that standards restrict consumer choice is unsupported by evidence and misrepresents both the economic meaning of consumer choice and the actual trajectory of the vehicle market under GHG regulation.

Consumer survey evidence does not demonstrate declining long-term interest in EVs

In the DRIA, EPA asserts an observed decline in consumer interest in EVs based on findings from several surveys. These isolated data points are often taken out of context and are insufficient to support such a conclusion, for several reasons.

Long-run trends demonstrate that consumer acceptance of EVs is increasing

Point-in-time surveys cannot substitute for research that examines how preferences evolve over time or how they are revealed in actual purchasing behavior. Longitudinal analyses show that consumer willingness to adopt EVs has grown steadily, reflecting deeper, systematic changes in

[84] *Id.*

sentiment rather than year-to-year fluctuations.[85] Revealed preference data from vehicle sales confirms that acceptance has risen even when survey responses have appeared static.[86]

Moreover, the underlying trajectory of acceptability continues to rise because the technology itself is improving.[87] Vehicle range (see **Figure 6**), performance (including highly valued traits of speed responsiveness, braking, and noise)[88], and cost have advanced significantly, and the availability of EVs across more market segments (see **Figure 7**) makes them increasingly attractive to diverse consumers.

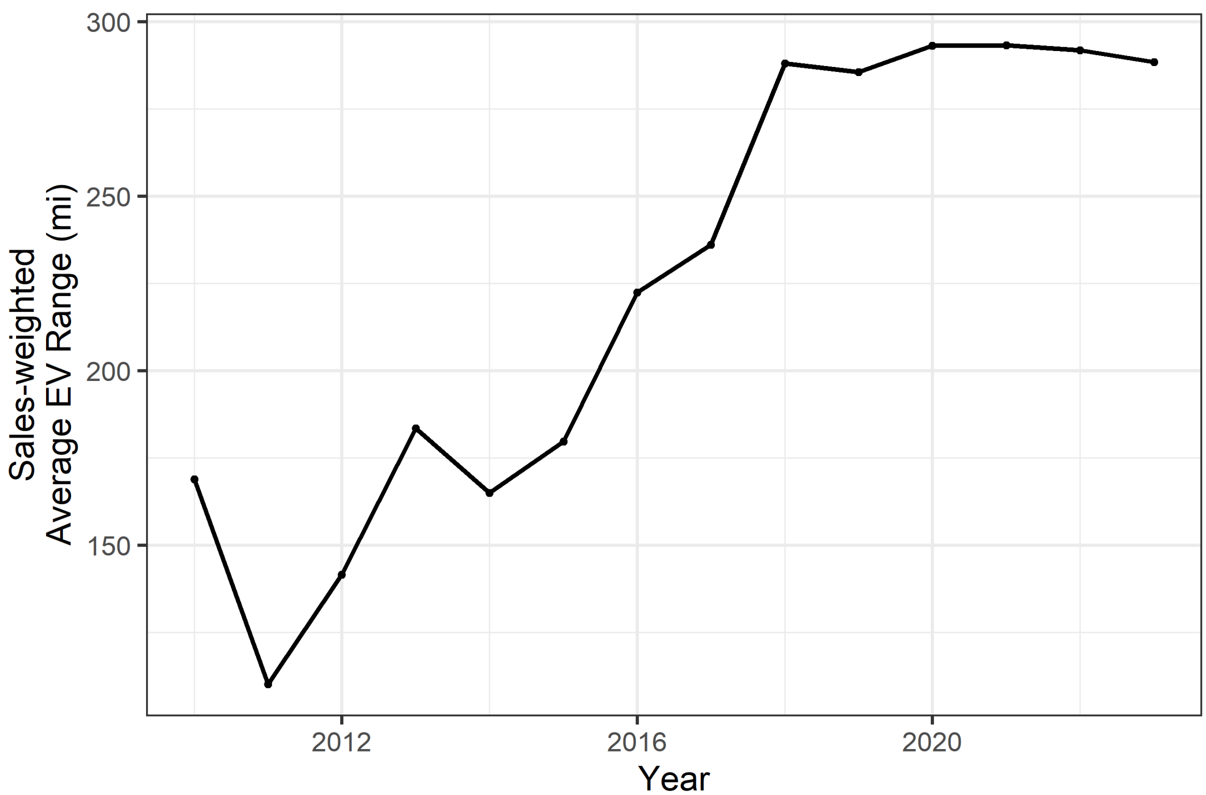


Figure 6: Sales-weighted trend in EV range overtime in the US[89]

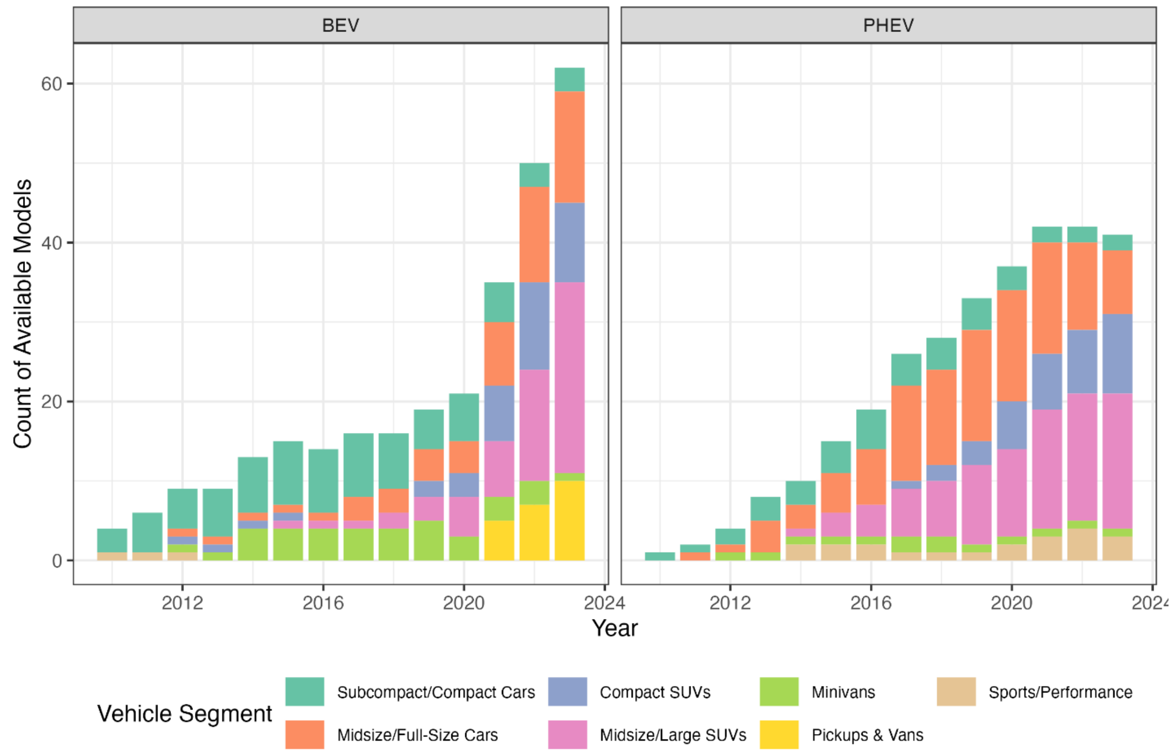
[85] Carley, Sanya, Saba Siddiki, and Sean Nicholson-Crotty, "Evolution of plug-in electric vehicle demand: Assessing consumer perceptions and intent to purchase over time," *Transportation Research Part D: Transport and Environment* 70 (2019): 94-111, https://doi.org/10.1016/j.trd.2019.04.002.

[86] Kenneth T. Gillingham, Arthur A. van Benthem, Stephanie Weber, Mohamed Ali Saafi and Xin He, "Has Consumer Acceptance of Electric Vehicles Been Increasing? Evidence from Microdata on Every New Vehicle Sale in the United States," 113 *AEA Papers and Proceedings* 329–35 (2023), https://doi.org/10.1257/pandp.20231065.

[87] Forsythe, Connor R., Kenneth T. Gillingham, Jeremy J. Michalek, and Kate S. Whitefoot, "Technology advancement is driving electric vehicle adoption," *Proceedings of the National Academy of Sciences* 120, no. 23 (2023): e2219396120, https://doi.org/10.1073/pnas.2219396120.

[88] Stephen M. Skippon, *How consumer drivers construe vehicle performance: Implications for electric vehicles*, Transportation Research Part F: Traffic Psychology and Behaviour Volume 23, March 2014, pages 15-31 https://www.sciencedirect.com/science/article/pii/S136984781300137X

[89] EV Volumes (2024), *EV-Volumes – The Electric Vehicle World Sales Database*, https://www.ev-volumes.com/.



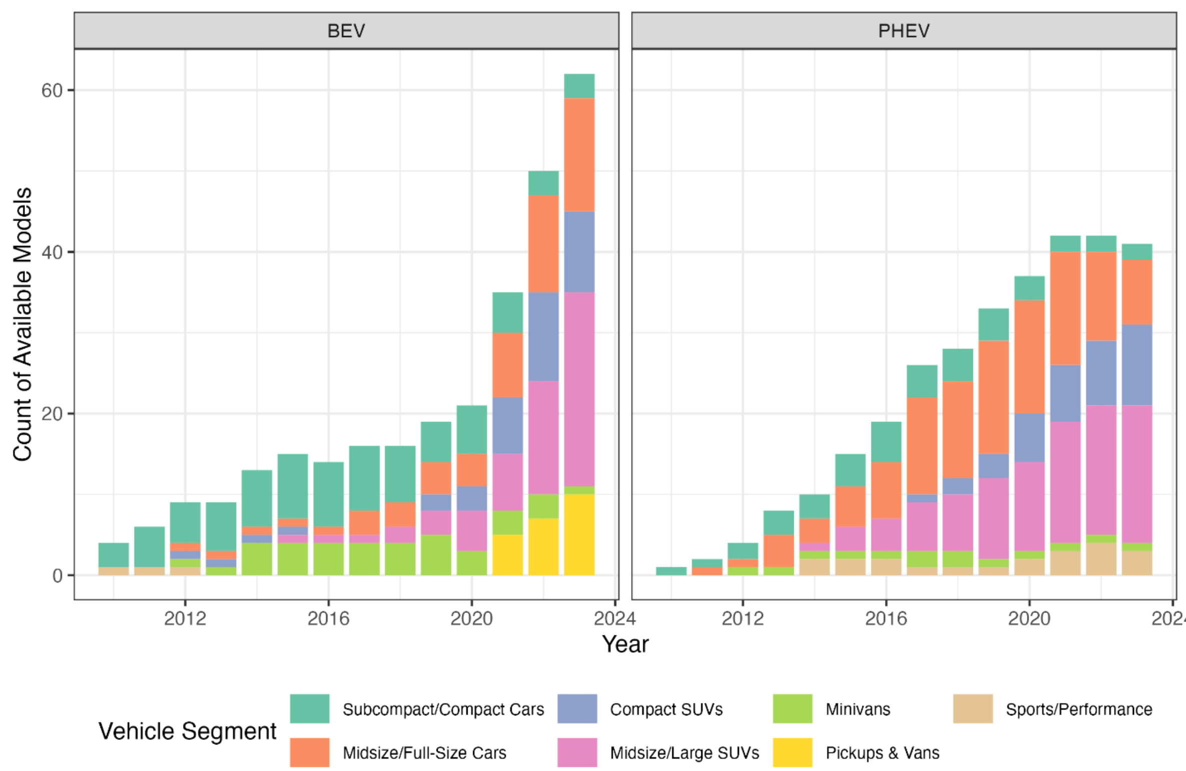


Figure 7: Availability of models broken down by vehicle segments in the US[90]

At the same time, the expansion and reliability of charging infrastructure have increased satisfaction with the ownership experience.[91] In just four years, consumers have reported a nearly 20% increased satisfaction in vehicle charging. [92] Together, this body of evidence indicates that consumer interest in EVs is not stagnant but growing as part of a durable trend tied to both evolving preferences and ongoing improvements in the vehicles and charging ecosystem.

Consumer adoption behavior demonstrates strong satisfaction and retention

Once consumers purchase EVs, they overwhelmingly report being satisfied with the technology—in fact, four of the top ten vehicles from Consumer Reports in 2024 were electric.[93] This reflects not only environmental preferences, but also pragmatic benefits such as lower fuel and maintenance costs, performance advantages, and the convenience of home charging.[94] Such satisfaction means that the initial concerns cited in surveys diminish substantially after adoption, undermining the argument that these concerns will remain barriers to growth.

Research consistently demonstrates that EV owners intend to remain with the technology and are unlikely to revert to internal combustion vehicles. 94% of BEV owners indicate repurchase intent for their next vehicle.[95] This continuity is crucial: it demonstrates that the technology is "sticky" once adopted.[96, 97] Even when studies have examined discontinuance, they find it is rare and usually tied to early-market infrastructure shortcomings that are being corrected.[98]

Survey responses are not predictive of EV sales outcomes

First, survey sentiment and sales trends have often diverged in the context of EVs. As shown in **Figure 8** below, multiple years demonstrate flat or declining survey interest at the same time that EV sales were accelerating. For example, while surveys in 2018-2020 suggested limited or declining intent to purchase, sales grew significantly during the same period. More recently,

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[90] *Id.*

[91] Lin, Boqiang, and Mengqi Yang, "Changes in consumer satisfaction with electric vehicle charging infrastructure: Evidence from two cross-sectional surveys in 2019 and 2023," *Energy Policy* 185 (2024): 113924, https://doi.org/10.1016/j.enpol.2023.113924.

[92] *Id.*

[93] Consumer Reports, "Consumer Reports' 2024 annual 10 top picks cars list includes bevy of partially and fully electrified vehicles," Feb. 29, 2024, https://www.consumerreports.org/media-room/press-releases/2024/02/consumer-reports-2024-annual-10-top-picks-cars-list-includes-bevy-of-partially-and-fully-electrified-vehicles/.

[94] Ooi, Say Keat, Yiqi Xu, and Jasmine AL Yeap, "Beyond the first charge: Understanding continuance intention among electric vehicle drivers in China," *Research in Transportation Business & Management* 61 (2025): 101420, https://doi.org/10.1016/j.rtbm.2025.101420.

[95] J.D. Power, "J.D. Power 2025 U.S. Electric Vehicle Experience (EVX) Ownership Study" (Feb. 7, 2025), https://www.jdpower.com/business/press-releases/2025-us-electric-vehicle-experience-evx-ownership-study.

[96] Cruz-Jesus, Frederico, Hugo Figueira-Alves, Carlos Tam, Diego Costa Pinto, Tiago Oliveira, and Viswanath Venkatesh, "Pragmatic and idealistic reasons: What drives electric vehicle drivers' satisfaction and continuance intention?", *Transportation research part A: policy and practice* 170 (2023): 103626.

[97] Dua, R., Edwards, A., Anand, U. & Bansal, P., "Are American electric vehicle owners quitting?," *Transportation Research Part D: Transport and Environment* 133, 104272, doi:10.1016/j.trd.2024.104272 (2024).

[98] Hardman, S. & Tal, G, "Understanding discontinuance among California's electric vehicle owners," *Nature Energy* 6, at 538–545, https://doi.org/10.1038/s41560-021-00814-9 (2021).

despite reported declines in willingness to purchase in some surveys between 2023-2024, EV sales reached record highs.

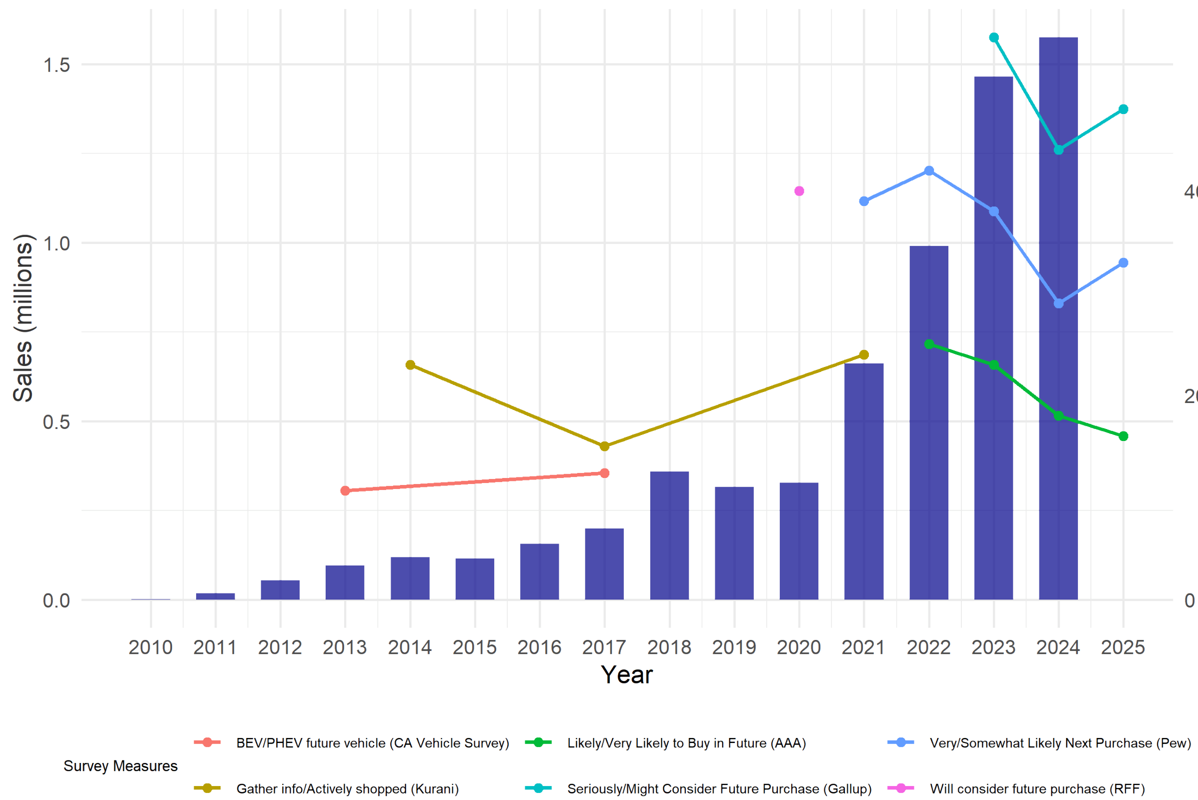

Figure 8: Comparison of U.S. EV sales (2011–2025) with multiple survey measures of consumer intent to purchase EVs. The figure reveals survey responses fluctuate considerably over time and often suggest declining or stagnant interest, whereas actual EV sales have grown consistently and reached record highs in recent years.[99, 100, 101, 102, 103, 104, 105]

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[99] California Energy Commission, *California Vehicle Survey, 2013*, Sacramento, CA: California Energy Commission (2013), https://www.nrel.gov/transportation/secure-transportation-data/tsdc-california-vehicle-survey-2013.html.

[100] California Energy Commission, *California Vehicle Survey, 2017*, Sacramento, CA: California Energy Commission (2017), https://www.nrel.gov/transportation/secure-transportation-data/tsdc-california-vehicle-survey-2017.html.

[101] Saad, L., *U.S. Electric Vehicle Interest Steady at Lower 2024 Level*, Gallup (April 8, 2025), https://news.gallup.com/poll/658964/electric-vehicle-interest-steady-lower-2024-level.aspx.

[102] Moye, B., *Americans Slow to Adopt Electric Vehicles*, AAA News (June 3, 2025), https://newsroom.aaa.com/2025/06/aaa-ev-survey/.

[103] Kennedy, B., Kikuchi, E., & Tyson, A, *Americans' interest in purchasing electric and hybrid vehicles*, Pew Research Center (June 5, 2025), https://www.pewresearch.org/science/2025/06/05/americans-interest-in-purchasing-electric-and-hybrid-vehicles/.

[104] MacInnis, B. & Krosnick, J.A., *Climate Insights 2020: Electric Vehicles*, Resources for the Future (2020), https://media.rff.org/documents/Climate_Insights_2020_Electric_Vehicles.pdf.

[105] Kurani, K.S., *2021 Multi-State Zero Emission Vehicle Market Study: Volume 1: A Subset of ZEV States*, UC Davis: Institute of Transportation Studies (2023), https://escholarship.org/content/qt8tm9q1zh/qt8tm9q1zh.pdf.

Sales respond to many structural factors, not only to fluctuating consumer sentiment. Vehicle prices, model availability, charging infrastructure, and policy incentives have a strong effect on adoption. As technology costs decline and infrastructure expands, sales continue to grow, regardless of short-term fluctuations in reported consumer interest. Survey responses are highly sensitive to current events (e.g., gas prices, media narratives, political polarization), whereas adoption reflects durable market fundamentals (such as prices, model availability, infrastructure, and policy incentives).

Reliance on cross-sectional surveys ignores the feedback effects of adoption. As adoption grows, positive experiences of owners diffuse into the broader market through word-of-mouth and visibility, accelerating mainstream acceptance.[106, 107, 108] This dynamic means that surveys taken at one point in time may systematically understate long-run willingness to purchase, since preferences shift as the market develops.

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[106] Kim, Minsu, "Peer Effects in Electric Vehicle Adoption," available at SSRN 5365165, https://dx.doi.org/10.2139/ssrn.5365165.

[107] Chakraborty, Debapriya, David S. Bunch, David Brownstone, Bingzheng Xu, and Gil Tal, "Plug-in electric vehicle diffusion in California: Role of exposure to new technology at home and work," *Transportation Research Part A: Policy and Practice* 156 (2022) at 133-151, https://doi.org/10.1016/j.tra.2021.12.005.

[108] Tebbe, Sebastian, *Peer Effects in Electric Car Adoption: Evidence from Sweden* (July 14, 2025), https://sebastiantebbe.github.io/uploads/YST_Paper.pdf.

III. Fleet Turnover

In the Proposal, EPA proposes that "GHG emission standards harm public health and welfare by … slowing the replacement of older vehicles that are less safe and emit a greater volume and variety of air pollutants than new motor vehicles and engines."[109] However, EPA provides no new modeling or analysis to justify its assertions and never analyzes the impacts of repealing its GHG standards on vehicle sales and fleet turnover.

The only support EPA provides for its fleet turnover rationale is a set of footnotes citing the SAFE II Rule.[110] In SAFE II, EPA and the National Highway Traffic Safety Administration (NHTSA) similarly argued that GHG standards would raise vehicle prices, resulting in some consumers delaying new vehicle purchases, and leaving older, more-polluting vehicles on the road longer.[111] SAFE II's analysis of fleet turnover for light-duty vehicles suffered from serious deficiencies and was highly contested in written comments and petitions for reconsideration.[112] Further, the final SAFE II Rule found minimal effects from fleet turnover on emissions.[113]

EPA subsequently conducted extensive research to improve its modeling of fleet turnover and address the deficiencies raised in the SAFE II comments. In 2021, EPA commissioned a study to assess the effects of new-vehicle price changes on vehicle sales and fleet turnover for passenger vehicles.[114] The study conducted a literature review and developed a method to examine the effects of changes in the prices of new vehicles on new and used vehicle sales and vehicle scrappage. The literature review identified 20 relevant papers using U.S. data and published since 1995 with enough data to calculate the demand elasticity of new or used vehicles. The study concludes that new vehicle sales have a long-run demand elasticity between -0.15 and -0.4, meaning that a 1 percent increase in vehicle price leads to 0.15 to 0.4 percent reduction in vehicle sales.

Based on this report, EPA conservatively chose the higher demand elasticity of -0.4 for light-duty vehicle sales in its modeling of fleet turnover for the 2024 Multipollutant Standards.[115] EPA

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[109] 90 Fed. Reg. at 36,291.
[110] 90 Fed. Reg. 36,312-13 n.108, 109, & 111 (citing 85 Fed. Reg. at 24,174, 24,186, 24,626, and 25,039).
[111] 85 Fed. Reg. 24,186-24,187.
[112] *See*, *e.g.*, Ken Gillingham, PhD, The Rebound Effect of Fuel Economy Standards: Comment on the Safer Affordable Fuel-Efficient (SAFE) Vehicles Proposed Rule for MY2021-2026 Passenger Cars & Light Trucks (Oct. 24, 2018), EPA-HQ-OAR-2018-0283-5054, https://resources.environment.yale.edu/gillingham/Gillingham%20-%20Rebound%20Effect.pdf; Center for Biological Diversity et al., Petition for Reconsideration of EPA's Final Rule—The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for MY2021-2026 Passenger Cars & Light Trucks (June 29, 2020), EPA-HQ-OAR-2018-0238, https://ago.vermont.gov/sites/ago/files/wp-content/uploads/2020/08/20200629-UCS-et-al-SAFE-Part-II-Petition-for-Reconsideration_Print_Copy.pdf.
[113] SAFE II Rule at 25,042-25,051.
[114] RTI Int'l, *The Effects of New-Vehicle Price Changes on New- and Used-Vehicle Markets and Scrappage*, EPA–420–R–21–019 (2021), https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=352754&Lab=OTAQ.
[115] Although not transparent, the Appendix B Supporting Materials spreadsheet reveals EPA retained the assumption of -0.4 demand elasticity, although neither the RIA nor Appendix B discusses the impacts of demand elasticity on vehicle sales and fleet turnover. EPA, *Appendix B Supporting Materials* (July 2025), EPA-HQ-OAR-2025-0194-0091, https://www.regulations.gov/document/EPA-HQ-OAR-2025-0194-0091 (Appendix B Supporting Materials).

explained its reason for selecting the higher end of the range, noting "A smaller elasticity does not change the direction of sales effects, but it does reduce the magnitude of the effects. Using the value of -0.4 is conservative, as the larger estimate yields a larger change in sales."[116]

Even with conservative assumptions, consumers' long-run demand for new vehicles is fairly inelastic, and the impact of regulations that could raise the price of vehicles on fleet turnover will be fairly small. EPA concluded that "For durable goods, such as vehicles, people are generally expected to have more flexibility about *when* they purchase new vehicles than *whether* they purchase new vehicles; thus, their behavior is more inflexible (less elastic) in the long run than in the short run."[117]

Because EPA's modeling of fleet turnover is a critical component to its vehicle rulemakings, the EPA 2021 report was subject to independent peer review[118] in compliance with OMB's guidance for influential scientific information.[119] The report received generally positive peer reviews, with one reviewer calling it the "best government report" that she had read.[120] The final report, peer reviewer comments, and agency response to peer review are all publicly available.

This finding that the impact of vehicle standards on fleet turnover is small matches the results of EPA's detailed analyses in the 2024 rulemakings for light-, medium-, and heavy-duty vehicles. For example, EPA found the 2024 Multipollutant Rule to have "very small impacts" on light-duty vehicle sales, ranging from a decrease of about 0.2 percent to 0.9 percent per year.[121]

As mentioned above, EPA used the OMEGA model to analyze projected impacts of the rules, including impacts on vehicle sales.[122] OMEGA models the interaction between producers and consumers, including producer decisions in response to emissions policies (in the context of technology cost and market conditions) and consumer responses to new vehicles and services (accounting for new vehicle prices, fuel and electricity costs, elasticity of new vehicle demand,

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[116] 2024 Multipollutant Rule RIA at 4-61.

[117] *Id.*

[118] RTI Int'l & ICF Int'l, *The Effects of New-Vehicle Price Changes on New- and Used-Vehicle Markets and Scrappage: Peer Review and Response to Reviewer Comments*, EPA-420-R-21-020 (2021), https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=543272&Lab=OTAQ (Effects of New-Vehicle Price Changes Peer Review and Response).

[119] OMB defines "influential scientific information" (ISI) as "scientific information the agency reasonable can determine will have or does have a clear and substantial impact on important public policies or private sector decisions." OMB direction requires agencies to conduct a peer review of influential scientific information and notes "When an information product is a critical component of rule-making, it is important to obtain peer review before the agency announces its regulatory options so that any technical corrections can be made before the agency becomes invested in a specific approach or the positions of interest groups have hardened. If a review occurs too late, it is unlikely to contribute to the course of a rulemaking. Furthermore, investing in a more rigorous peer review early in the process 'may provide net benefit by reducing the prospect of challenges to a regulation that later may trigger time consuming and resource-draining litigation.'" Office of Management and Budget, *Final Information Quality Bulletin for Peer Review*, 70 Fed. Reg. 2664, 2668 (January 14, 2005).

[120] Effects of New-Vehicle Price Changes Peer Review and Response at 7.

[121] Multipollutant RIA at 4-60.

[122] 89 Fed. Reg. at 28,121.

and other consumer-related assumptions).[123] Because of its criticality to the rulemakings, the OMEGA model was also subject to rigorous peer review prior to its use in the developing the 2024 Multipollutant Standards.[124]

At a high level, OMEGA estimates the effects of a policy on new vehicle sales volumes as a deviation from the sales that would take place in the absence of the standards by applying the demand elasticity of –0.4 to the change in new vehicle net price.[125] Because the OMEGA model accounts for the entire on-road fleet of light- and medium-duty vehicles, including re-registered vehicles and new vehicles, fleet turnover effects are accounted for endogenously in the model. Total fleet size is normalized to the EIA Annual Energy Outlook and does not change across scenarios, so changes in new vehicle sales are also reflected in the remaining onroad fleet.[126] This means the impacts reported in the 2024 Multipollutant Rule RIA can be considered to fully incorporate fleet turnover impacts. Under the 2024 Multipollutant Standards, the vehicle sales range from a decrease of 0.18 percent in MY 2027 to a decrease of 0.92 percent in MY 2032 compared to a No Action scenario without the final standards (Table 227 in the Final Rule, copied below).[127]

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TABLE 227—TOTAL NEW LD SALES IMPACTS IN THE FINAL RULE

Year	No action	Final rule	
	Total sales	Total sales	Change from no action (%)
2027	16,046,000	16,017,000	−29,000 (−0.18)
2028	15,848,000	15,790,000	−58,000 (−0.37)
2029	15,923,000	15,840,000	−83,000 (−0.52)
2030	15,792,000	15,670,000	−122,000 (−0.78)
2031	15,669,000	15,534,000	−135,000 (−0.86)
2032	15,585,000	15,442,000	−143,000 (−0.92)

One important aspect to understand about the modeling is that the effect on vehicle sales is due to the costs of meeting the combined (GHG + criteria pollutant) standards. As such, only a portion of the reduction in vehicle sales should be attributed to the GHG standards. But the key point is that the response is relatively small compared to overall sales due to the relatively inelastic demand.

EPA also addressed fleet turnover and vehicle sales in its 2024 Phase 3 GHG Standards for Heavy-Duty Vehicles. There, EPA concluded heavy-duty regulations have limited impacts on

[123] 2024 Multipollutant Rule RIA at 2-5.

[124] *External Peer Review of EPA's OMEGA Model*, EPA-420-R-23-010 (Apr. 2023), https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=547888&Lab=OTAQ.

[125] 2024 Multipollutant Rule RIA at 4-60.

[126] 2024 Multipollutant Rule RIA at 4-64.

[127] 89 Fed. Reg. at 28,122.

purchase decisions,[128] and found, based on its analysis of the potential sales impacts of the rule, that turnover effects would "not occur at all, or if they do, occur in a limited way that will not significantly affect the GHG emissions reductions projected by this rule or that would unduly disrupt the HD vehicle market," particularly given the favorable total cost of ownership of zero-emission vehicles related to gasoline and diesel vehicles.[129]

The Proposal's argument that "standards may harm air quality by reducing fleet turnover" is an apples-to-oranges comparison that focuses only on the emissions from the small number of older vehicles that remain on the road longer. It ignores the emissions reductions achieved by the overwhelming number of new vehicles sold that meet the new standards. For every one older car that remains on the road longer due to a slight sales decrease, EPA's prior analysis shows there are hundreds of new, cleaner vehicles sold that replace older, more polluting vehicles. In general, if, as a result of an emissions standard, sales of new vehicles are projected to decline by X percent, then the ratio of new vehicles sold that meet the new standards to older vehicles that remain on the road longer than they otherwise would in the absence of a standard is given by a simple formula:

$$ratio\ of\ new\ vehicle\ sales\ to\ old\ vehicles = \frac{100 - X}{X}$$

In the 2024 Multipollutant Standards final rule, EPA's modeling found that sales would decline by 0.18 percent in 2027 compared to a No Action scenario. EPA's modeling redistributes the vehicle miles that would have been traveled by those new vehicles to older vehicles, which are higher emitting. EPA nonetheless found that the pollution reductions from new vehicles complying with the standard far outweighed the increase in emissions from older vehicles that remain in the fleet for longer. Because the effects on fleet turnover are so small, the number of new, lower-emitting vehicles vastly outweighs the number of higher-emitting older vehicles that remain in the fleet. Plugging 0.18 into the formula yields a ratio of over 550 new vehicles sold in 2027 that meet the standards for every 1 older vehicle that remains on the road longer.[130] Even with a larger 0.92 percent sales decline in 2032, the ratio remains overwhelmingly in favor of lower pollution, with 108 new cars sold for every one older car remaining in the fleet.

Even if EPA uses substantially different assumptions about technology costs, demand elasticity, and payback period than it did in the 2024 Multipollutant standards, it is difficult to envision a case where the increase in emissions from delayed fleet turnover could ever approach the same

[128] *See Analysis of Heavy-Duty Vehicle Sales Impacts Due to New Regulation*, EPA-420-R-21-013 (May 2021), https://cfpub.epa.gov/si/si_public_pra_view.cfm?dirEntryID=349838&Lab=OTAQ (literature review and EPA analysis of turnover impacts due to HD regulations).

[129] 89, Fed. Reg. at 29,698.

[130] This calculation yields the same result if performed using the absolute sales numbers. In 2027, EPA's modeling estimated 16,046,000 vehicles sold in the No Action scenario. With the final standards in place, new vehicles sold drop to 16,017,000, while 29,000 older vehicles remain on the road longer. The ratio of 16,017,000 to 29,000 is more than 550 to 1.

order of magnitude as the impact from new vehicles. For example, if EPA subsequently asserts that standards would raise new vehicle prices by 25 percent—an absurd assertion in light of recent trends related to vehicle pricing—then EPA's own analysis of demand elasticity shows that new vehicle sales would decline by 10 percent. This means that, for every 1 older, more polluting vehicle that remains on the road longer, there are 9 new vehicles sold meeting the presumably more stringent new emissions standards.

EPA's 2024 analysis makes the key insight exceedingly clear: the emissions-reduction benefits of emissions standards for new vehicles far outweigh the impact of the small number of older vehicles that may remain on the road longer as a result of the standards. The OMEGA model tracks the entire fleet of on-road light- and medium-duty vehicles and endogenously accounts for fleet turnover impacts.[131] As noted above, fleet size does not change across scenarios—as new vehicle sales change in a regulatory scenario, OMEGA adjusts the fleet of existing vehicles to match AEO projections, which leads to higher vehicle miles traveled for those existing vehicles. Emissions reported for any given year include both new vehicles sold in that year and re-registered vehicles that were sold in previous years. This means the final change in criteria, air toxics, and greenhouse gas emissions reported by the OMEGA model accounts for the impact of both new vehicles meeting the new standards and older vehicles that remain on the road. For example, EPA's analysis of the 2024 Multipollutant Standards finds that the net impact of the standards would avoid more than 145,000 tons of $PM_{2.5}$ cumulatively through 2055.[132]

Conversely, the Proposed repeal would result in increases of criteria, toxics, and GHG emissions. While fleet turnover would only marginally increase, new vehicles would no longer be required to meet increasing emissions standards, and overall emissions across the entire fleet of vehicles would increase. Indeed, EPA's own analysis confirms this. The only model runs that EPA provides in the docket show enormous criteria, air toxics, and greenhouse gas emissions increases from the Proposal.[133] To the extent that these results are outputs of OMEGA, which accounts for fleet turnover effects endogenously, they flatly contradict the proposed finding that GHG standards "may be harming air quality by raising prices and reducing fleet turnover." 90 Fed. Reg. at 36,313.

[131] 2024 Multipollutant Rule RIA at 4-64.

[132] 89 Fed. Reg. 28,100, Table 208.

[133] T. Sherwood, *Vehicle Rule LD/MD/HD Physical Effects* at 2-13 (July 7, 2025), EPA-HQ-OAR-2025-0194-0047, https://www.regulations.gov/document/EPA-HQ-OAR-2025-0194-0047 (EPA Physical Effects).

IV. <u>Consumer Benefits of Future Fuel Savings</u>

Assuming Consumers Benefit from Only 21% of Future Fuel Savings is Incorrect

The DRIA makes a crucial assumption about the benefits that would accrue to car buyers in the United States from the 2024 Multipollutant Rule, and this leads to some of the findings in Tables 6 and 7 in the NPRM . Specifically, in the DRIA one of the key scenarios assumes that car buyers only receive the benefits of 21% of the monetized value of future fuel savings that would occur due to the 2024 Multipollutant Rule. In other words, EPA's cost-benefit analysis gives zero value to the fuel savings that car owners accrue after the first 2.5 years of owning a vehicle. This 21% is intended to align with the assumption that consumers do not fully value fuel economy and only value the first 2.5 years of the future fuel savings when making a vehicle purchase decision (see page 31 in the DRIA). However, **both the choice of 2.5 years and the application of this assumption to only value 21% of future fuel savings are not based in economic theory and do not align with empirical evidence**. The DRIA thus significantly undervalues the disbenefits of the Proposal in lost consumer savings.

In the following, I lay out why this assumption is unsupported by the evidence and should not be considered in supporting the analysis. I will first discuss why—even if the 2.5-year assumption was correct—the implementation of 2.5-year assumption is flawed from an economic theory perspective. In other words, the source of the 2.5-year assumption is at odds with the way it is being applied and thus accounting for only 21% of consumers' future fuel savings is incorrect. Moreover, if we assume the 2.5-year assumption is correct and apply it appropriately based on its source, the result is not a 21% scaling factor but a 79% scaling factor, such that 79% of the future fuel savings that accrue are quantified. I then will describe why the 2.5-year assumption itself is deeply problematic based on an appropriate reading of the most recent literature and because the assumption does not align with the basic assumptions in the modeling that led to the estimates that are scaled by 21%. I conclude with a discussion of why the correct number, based on the best evidence we have available, is the estimate in the 2024 Multipollutant Rule.

The 2.5-year assumption is misapplied in the analysis

If the 2.5-year assumption is correct (which it is not), how would one implement this to appropriately calculate the costs and benefits of vehicle greenhouse gas regulations? The DRIA describes the assumption as the following:

> *"More specifically, this analysis explicitly assumes that: 1) consumers are willing to pay for fuel economy improvements that pay back within the first 2.5 years of vehicle ownership (at average usage rates); 2) manufacturers know this and will provide these improvements even in the absence of regulatory pressure; 3) consumers weigh these savings against increases in new vehicle prices when deciding whether to purchase a vehicle…"* DRIA at 19.

In other words, the stated assumption is that both consumers and manufacturers know that consumers are willing to pay for "fuel economy improvements"[134] that do not affect any other attribute of the vehicle and pay back within 2.5 years. Under this assumption, consumers are willing to pay for only 2.5 years of monetized future fuel savings at the time of vehicle purchase, so they must undervalue fuel savings, for there are many additional years of future fuel savings that actually occur that the consumers are not willing to pay for. Thus, if the assumption is applied correctly, consumers would not receive additional benefits for the first 2.5 years of future fuel savings under the standards because this value is already captured in the vehicle purchase decision baseline. Under the 2.5 years assumption, automakers have designed a given vehicle with its particular set of technologies to deliver the 2.5 years of fuel savings that consumers will pay for, and that choice of technologies carries net opportunity costs or other costs at the time of purchase that should be counted against the benefits of that set of technologies. Following that reasoning, consumers do not receive additional benefits for the first 2.5 years of future fuel savings under the standards, due to those other net costs, but they *will* receive benefits for all the remaining years of future fuel savings. Thus, given a standard life of vehicles, 79% of the future fuel savings should be considered as benefits. Yet, the DRIA only counts 21% of the future fuel savings, which appears to be a complete misunderstanding of what it means for consumers to be willing to pay for the first 2.5 years of future fuel savings.

To summarize, EPA misinterprets the assumption it is making and only counts 21% of savings instead of the correct 79% of savings—an enormous underestimate. This alone is easily enough to flip the net savings in the DRIA Table 3 (with the 3% discount rate) to negative for Scenario 4 (and close to enough in Table 2 with the 7% discount rate). Specifically, I performed some calculations based on the numbers to back out what counting 79% instead of 21% of fuel savings would mean, and it would imply that the net savings from the Proposal in Scenario 4 would be -$151 billion in Table 3 and $45 billion in Table 2 in the DRIA. This appears to just be a major mistake and misunderstanding of how to apply the literature, but it entirely changes the sign of the net savings in Table 3 and nearly changes the sign in Table 2 in the DRIA. It is also worth mentioning here that even the 79% interpretation is not defensible based on the literature, as will be discussed below.

The DRIA has a discussion on page 19 that relates to this. It says that "one interpretation" of the 2.5-year value is that "consumers significantly undervalue the private fuel savings in their purchase decisions." That interpretation is entirely correct based on economic theory and an understanding of what a 2.5-year payback period means. However, the DRIA then discards this interpretation, stating that "based on evidence from recent studies that use a rich panel of individual transaction data, several of these assumptions, or that interpretation, seem

[134] Although the DRIA uses the term "fuel economy improvements," this discussion uses the more precise term "fuel savings" to describe the benefit that accrues to consumers from vehicles that comply with stricter GHG standards. A battery-electric powertrain, for example, does not "improve" the "fuel economy" of an electric vehicle, but its charging costs are substantially lower than an ICE vehicle's gasoline fueling costs.

implausible." The next section will explain why the evidence from recent studies was cherry-picked and misinterpreted. But based on the incorrect literature review, the DRIA proposes "another interpretation." As stated on page 19: "Another interpretation is that consumers fully internalized changes in future fuel costs and the value of 2.5 years of fuel savings approximates consumers' willingness to pay for the increase in fuel economy adjusted for potentially missing costs or consumer preferences." This sentence simply does not make economic sense. If consumers fully internalize future fuel savings, then it cannot be the case that consumers are only willing to pay for 2.5 years' worth of fuel savings. Consumers fully internalizing future fuel savings would mean that consumers would be willing to pay 100% of the savings over the full lifetime of the vehicle, not 2.5 years. The explanations for why consumers might be internalizing some degree of future fuel savings have to be the same as why consumers are willing to pay for 2.5 years already. This "alternative interpretation" is internally inconsistent and simply cannot possibly be true at the same time as the 2.5 years assumption.

The 2.5-year assumption is based on an incorrect understanding of the literature

While the 2.5-year assumption was misapplied in the DRIA, what is equally important is that the DRIA misinterprets the literature on how consumers value future fuel savings (or consumers' willingness to pay for future fuel savings). Again, on page 19, the DRIA states that the standard economic interpretation for the 2.5-year assumption should be disregarded because "based on evidence from recent studies that use a rich panel of individual transaction data, several of these assumptions, or that interpretation, seem implausible."

Indeed, there is a growing literature of recent studies that use a rich panel of individual transaction data to examine the consumer valuation of fuel economy. However, the DRIA cherry-picks a set of these papers, mostly older ones, excluding some of the newer ones. For example, Gillingham et al. (2021) is excluded, and this study finds a very high degree of undervaluation of future fuel savings,[135] which would mean that consumer willingness to pay for future fuel savings in purchase decisions is small and the consumer benefits from those fuel savings are much greater. In other words, consumers would receive most, if not all, of the benefits from future fuel savings due to the improved efficiency in the 2024 Multipollutant Rule. Given that Gillingham et al. (2021) is clearly referenced in the 2024 Multipollutant Rule, it is unclear why it is not referenced in the DRIA. Gillingham et al. (2021) also points out that many of the current papers have an upward bias of their valuation parameter, doubling the parameter in all the older papers being referenced in the DRIA, so that the correct value would be half of what is reported.

Another paper not mentioned in the DRIA is Leard et al. (2025),[136] which estimates a preferred valuation parameter of 22% (i.e., implying that 78% of the future fuel savings should be counted

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[135] Gillingham, Kenneth T., Sébastien Houde, and Arthur A. Van Benthem, "Consumer myopia in vehicle purchases: evidence from a natural experiment," *American Economic Journal: Economic Policy* 13, no. 3 (2021): 207-238, http://doi.org/10.1257/pol.20200322.

[136] Leard, Benjamin, Joshua Linn, and Katalin Springel, "Vehicle Attribute Tradeoffs and the Distributional Effects of US Fuel Economy and Greenhouse Gas Emissions Standards," *Journal of Political Economy: Micro*,

in the analysis), which again shows a very high degree of undervaluation. This paper finds that valuation varies with income groups, but that the average is consistently below 56% regardless of the group. This is less undervaluation than the 2.5 years assumption. Another note that emerges here is that the literature uses lower discount rates than the DRIA to discount future fuel savings that accrue to consumers. The DRIA uses a 7% rate. Leard et al. (2025) uses 3-6%, while Gillingham et al. (2021) argue that 3% is most likely to be appropriate and that anything over 5% is likely to be inappropriate. The DRIA's choice of 7% without any justification is out of line with the literature.

Returning to the valuation literature review in the DRIA, the only very recent paper that is cited is Leard et al. (2023). This paper finds a relatively high degree of undervaluation of future fuel savings[137] (higher than any of the other studies in Table 1), as is evidenced even in the abstract of the paper: "we find undervaluation of fuel cost savings and high valuation of performance." Even this paper is improperly referenced in Table 1 in the DRIA, as the preferred estimate of consumer valuation of fuel savings in the paper is 54%, not the cited 73% number, which the DRIA appears to cherry-pick from a calculation in the appendix that uses clearly-stated outdated data. It is simply not appropriate to use.

A fair summary of the literature on the undervaluation of future fuel savings is that while there is a wide range of possible estimates in the literature, journal articles using data from the past decade and the most up-to-date empirical approaches tend to find substantial undervaluation of future fuel savings, in direct contrast to the statement in the DRIA.

EPA also ignores the explanations for undervaluation found in the literature and discussed in the 2024 Multipollutant Rule: specifically, that what is commonly called the "efficiency gap" exists because in the real world there are a variety of distortions that influence consumer decision making. For example, consumers do not have perfect information (and face information asymmetries). Similarly, producers may face costs and uncertainty in offering new technological innovations (including the "first-mover" disadvantage), and are motivated to differentiate their products in ways that are most likely to maximize profits, but may not maximize consumer welfare.[138]

In a widely cited passage in the RIA supporting the 2024 Multipollutant Rule—citations to which appear to be entirely missing in the current DRIA—EPA clearly explained:

> As described in previous EPA GHG vehicle rules (most recently in the 2021 rule), engineering analyses identified technologies (such as downsized-turbocharged engines,

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forthcoming; previous Resources for the Future working paper can be found at https://media.rff.org/documents/WP_23-04.pdf.

[137] Leard, Benjamin, Joshua Linn, and Yichen Christy Zhou," How much do consumers value fuel economy and performance? Evidence from technology adoption," *Review of Economics and Statistics* 105, no. 1 (2023): 158-174, https://doi.org/10.1162/rest_a_01045.

[138] 89 Fed. Reg. at 28,137.

> gasoline direct injection, and improved aerodynamics) where the additional cost of the technology is quickly covered by the fuel savings it provides, but they were not widely adopted until after the issuance of EPA vehicle standards. Research also suggests that the presence of fuel-saving technologies do not lead to adverse effects on other vehicle attributes, such as performance and noise. Instead, research shows that there are technologies that exist that provide improved fuel economy without hindering performance, and in some cases, while also improving performance (Huang, Helfand, et al. 2018) (Watten, Helfand and Anderson 2021). Additionally, research demonstrates that, in response to the standards, automakers have improved fuel economy without adversely affecting other vehicle attributes (Helfand and Dorsey-Palmateer 2015). Lastly, while the availability of more fuel efficient vehicles has increased steadily over time, research has shown that the attitudes of drivers toward those vehicles with improved fuel economy has not been affected negatively (Huang, Helfand, et al. 2018) (Huang, Helfand and Bolon 2018a).[139]

This passage identifies an extremely important aspect to the existing studies that seems to be missed by the DRIA. Most of the existing studies, and especially the older ones cited in Table 1, *assume that automakers are changing the attributes of their vehicles to minimize the costs of improving vehicle greenhouse gas emissions.* This is important because the EPA analysis that underpins the feasibility analysis for the 2024 Multipollutant Rule standards – as well as and the net benefits numbers in the DRIA[140] – explicitly assumes that automakers *do not* change their vehicle attributes. Page 19 of the DRIA states the key assumption that "vehicle performance is held constant," although this is misleadingly written to imply that performance would be better without the 2024 Multipollutant Rule. That is not the case. In EPA's modeling of the 2024 Multipollutant Rule, the vehicle greenhouse gas standards are met by a fleet with the same performance attributes as the fleet without any increase in standard stringency, so that performance is identical in the baseline and under the standard. (If automakers chose to change performance in different ways, this would only serve to lower the compliance costs of the standards and further improve the net benefits of the 2024 Multipollutant Rule's standards.)

The fact that vehicle performance does not change in the modeling that was used to calculate the net benefits of the 2024 Multipollutant Rule standards is so crucial because differences in performance are what economists who apply a willingness-to-pay assumption point to as a possible "missing cost" (as described on page 19 of the DRIA) or "hidden cost" (as economists in this field usually describe it) that purportedly offsets a portion of the consumer's fuel savings. The papers listed in Table 1 explicitly discuss how automakers may adjust performance to help meet standards in the most cost-effective way possible. Since consumers value vehicle

[139] 2024 Multipollutant Rule RIA at 4-56. *See also id.* at 4-56-4-59.

[140] Page 26 of the DRIA states that Scenario 1 in the cost-benefit tables "us[es] the same assumptions, methods and tools as used in the analyses for the LMDV and HDP GHG Phase 3 rules, including projections of vehicles, technologies, emission estimates, and fuel prices." Subsequently, Scenarios 2-5 are iterated from Scenario 1 by changing discrete assumptions in the 2024 modeling but leaving others in place.

performance, these changes in performance could constitute a hidden cost or opportunity cost of the standards. But this hidden cost or opportunity cost is in effect shut down in the DRIA's analysis because EPA holds performance the same in the baseline and under the standards. Thus, one would have to point to some other hidden cost to justify the assumption that consumers fully internalize the future fuel savings. Yet neither the literature or the DRIA mentions any other large hidden cost.

To the extent that EPA claims that the missing cost is due to differences between electric vehicles and gasoline vehicles, it is worth discussing whether a switch towards electric vehicles could lead to such hidden costs due to the different characteristics of electric vehicles. If we were only considering gasoline vehicles, the 2024 Multipollutant Rule EPA analysis that carefully holds vehicle performance constant should eliminate any hidden costs relating to improving the efficiency of vehicles – there would simply be a tradeoff between the cost of adding the efficiency technology and the benefits from the improved efficiency. But electric vehicles could be different in that there are a set of characteristics inherently differ between gasoline and electric vehicles, even if the goal is to hold performance constant. For example, gasoline vehicles cannot match the low-speed torque of electric vehicles. At the same, time gasoline vehicles and electric vehicles are refueled differently.

The DRIA includes mention of the fact that it currently takes longer to recharge an electric vehicle than it does to refuel a gasoline vehicle.[141] This could be a hidden cost, but it is offset and possibly even dominated by two other factors. First, as mentioned in the previous paragraph, electric vehicles are well-known to have fantastic low-speed torque, which has been shown in surveys to be highly valued by consumers.[142] Second, most electric vehicle owners predominantly charge their vehicles at home, which is far more convenient than refueling a gasoline vehicle because the vehicle is plugged in overnight or during a period when the vehicle is not in use.

Indeed, approximately 86% of charging events take place at home,[143] which eliminates most of the time costs associated with refueling. Rather than a slower form of gasoline-style refueling, home charging offers added convenience by allowing drivers to begin each day with a full

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[141] *See* DRIA at 5-6: "A survey from JD Power representing U.S. consumers planning to buy or lease a vehicle in the next year.. indicates that there is continued concern with charging," and 7: "OEMs suggest there is a range of reasons for lower EV demand, including… charging infrastructure limitations," and inclusion of "refueling time" as part of an impact category in Appendix A.

[142] Skippon, Stephen, *How consumer drivers construe vehicle performance: Implications for electric vehicles*, *Transportation Research Part F: Traffic Psychology and Behaviour* Volume 23 (March 2014) at 15-31, https://doi.org/10.1016/j.trf.2013.12.008.

[143] Lee, Jae Hyun, Debapriya Chakraborty, Scott J. Hardman, and Gil Tal, "Exploring electric vehicle charging patterns: Mixed usage of charging infrastructure," *Transportation Research Part D: Transport and Environment*, 79 (2020): 102249, https://doi.org/10.1016/j.trd.2020.102249.

"tank." Surveys consistently document that home charging dominates charging behavior,[144, 145] making it the defining feature of the EV refueling experience rather than an incremental inconvenience.

Not only does home charging change the nature of vehicle refueling, it also creates measurable economic value for consumers. For example, a study found that consumers are willing to pay a premium of €22 per month for home charging compared to workplace charging and €46 per month compared to roadside charging.[146] This is not an isolated finding: a broad review of stated-preference studies concludes that access to home charging consistently ranks among the most valued vehicle attributes across many discrete choice experiments.[147]

WhileWhile it is true that it takes longer to recharge at a public charging station than to refuel at a gasoline station, focusing on this also omitsthe fact that the gap between the two refueling times is rapidly decreasing. Charging speeds are improving rapidly. The average power of a Level 3 fast charger has increased substantially in recent years, and the trend is accelerating with the rollout of fast chargers exceeding 200 kW (Figure 9). At the cutting edge, new technologies such as BYD's five-minute fast-charging battery demonstrate that refueling parity with gasoline is within reach.[148] As the charging network continues to deploy higher-capacity equipment, the time gap between public charging and gasoline refueling can be expected to shrink rapidly in the upcoming years.

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[144] Hardman, Scott, Alan Jenn, Gil Tal, Jonn Axsen, George Beard, Nicolo Daina, Erik Figenbaum et al, "A review of consumer preferences of and interactions with electric vehicle charging infrastructure," *Transportation Research Part D: Transport and Environment* 62 (2018): 508-523, https://doi.org/10.1016/j.trd.2018.04.002.

[145] Ge, Yanbo, Christina Simeone, Andrew Duvall, and Eric Wood, *There's no place like home: residential parking, electrical access, and implications for the future of electric vehicle charging infrastructure*, National Renewable Energy Lab (Oct. 2021), No. NREL/TP-5400-81065, https://doi.org/10.2172/1825510.

[146] Wolff, Stefanie, and Reinhard Madlener, "Charged up? Preferences for electric vehicle charging and implications for charging infrastructure planning," (2019), https://dx.doi.org/10.2139/ssrn.3491629.

[147] Liao, Fanchao, Eric Molin, and Bert Van Wee, "Consumer preferences for electric vehicles: a literature review," *Transport Reviews* 37, no. 3 (2017) at 252-275, https://doi.org/10.1080/01441647.2016.1230794.

[148] InsideEVs, *BYD's New 'Megawatt' EV Charging Is So Fast It Makes Gas Irrelevant*, InsideEVs (March 18, 2025), https://insideevs.com/news/753913/byd-ev-one-megawatt-charging/.

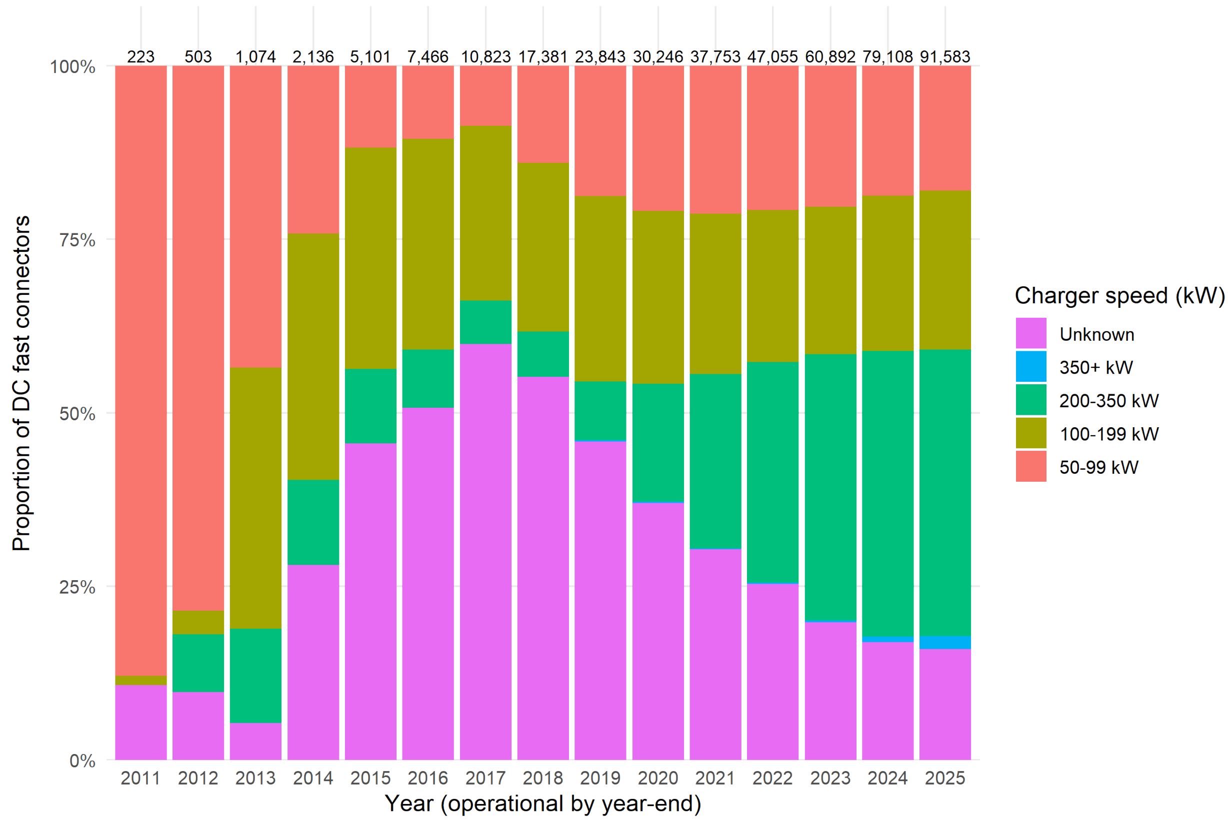

Figure 9: Proportion of speeds of DC fast chargers in the US over time. Historical trends point to increasing charging speeds over time. Numbers on top of bars indicate count of DC fast-charging connectors by year.[149]

Nor can "hidden costs" be attributed to differences in safety outcomes. Using data from the Fatal Analysis Reporting System (FARS) and the Crash Report Sampling System (CRSS), it is possible to explore fatal accidents and police-reported accidents nationwide. Combined with data on new vehicle registrations from state DMVs, we can observe the crash rates for EVs and gasoline vehicles. Using data from vehicles with model years 2019 to 2021, one will find that electric vehicles have a fatal crash rate of 0.028%, while gasoline vehicles have a fatal crash rate of 0.050%. The total police-reported crash rate (this includes any crash, even a fender-bender) for electric vehicles is 7.04% and for gasoline vehicles is 11.65%. Similar findings can be found looking at different vehicle body types and even in performing a matching analysis that matches each electric vehicle to the most similar gasoline vehicle of the same model year (e.g., RAV4 EV to the RAV4, BMW i3 to the BMW I-series, etc.). The basic finding that EVs are just as safe, if not more safe, also appears to hold when looking at fatal accidents and total accidents per mile driven in a set of states that have odometer readings from vehicle inspections for both electric

[149] U.S. Department of Energy, Alternative Fuels Data Center, *Alternative Fueling Station Locator: Electric Vehicle Charging Stations (dataset)* (accessed August 28, 2025). Available via AFDC Data Downloads and Station Locator at https://afdc.energy.gov/data_download.

and gasoline vehicles. Further work is underway to explore the explanations for these findings. But the summary statistics are very clear that, at least from the data we have so far, increasing the fraction of EVs on the road is more likely to improve safety, rather than reduce it.

This evidence all implies that assuming consumers fully internalize changes in future fuel costs due to hidden costs is incorrect.

Summary

The approach in the DRIA used to calculate net benefits that assumes consumers only receive 2.5 years of future fuel savings has no basis in economic theory or the economic literature. Assuming the 2.5 years number is correct (which it is likely not in this context based on the best literature available), this would imply a 79% scaling factor of the future fuel savings benefits of the 2024 Multipollutant standards. The 21% scaling used is simply incorrect. In addition, the justification for the way the 2.5-year estimate is used—as a reason to assign zero value to the majority of the fuel savings that accrue to consumers in the real world—is cherry-picking and misinterpreting the literature. After accounting for the bias in the literature pointed out in Gillingham et al. (2021), nearly all of the literature suggests that consumers undervalue future fuel savings, which means that much or all of the fuel savings are benefits to consumers that are not offset by hidden or missing costs.

Moreover, the primary reason given in the literature for why there is not 100% undervaluation is that automakers may change some of the attributes of their vehicles to more cost-effectively comply with the vehicle greenhouse gas standards, which could involve changes in performance that would also have a cost. This is indeed mentioned in the economics literature as a hidden cost or opportunity cost. But the EPA modeling that generates the benefits and cost estimates in the DRIA Tables 1 and 2 explicitly shuts down this channel by holding performance constant between the baseline and under the standards. There are no other obvious hidden costs mentioned either in the literature or DRIA, implying that there is no economic argument for assuming that consumers do not benefit from the entire stream of fuel savings in the modeling. For the assumption that consumers do not benefit from all future fuel savings to make any economic sense in this context where performance is held constant, the DRIA would have to provide clear evidence of both the existence and magnitude of another hidden cost, and in a proper analysis would include it as another line item in the analysis.

Thus, the correct approach for calculating the valuation of fuel economy, based on the current literature and EPA's current modeling, is the approach in the 2024 Multipollutant Rule, where all future fuel savings from the standard are included in the benefits to consumers. The assumption that consumers only receive 21% of the future fuel savings is not supported by economic theory or evidence.

V. “Lower Bound” Cost Estimate Methodology

EPA’s approach to a “lower bound” cost estimate relies on outdated and inappropriate assumptions.

Perhaps anticipating the weaknesses of its other approaches, in section C.2.1 of the DRIA EPA outlines an approach to estimating costs of increased EV penetration that relies on cost estimates from the 2021 vehicle standards for light-duty vehicles, stating “[t]he purpose here is to obtain a lower bound on the resource and opportunity costs of GHG emissions for LD vehicles without relying on CEA’s measurement of inter-manufacturer credits or relying on linear extrapolation.”[150] On the principle that costs of compliance increase at an increasing rate the more stringent standards get, and because 2024 standards implemented greater emissions reductions than the 2021 standards, EPA asserts that fleet-wide compliance cost estimates from 2021 can be applied to vehicles through 2032. In implementing this approach EPA relies on arbitrary assumptions that in turn ignore and underestimate the role of recent and future technological progress in reducing costs of alternatives to ICE vehicles. This failure to integrate recent best evidence undermines the legitimacy of the approach as a “lower bound.”

EPA’s 2021 rule relied on modeling from the CAFE Compliance and Effects Model, which uses assumed technology costs and learning rates to arrive at a least-cost total cost of compliance for a given standard.[151] Based on the total cost of compliance, EPA computed an estimated fleetwide average compliance cost per vehicle for 2023-2026. The DRIA uses the 2021 estimate of MY2026 per vehicle compliance costs of $1,154 as the basis for its calculations for the period covering 2027-2055, reflecting vehicle cost and technology projections from 2021. As discussed earlier in this comment, recent technological advances have reduced costs of alternatives to combustion engine vehicles faster than estimated even a few years ago. These developments are not reflected in the MY2026 estimated average cost of compliance per vehicle developed in 2021.

In order to account for technological progress separately, EPA states it calculates a coefficient for technological progress in LD vehicles based on miles per gallon, horsepower, and vehicle year data from 1978-2011. During this period the market had no significant share of non-combustion engine vehicles, meaning the coefficient was produced using data reflective of a mature technology. It is well established that newer technologies see greater rates of technological progress and potential for cost reductions than mature ones over a given period. This is due to opportunities for innovation, applications of economies of scale, and steeper learning curves, among other things. It is fundamentally inappropriate to apply a rate of technological progress from a mature technology to a cohort of powertrains based on new technologies, as this approach

[150] DRIA at 48.

[151] NHTSA, “Draft CAFE Model Documentation” (August 2021), at 3, https://www.nhtsa.gov/sites/nhtsa.gov/files/2021-08/CAFE_Model_Documentation_NPRM_2021_draft-for-web.pdf; NHTSA, “CAFE Compliance and Effects Modeling System” (last visited Sept. 20, 2025), https://www.nhtsa.gov/corporate-average-fuel-economy/cafe-compliance-and-effects-modeling-system.

systematically underestimates technological progress in alternatives to combustion engine vehicles.

Finally, in computing its “lower bound” EPA appears to apply a flat 10% EV production cost premium, “EV production-cost premium, share of baseline ATP,” sans citation or mention in the text.[152] As discussed earlier in the comment, EPA presents no evidence to justify the assumption of an EV cost-premium over the period covered by the proposed rule, and the inclusion of such a premium—which remains in place in full through the year 2263 in the accompanying calculations—fails to account for observed declining cost trends in electric vehicles.

[152] EPA, EPA-HQ-OAR-2025-0194-0091, Appendix B supporting materials (July 2025), https://www.regulations.gov/document/EPA-HQ-OAR-2025-0194-0091.

VI. CEA Report Methodology

EPA's reliance on CEA Report to estimate net benefits from the proposed rule is flawed

The DRIA uses two methods used to estimate the monetized savings, costs, and net savings from the proposed rule. The first method adjusts previous EPA analyses. The second method draws from a non-peer reviewed 2020 White House Council of Economic Advisers (CEA) report and a set of opaque calculations and is summarized in Table 4 of the DRIA.

This comment first discusses the 2020 CEA report, discussing why this report would never have passed peer review and why using it as a basis for regulatory analysis is entirely inappropriate. The comment then turns to the operationalization of the logic of the 2020 CEA report in the DRIA and the deep conceptual issues inherent in the DRIA's calculations. The key finding is that the DRIA's second method relying on the CEA report is a deeply flawed approach that is not supported by economic theory or evidence.

The 2020 CEA Report is Not a Suitable Basis for Regulatory Analysis

The 2020 CEA report purports to develop a new methodology for analyzing the costs and benefits of fuel economy standards in support of the jointly developed SAFE II vehicle greenhouse gas emission standards and fuel economy standards. It misinterprets the literature and makes some extremely unusual and unsupported assumptions that would never pass muster in peer review. The basic idea behind the report is that when we have standards with a trading mechanism, in which automakers who overcomply can sell credits to those who undercomply, then we can use the credit price to learn something about the marginal cost of complying with regulation. With some caveats, this simple idea is true and is very well known in the economics profession. Indeed, several of the papers referenced in the report, such as Leard and McConnell (2017), discuss how credit prices can provide some evidence but are not sufficient for a full cost-benefit analysis.[153]

Yet the report claims to be able to do a full cost-benefit analysis based simply on the vehicle greenhouse gas credit prices and no other information. It's even more extreme than that: the report claims to be able to use only two data points as the basis for the entire cost-benefit analysis (see Figure 10 below, reproduced from the CEA report). Furthermore, there are problems with the calculated point used in the figure, so only one of the two points is actually valid, rendering the linear slope completely meaningless.

[153] Leard, B., and V. McConnell, "New Markets for Credit Trading under US Automobile Greenhouse Gas and Fuel Economy Standards," *Review of Environmental Economics and Policy* 11, no. 2: 207-26 (2017), https://www.journals.uchicago.edu/doi/epdf/10.1093/reep/rex010.

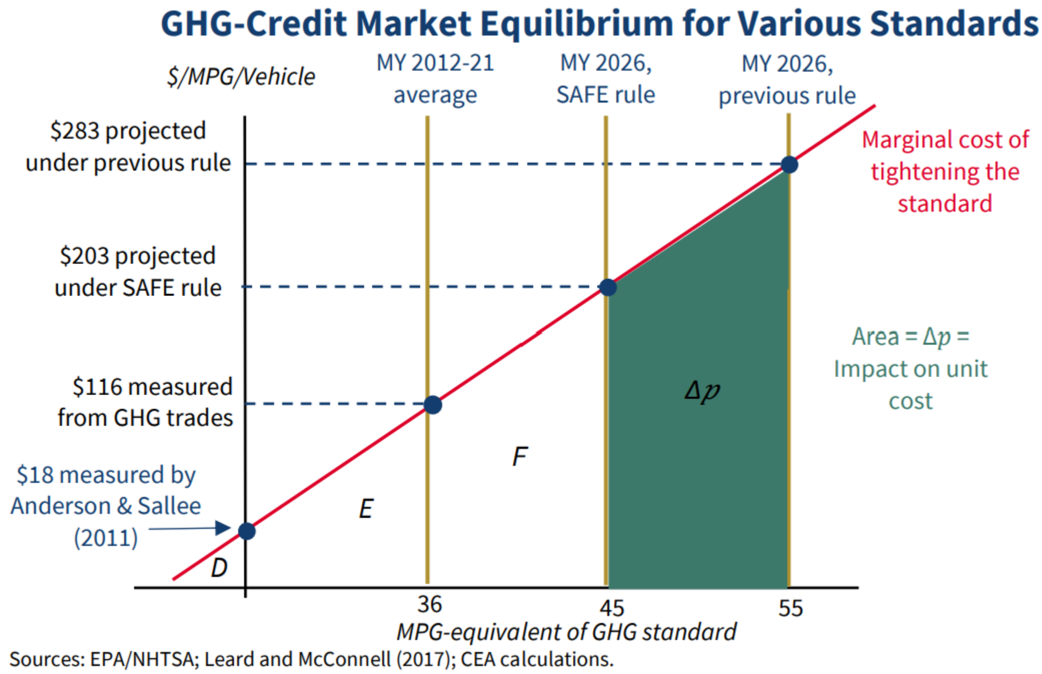

Figure 10: Figure reproduced from CEA report that demonstrates the two data points used in the cost-benefit methodology, the first labeled "$18 measured by Anderson & Sallee (2011)" and the second labeled "$116 measured from GHG trades."[154]

To summarize briefly, there are seven major inherent flaws in the CEA report, which also apply to the second method in the DRIA.

1) The linear marginal cost curve (i.e., the line showing the additional cost of building vehicles with added control technology) is conceptually flawed as implemented. The CEA report and DRIA (Figures RIA-3, RIA-4, and RIA-5) show a linear marginal cost curve. The DRIA uses this curve to calculate the "opportunity and resource costs" by taking the area under the curve. However, this linear marginal cost curve seems to conflate the stringency of a policy in a given year with what the marginal cost looks like in different years. They are definitely not the same thing. The marginal cost curve of a policy in a given year is certainly going to be upward sloping, as automakers would install the most cost-effective technology first and then increasingly add more expensive technology. But over time, there is technological change, and likely induced technological change. Figures RIA-3, RIA-4, and RIA-5 show an arrow possibly moving the marginal cost curve to the right, which is what would happen with technological change, but nevertheless simply assume no technological change in the calculations and use a static (non-time-varying) marginal cost curve. This is deeply problematic, as we

[154] The Council of Economic Advisers, *Estimating the Value of Deregulating Automobile Manufacturing Using Market Prices for Emissions Credits* (2020), https://trumpwhitehouse.archives.gov/wp-content/uploads/2020/12/CEA_SAFE_Report.pdf.

know that there is technological change in automobile manufacturing. This alone leads to a substantial bias in the estimates.

2) Using only two data points to fit a line is not an appropriate basis for developing a marginal cost curve. Using revealed preference estimates is of course useful, but not when there are only two data points and one of the data points is not from a rigorous peer reviewed study, but rather from a suggestive calculation using data over a several year period (from 2012 to 2016) that cannot be tied to a specific year. Specifically, the CEA report used financial filings from Tesla to infer the price of credits. This approach uses data on the total revenues Tesla received from selling credits and the total number of credits sold during the period 2012 to 2018, with the calculations based on data from 2012 to 2016. The resulting estimate in the CEA report is then used for the year 2014, yielding a steeply sloping line (i.e., a sharply increasing in credit price) from the Anderson and Sallee estimate from 2011 to the 2014 estimate. One major issue with this approach is the unjustified assumption that the data point from the calculation is squarely in the middle of the time period is likely also biasing the estimate upwards. In short, the basic methodology of using only two data points to establish a marginal cost curve is entirely inadequate for performing a regulatory analysis.

3) Using credit prices as a proxy for the marginal cost is problematic due to the small number of suppliers of credits and the likelihood of market power. Whenever there is a very small number of suppliers in a market, it is likely that they have market power, which pushes up the price and leads to a meaningful deviation between the price and the marginal cost. In the credit market, Tesla is the dominant seller of credits and only a few other automakers sell any credits at all in most years. Page 11 of the DRIA contains a very confused statement claiming that the analysis holds if perfect competition is relaxed. This statement is false. If perfect competition is relaxed, as can be seen in any microeconomics textbook the price is not telling us the marginal cost.[155] Relatedly, credit prices might also adjust to demand conditions changing, such as a build out of the charging station infrastructure, which would make EVs more appealing, leading automakers to sell more of them, which would lower credit prices in equilibrium. This is an inherent weakness in using credit prices, since they are influenced by both supply and demand in equilibrium, which is important as soon as the assumption of perfect competition is relaxed.

4) Evidence suggests that credit prices are not rising over time and are not rising with increased stringency. This is incorrect for many reasons. First, banking alone would not necessarily imply that the credit price remains the same and extrapolating results from 2012 to 2018 all the way to 2026 and beyond is obviously not going to take into account the major changes in the market. With innovation and new efficient vehicle models, credit

[155] *E.g.*, Mankiw, N. Gregory, Principles of Microeconomics (6th ed.) at 307, Cengage Learning (2011).

prices would be expected to drop. Second, calculations by Ben Leard and Josh Linn using the same data source (see comment in the docket by these scholars) indicate that credit prices have indeed not been increasing over time. Specifically, Leard and Linn use 2023 data to calculate credit prices of \$33-44/metric ton of CO_2 or \$41-53 per additional mile per gallon on a vehicle. These are in 2018 dollars, so they can be compared directly to the \$86 per ton estimate in the CEA report. This provides real-world evidence that credit prices are not increasing linearly, as is assumed in the CEA report and DRIA, but rather have actually *dropped* in recent years. This suggests that technological change and innovation in cleaner vehicles have been offsetting the increased stringency, as one would expect and as the CEA report acknowledged could be the case. In short, the best evidence available suggests that credit prices are not continually increasing over time with increased stringency, as is modeled in the CEA report and the DRIA. This undermines the DRIA's entire "second method" based on the CEA report.

5) The fuel savings that consumers receive from tightened standards are real and cannot just be ignored or assumed away. Both the CEA report and the DRIA's second method simply assume these fuel savings do not exist and loosely refer to possible opportunity costs, yet do not name them. This is discussed at length in section IV above in this comment, but it is important to mention here as well.

6) The CEA report does make calculations that account for climate change impacts, but the DRIA assumes no climate change impacts, contrary to the preponderance of scientific evidence available. This is mentioned elsewhere in the States and Local Governments' comments on the Proposal but is worth mentioning here as well.

7) The CEA report includes a full appendix that claims to mathematically show that "credit prices should reflect the value that consumers place on fuel savings, with greater preferences for fuel savings leading to lower credit prices." But it does not show anything of the sort. Rather, the appendix just shows that the credit price is what economists refer to as the shadow cost of the regulation, which is a technical economics term referring to the implicit cost of the regulation to society. The idea that credit prices are passed through in at least some way to the consumer and are reflected in the price of a vehicle is a common assumption in economics. And under perfect passthrough (which has not been demonstrated with data in this market), changes in credit prices would lead to corresponding changes in the price of the vehicle. Further, this is exactly what the EPA analysis for the 2024 Multipollutant Rule does. But the value that consumers place on future fuel savings at the time of vehicle purchase is an empirical question, and thus the incomplete and misleading literature review in the DRIA is at the heart of the issue here, as was discussed in the previous section relating to the 2.5-years assumption. In summary, the CEA report purports to show a mathematical proof that credit prices can be used to reflect the value that consumers place on fuel savings, but this is simply not the case.

There are also other problematic aspects of the CEA report, such as Figure 3, which ignores all other margins of adjustment in response to standards (such as innovating in vehicle attributes) and thus is an inappropriate way to conceptualize automaker responses.

In summary, the DRIA's "second method" is entirely inappropriate for use in regulatory analysis. The "second method" leads to obviously incorrect estimates of net savings that are an order of magnitude different than the much more careful and complete EPA analysis in the 2024 Multi-pollutant Rule.

VII. Power Sector Impacts

EPA's Proposal fails to identify any power sector benefits

EPA's record in the 2024 Multipollutant Rule and Phase 3 Heavy Duty Rule clearly supports the ability of the power system to reliably integrate new electricity demand from EVs, and nothing in the Proposal provides any evidence that this has changed since the rule was finalized nor that the proposed rollback of vehicle emission standards would offer significant benefits to the power system. Despite some language in the DRIA discussing the possible impact of the 2024 Multipollutant Rule and Phase 3 Heavy Duty Rule on power system reliability or operations, EPA has not cited power system reliability improvements as a justification in the Proposal. Nor would such an argument be supported.

The Proposal will not improve power system reliability

EPA claims that the significant new growth in electricity demand driven mainly by AI data centers now anticipated was not taken into account during development of the 2024 rules. EPA's new DRIA references reliability challenges facing the power sector but simply assumes—without providing any relevant data, findings, or analysis—that eliminating the vehicle standards would materially improve reliability, stating only "…[n]o longer requiring compliance with LD, MD, and HD GHG standards would reduce the overall demand for electricity, which in turn may incrementally improve the reliability outlook for the sector."[156] However, EPA failed to provide any new analysis, data, or modeling to justify this assertion that the proposal "may" improve reliability. In fact, the one piece of data that EPA does provide simply asserts that annual demand from additional EV charging attributable to the GHG standards is 64 TWh in 2030, a fraction of EPA's estimate of new demand from data centers of 600 TWh in 2030.[157] But, the power system's ability to meet demand when needed (known as resource adequacy) is primarily a function of peak power demand in a given time period, not a function of annual electricity demand. Especially for highly flexible loads like EVs—which can easily shift demand away from peak periods as discussed in more depth below—the use of annual demand is an incorrect metric to assess impact on system reliability.

Although the Proposal implies that EPA previously ignored the potential impacts of increasing electricity demand from other sources in combination with GHG vehicle emission standards,[158] this is false. EPA assessed the reliability of the power system across various scenarios, including scenarios with higher demand growth and with the 2024 Multipollutant and Phase 3 HD Rules, and determined they were feasible. In particular, EPA performed scenario analyses which assessed specifically the combined impact of increasing demand for electricity from data centers and other sources with the demand for EVs arising from the 2024 final vehicle rules and found

[156] DRIA at 12.
[157] *Id.*
[158] *Id.* at 5 ("Some of the assumptions we no longer believe are appropriate and would significantly impact the costs and benefits of this proposed rule include… [c]hanges in the power generation sector as a result of recent projections for data center demands… and the impacts of increased use of EVs.")

that the power sector could meet all resource adequacy requirements.[159] The total power sector generation in this sensitivity analysis reached 5,333 TWh in 2035,[160] equivalent to a ten-year compound annual growth rate of 1.9%. This scenario exceeds the most recent EIA Annual Energy Outlook forecast of 4,768 TWh for that same year,[161] and is even higher than the 1.7% annual growth rate through 2035 that the North American Electric Reliability Corporation Long-Term Reliability Assessment forecast that is cited in the DRIA.[162]

EPA also reviewed other studies across a wide range of models and scenarios, including those with higher levels of EV demand and higher levels of overall load growth in determining that EPA's results were reasonable and comparable to other power system analyses.[163] In particular, across 10 multi-sectoral models and 4 power sector-only models, future total power sector generation grew significantly, reaching 4,800 TWh in 2035 in the median scenario and 6,265 TWh in the scenario with the highest load growth,[164] representing 12% and 46% growth as compared to 2024.[165]

Recognizing that EPA could not model every possible future power system scenario, the agency also reviewed the existing power system regulatory entities, their respective roles, and overall short-term and long-term planning processes, industry standards, and tools that exist to ensure resource adequacy is met and maintained.[166] Ultimately EPA concluded that "[i]n sum, the power

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159 *See* EPA, *IPM Sensitivity Runs Memo* at 27-28 (April 2024), https://www.regulations.gov/document/EPA-HQ-OAR-2018-0794-6972 ("Under the high demand sensitivity, power sector demand was updated to account for the EV electricity demand associated with the LDV, MDV and HDV rulemakings (Vehicle Rules) as well as the non-EV load from the AEO 23 High Economic Growth Case… IPM includes various constraints that model resource adequacy requirements – even under the higher demand environment, EPA projects that these requirements can be met, and the cost of compliance cited here is fully inclusive of the costs of meeting these constraints.").

160 *Id*. at Table 3-8.

161 EIA, *Annual Energy Outlook 2025*, Table 8, Electricity Supply, Disposition, Prices, and Emissions, Reference Case, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=8-AEO2025&region=0-0&cases=ref2025&start=2023&end=2050&f=Q&linechart=ref2025-d032025a.25-8-AEO2025&ctype=linechart&sourcekey=0.

162 North American Electric Reliability Corporation, *2024 Long-Term Reliability Assessment*, Figure 18 (December 2024, updated July 2025), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_Long%20Term%20Reliability%20Assessment_2024.pdf.

163 *See* EPA, *Resource Adequacy Analysis Final Rule Technical Memorandum* at 6 (March 2024), https://www.regulations.gov/document/EPA-HQ-OAR-2022-0829-5682 (Resource Adequacy Technical Memo) ("EPA's analysis shows that the projected outcomes pertaining to the Vehicle Rules' impact on demand and of its proposed Power Sector Rules' impact on electricity supply are well within the range of fleet conditions that respect resource adequacy, as projected by multiple, highly respected peer-reviewed models.").

164 *See* EPA, *Electric Sector Emissions Impacts of the Inflation Reduction Act*, Data Annex (last updated Aug. 26, 2025), https://www.epa.gov/inflation-reduction-act/electric-sector-emissions-impacts-inflation-reduction-act.

165 U.S. total power sector generation in 2024 is reported as 4,300 TWh. *See* EIA, *Short-Term Energy Outlook*, Table 7a (Sept. 2025), https://www.eia.gov/outlooks/steo/tables/pdf/7atab.pdf.

166 *See* 89 Fed. Reg. 28,020 ("[There are] existing and well-established institutional guardrails at the federal- and state-level, as well as non-governmental organizations, which we expect to continue to maintain resource adequacy and grid reliability. These well-established institutions—including the Federal Energy Regulatory Commission (FERC), state Public Service Commissions (PSC), Public Utility Commissions (PUC), and state energy offices, as well as NERC and Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs)—have been in place for decades, during which time they have ensured the resource adequacy and reliability of the electric

sector analysis conducted in support of this rule indicates that the Vehicle Rules, whether alone or combined with the Power Sector Rules, are unlikely to affect the power sector's ability to maintain resource adequacy and grid reliability."[167] EPA also assessed the impact of the rules on the transmission system, finding that together the 2024 Multipollutant Rule and the Phase 3 HD Rule would have a very small impact on transmission needs, equivalent to approximately one percent of transmission needs between now and 2050.[168] EPA outlined pathways to meet transmission needs that are already being used in the industry without building new lines, including re-using existing transmission rights of ways avoiding the need to secure and permit a new route, reconductoring existing transmission lines with advanced conductors capable of carrying more power, and use of grid enhancing technologies and storage as a transmission asset to more effectively use existing lines.[169] EPA ultimately concluded that "it is reasonable to anticipate that transmission capacity will not constrain the increased demand for electricity projected in our central case modeling."[170] The Proposal provides no evidence that would support reaching a different conclusion.

Nor can EPA belatedly invoke DOE's July 2025 Resource Adequacy Report to justify any final rule based on a reliability rationale.[171] The report's conclusions rest on fundamentally flawed assumptions regarding load growth, retirements, and capacity additions.

First, the report without justification assumes 50 gigawatts (GW) of inflexible data-center load growth, but that load growth is highly uncertain[172] and, moreover, typically can be served with

power sector. As such, we expect these institutions will continue to ensure that the electric power sector is safe and reliable, and that utilities will proactively plan for electric load growth associated with all future electricity demand, including those increases due to our final rule."); Resource Adequacy Technical Memo at 19 ("The electricity sector also has numerous additional tools to maintain resource adequacy and grid reliability that are often not captured in models. Power companies, grid operators, and regulators have well-established, adaptive procedures and policies in place to preserve electric reliability in response to system changes. Grid operators administer adaptive programs, such as capacity markets and resource adequacy programs, designed to require or incentivize medium and long-term investment in the resources that will be needed to meet demand. In many states, regulators oversee long-term integrated resource planning by utilities to ensure that there is a diverse portfolio of generating resources with the qualities and attributes needed to reliably meet electricity demand.").

[167] 89 Fed. Reg. 28,020.

[168] 89 Fed. Reg. at 28,020-28,021.

[169] 89 Fed. Reg. at 28,021.

[170] *Id.*

[171] U.S. Dep't of Energy, Resource Adequacy Report: Evaluating the Reliability and Security of the United States Electric Grid (July 2025), https://www.energy.gov/sites/default/files/2025-07/DOE%20Final%20EO%20Report%20%28FINAL%20JULY%207%29.pdf (DOE Resource Adequacy Report).

[172] London Econ. Int'l LLC & S. Poverty L. Ctr., Uncertainty and Upward Bias Are Inherent in Data Center Electricity Demand Projections (July 7, 2025), https://www.selc.org/wp-content/uploads/2025/07/LEI-Data-Center-Final-Report-07072025-2.pdf; Brian Martucci, *A Fraction of Proposed Data Centers Will Get Built. Utilities Are Wising Up*, Utility Dive (May 15, 2025), https://www.utilitydive.com/news/a-fraction-of-proposed-data-centers-will-get-built-utilities-are-wising-up/748214/ ("Even seasoned data center customers like Microsoft, Meta, Amazon and Google propose several times more projects than they're likely to need due to uncertainty around power availability and permitting at any given site. . . . Less sophisticated developers abandon proposed projects at an even higher rate…").

existing capacity[173] or addressed through industry efforts[174] and new state laws and policies.[175] Second, the report assumes 104 GW of retirements by 2030, but the June 2025 Energy Information Administration data project that only half of this capacity will retire by then,[176] and the report fails to account for potential reductions in retirements occasioned by this Administration's own policies. Third, the report assumes only 210 GW of new capacity, including only 22 GW of new "firm" baseload capacity (which it arbitrarily limits to gas), and only includes in its capacity projections "Tier 1" resources, i.e., those projects that have a very high likelihood of success. The report also projects only minimal capacity additions after 2026.[177] But the EIA Annual Energy Outlook 2025 modeled total additions (planned and unplanned) at 301 GW through 2030, including 120 GW from "firm" sources.[178] Additionally, the report's (unfounded) load growth assumptions undermine its exclusion of Tier 2 resources: if higher demand for electricity occurs, then projects in the Tier 2 category would be more likely to move toward completion. The report makes no attempt to reconcile those projections. Indeed, the report itself acknowledges its limitations: "the resource adequacy analysis that was performed in support of this study could benefit greatly from the in-depth engineering assessments which occur at the regional and utility level.[179] These and other flaws in the July 2025 Resource Adequacy Report undercut its conclusions and make it wholly unhelpful to EPA in assessing reliability impacts of the Proposal here.

In addition to rising demand from the power sector, the DRIA calls out the changes in tax credit eligibility and expiration timeline for clean electricity tax credits due to enactment of H.R. 1 as the other major change affecting the power sector since finalization of the 2024 Multipollutant

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[173] *See* Tyler H. Norris et al., Nicholas Inst. for Energy, Env't & Sustainability, Duke Univ., Rethinking Load Growth: Assessing the Potential for Integration of Large Flexible Loads in US Power Systems 3 (2025), https://hdl.handle.net/10161/32077 ("US power system's existing headroom, resulting from intentional planning decisions to maintain sizable reserves during infrequent peak demand events, is sufficient to accommodate significant constant new loads, provided such loads can be safely scaled back during some hours of the year.").

[174] *See* Elec. Power Rsch. Inst., *DCFlex Initiative Overview,* https://dcflex.epri.com; Ingrid Lunden, *Alphabet Spin-Off SIP Launches Verrus, A Data Center Concept Built Around Battery 'Microgrids*,' TechCrunch: Enterprise (March 11, 2024, 7:45 AM PDT), https://techcrunch.com/2024/03/11/sip-verrus-data-center/ ("Verrus incorporates "microgrids" based on advanced, high-power batteries with software to understand and allocate energy to specific tasks and applications, and it is designed to address some of the power challenges posed by modern computing needs . . . that the first three data centers designed using Verrus' architecture . . . [the] aim is to have these operational in 2026 or 2027.").

[175] *See* Brian Martucci, *Texas Law Gives Grid Operator Power to Disconnect Data Centers During Crisis*, Utility Dive: Dive Brief (June 25, 2025), https://www.utilitydive.com/news/texas-law-gives-grid-operator-power-to-disconnect-data-centers-during-crisi/751587/.

[176] *See* EIA, *Preliminary Monthly Electric Generator Inventory* (June 2025), https://www.eia.gov/electricity/data/eia860m/archive/xls/june_generator2025.xlsx. The sum of "Nameplate Capacity (MW)" for all operating resources with a "Planned Retirement Year" of 2025, 2026, 2027, 2028, 2029, or 2030 is 51.7 GW.

[177] DOE Resource Adequacy Report at A-5.

[178] EIA, *Annual Energy Outlook 2025*, Table 9, Electricity Generating Capacity, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=9-AEO2025&cases=ref2025&sourcekey=0; *see also Preliminary Monthly Electric Generator Inventory* (June 2025), https://www.eia.gov/electricity/data/eia860m/archive/xls/june_generator2025.xlsx.

[179] DOE Resource Adequacy Report at i.

and Phase 3 HD Rules.[180] EPA notes that in particular, the effect is to reduce incremental builds of wind and solar resources after 2028—and that this combined with increased round-the-clock demand from data centers would strengthen the economics of thermal resources and reduce the pressure on uneconomic resources to retire. While some shift in generation away from wind and solar and towards thermal generation due to changes in tax credits combined with increased load growth is plausible, it in no way supports the rationale for the Proposal. In the near term, EPA noted that the 2024 Multipollutant Rule was estimated to increase electricity demand by less than 1% in 2030.[181] This is hardly a major driver of power sector changes—annual changes of 2 to 3% in total electricity demand are expected in the near term.[182] The exact makeup of the generation mix that would serve additional demand from EVs can be estimated but ultimately will be determined by a combination of market forces and decisions by power sector planners and regulators. Changes in those market forces or regulatory decisions may change the makeup of generation, but do not imply that the 2024 Multipollutant or Phase 3 HD Rules are infeasible or make EPA's prior assessment of their grid impacts invalid.

In the DRIA, EPA notes one example of an occurrence in California in 2022 when during an extreme heat wave residents were urged to reduce demand during the 4-9 PM window,[183] and attempts to use it to justify the position that EV charging is a burden on the grid which displaces other beneficial uses of electricity. This misrepresents the California notice to conserve electricity in 2022 and neglects to mention the key role EV charging can play (and is already beginning to play) in reducing peak demand through virtual power plants and other demand flexibility programs.

First, the notice does not call on only EVs to avoid charging, it calls on the public to reduce all non-essential sources of demand during the peak period. The full quote says "[t]he top three conservation actions are to set thermostats to 78 degrees or higher, avoid using large appliances and charging electric vehicles, and turn off unnecessary lights."[184] In other words, EVs are categorized with thermostat settings, running the washing machine, dishwasher, or dryer, and turning off unused lights as sources of demand response during a crisis. This demonstrates that EVs create opportunities for grid management in times of crisis, not the reverse.

Second, EV charging is among the most flexible loads on the system, as is detailed further below. Managed charging can be shifted outside of peak windows, meaning that EVs represent part of the solution rather than the problem in these rare stress events.

Finally, the claim ignores recent system trends. According to California's own emergency action records, no grid emergencies of this kind (called "Flex Alerts") have occurred in the past three

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180 DRIA at 11-12.
181 *Id.* at 11.
182 EIA, *Short Term Energy Outlook August 2025* at 12, https://www.eia.gov/outlooks/steo/archives/aug25.pdf.
183 California ISO, *Heat Bulletin - Excessive heat starting tomorrow will stress energy grid* (Aug. 30, 2022), https://www.caiso.com/Documents/excessive-heat-starting-tomorrow-will-stress-energy-grid.pdf.
184 *Id.*

years[185] despite accelerated and rapid EV adoption in the state with total sales of EVs reaching 25% of all LDVs in 2024 compared to 12% in 2022.[186] This improvement is due to the dramatic deployment of grid-scale storage in California, which has enabled renewable generation to be shifted into peak hours. As documented by CAISO, storage capacity has grown to the point where peak load events are now mitigated without the need for emergency curtailments, even during heat events.[187] Because of the ongoing statewide build-out of new battery storage and renewable generation resources, the 2025 *California Energy Resource and Reliability Outlook* projects that California will meet grid reliability standards through 2035, even with the recent addition of 3 GW of previously unplanned-for data center load to the state demand forecast.[188]

Far from being an example of EVs burdening the grid, the California example instead highlights how EVs, along with other sources of flexibility such as battery energy storage systems, are significantly easier to integrate into the grid than other loads due to the potential to control when they charge. The 2024 Multipollutant Rule EPA clarified this benefit of EVs relative to other loads, stating "[t]he study also found that the Action case, with managed charging, provides significant distribution system benefits relative to unmanaged charging both financially and in terms of the ability to defer necessary distribution system upgrades…[and] requires significantly less electricity at peak times… illustrating the benefits of employing grid integration technologies and techniques."[189] This is supported by other analysis that demonstrates that flexible EV charging is one of the most effective tools for improving grid reliability, as charging can be shifted away from peak hours or aligned with renewable output and allows meeting of grid needs with opportunities on the demand side instead of only on the supply side.[190]

In sum, there is nothing provided in the Proposal or the DRIA that would justify invalidating the prior conclusion that EPA reached regarding the ability of the power sector to reliably integrate additional electricity demand due to the 2024 Multipollutant and Phase 3 HD Rules.

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[185] California ISO, *Grid Emergencies History Report*, at 1 (Jun. 12, 2025), https://www.caiso.com/documents/grid-emergencies-history-report-1998-to-present.pdf.
[186] California Energy Commission, *New ZEV Sales in California* (accessed Aug. 22, 2025), https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/new-zev.
[187] Cliff Rose and Laura Fletcher, *The CAISO Energy Storage Revolution: Meeting California's Climate and Load Challenges*, Yes Energy (accessed Aug. 2025), https://blog.yesenergy.com/yeblog/the-caiso-energy-storage-revolution.
[188] California Energy Commission, *California Energy Resource and Reliability Outlook, 2025*, Publication Number CEC-200-2025-011 (July 2025), https://efiling.energy.ca.gov/GetDocument.aspx?tn=264559.
[189] 89 Fed. Reg. at 28,025.
[190] *See* Muhammad Bashar Anwar, et al., *Assessing the value of electric vehicle managed charging: a review of methodologies and results*, Energy & Environmental Science 15:2, 466-98 (2022) https://pubs.rsc.org/en/content/articlehtml/2021/xx/d1ee02206g; Omid Sadeghian, et al., *A comprehensive review on electric vehicles smart charging: Solutions, strategies, technologies, and challenges*, Journal of Energy Storage 54, 105241 (2022), https://www.sciencedirect.com/science/article/pii/S2352152X22012403.

EPA's alternative methodology to estimate the Proposal's impact on the "opportunity cost" of electricity is methodologically flawed

In the DRIA, EPA develops a new methodology to calculate the opportunity cost of using electricity to supply EVs.[191] EPA makes a sweeping generalization, stating that "[t]he 2021 and 2024 vehicle rulemakings quantified such opportunity costs by assuming that the rules would have little effect on electricity prices or average costs"[192] and then proceeds to propose an entirely new method of calculating the impact of the Proposal. As shown below, EPA fails to identify why the prior methodology used in the 2024 Multipollutant Rule RIA is flawed. Further, the new proposed method suffers numerous flaws in underlying assumptions, data, and methods, and should not be relied on as an acceptable method for assessing the power sector impact of the Proposal.

First, the only criticism of the prior 2024 Multipollutant Rule RIA method for assessing power sector impacts provided by EPA is the implication that EPA only made a gross assumption that the impact of the Rule on electricity prices was small without any other analysis or justification.[193] This is clearly incorrect based on EPA's own record. In the 2024 Multipollutant Rule RIA, EPA explicitly describes how the impact of the rules on the power system and retail electricity rate were determined, accounting for both the need to build additional power generation units and transmission at the bulk level and the need to build additional electrical infrastructure at the distribution level. This detailed analysis projected a national average electricity retail rate price increase of 2.46% in 2050.[194] This information was included in the overall cost-benefit analysis for the 2024 Multipollutant Rule.[195]

To calculate this cost impact and the overall power system impact, EPA previously used the Integrated Planning Model (IPM) tool, which represents capacity expansion of the U.S. power sector under various policy scenarios. EPA noted that IPM is a peer-reviewed,[196] multi-regional, dynamic, deterministic linear programming model of the contiguous U.S. electric power sector, providing forecasts of least cost capacity expansion, electricity dispatch, and emissions control strategies while meeting all energy demands and environmental, transmission, dispatch, and resource adequacy constraints.[197] EPA has relied on IPM to assess electricity sector impacts of its rulemaking for more than two decades.[198]

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[191] DRIA at 39, 40.
[192] *Id*. at 39.
[193] *Id*.
[194] 2024 Multipollutant Rule RIA at Table 5-4.
[195] *Id* at 5-18.
[196] *See* EPA, *EPA's Response to IPM v6 Peer Review Report* (April 2022), https://www.epa.gov/system/files/documents/2022-04/epas-response-to-ipm-v6-peer-review-report-4-18-2022.pdf.
[197] 80 Fed. Reg. at 28,020.
[198] *See* Final Clean Air Interstate Rule: Regulatory Impact Analysis (May 2005) at 7-1, https://www.epa.gov/sites/default/files/2015-09/documents/finaltech08.pdf; Clean Power Plan Final Rule: Regulatory Impact Analysis (Oct. 2015), https://www3.epa.gov/ttnecas1/docs/ria/utilities_ria_final-clean-power-plan-existing-units_2015-08.pdf; Repeal of the Clean Power Plan, and Emission Guidelines for Greenhouse Gas

In the DRIA EPA provides no evidence or reasoning to support the assertion that the prior methodology using IPM was invalid or insufficient. Instead, EPA simply proposes to use a single working paper (Fitzgerald and Mulligan 2023) that has not been peer-reviewed[199] and which contains an analysis which consists entirely of two lines drawn on a chart to determine power sector impacts and assess the economic opportunity cost.[200] The Fitzgerald and Mulligan (2023) working paper contains numerous incorrect assumptions, invalid techniques, and outdated data which make it absurd to use in lieu of the detailed IPM power sector modeling capabilities available to EPA. A non-comprehensive list of issues with this approach are outlined here.

First, the DRIA analysis—relying on assumptions in Fitzgerald and Mulligan (2023)—assumes that increases in electricity demand for EVs must be met by an entirely fictitious target of 80% new renewable resources (and that conversely every decrease in electricity demand due to the proposal avoids the need to build those renewable resources).[201] This is clearly incorrect as there is no national policy, law, or regulation which would require increased electricity demand from EVs to be met by 80% renewables. Increases in electricity demand are generally met by the combination of existing and new resources determined by a grid operator to be least-cost either through market mechanisms or through regulatory approaches, constrained by physics and applicable laws and regulations.[202] The RIA for the 2024 Multipollutant Rule shows that in 2035 an estimated near equal mix of additional renewables generation with additional fossil fuel generation from new and existing resources is used to meet incremental demand from EVs.[203]

Not only does the DRIA and the Fitzgerald and Mulligan analysis assume new EV demand must be met by 80% new renewables, it assumes that the marginal cost of additional renewable electricity is extremely high (approximately $110 per MWh) because the baseline assumes the power system is *already at 80% renewable generation*[204] rather than the current 22.7% renewable generation.[205] This unsupportable assumption dramatically overstates the marginal costs of adding new renewable generation. For comparison, the updated 2025 unsubsidized

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Emissions from Existing Electric Utility Generating Units: Regulatory Impact Analysis (June 2019), https://www.epa.gov/sites/default/files/2019-06/documents/utilities_ria_final_cpp_repeal_and_ace_2019-06.pdf; New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule: Regulatory Impact Analysis (April 2024), https://downloads.regulations.gov/EPA-HQ-OAR-2023-0072-8913/content.pdf.

[199] T. Fitzgerald and C.B. Mulligan, *The Economic Opportunity Cost of Green Recovery Plans* (February 2023), https://www.nber.org/papers/w30956.

[200] DRIA at 40.

[201] *Id* at 40.

[202] *See* U.S. Department of Energy. *Quadrennial Energy Review*, Appendix – Electricity System Overview, at A-29, (Jan. 2017), https://www.energy.gov/sites/default/files/2017/02/f34/Appendix--Electricity%20System%20Overview.pdf.

[203] 2024 Multipollutant Rule RIA at Figure 5-7.

[204] DRIA at 40.

[205] The sum of 2024 Utility scale solar generation (218.5 TWh), hydropower generation (242.2 TWh), and renewable sources excluding hydroelectric and solar (515.8 TWh) is 976.5 TWh, divided by total 2024 generation of 4,304 TWh = 22.7%. EIA, *Electric Power Monthly*, Table 1.1, Net Generation by Energy Source: Total (All Sectors) (July 2025), https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=table_1_01.

levelized cost of electricity is estimated to be $38-$78 per MWh for solar and $37-$86 for wind.[206] Oddly, the underlying paper cited by EPA in this analysis has a more reasonable starting point which recognizes the "Baseline" grid mix of the current day on its chart, which EPA appears to have removed when recreating the chart for the DRIA.[207] In other words, the sole citation EPA relies upon for its projections does not even support EPA's data or calculations.

Similarly, the Fitzgerald and Mulligan paper uses cost data that ultimately derives from an analysis originally published in 2014[208] and includes future capital cost assumptions that now are significantly out of date. For example, the capital cost for utility-scale solar photovoltaic installations in 2050 is assumed to be $2,060 per kW-DC[209] whereas the actual average capital cost for utility-scale solar photovoltaic systems installed in 2023 was less than half that at 1,080 per kW-DC.[210] These numbers differ by a factor of 2 before even accounting for inflation.

In addition, the DRIA analysis assumes that the Proposal results in 1,000 TWh of electricity demand avoided per year.[211] This appears to be taken directly from the Fitzgerald and Mulligan working paper, which provides no evidence, calculations, or justification as to how the 1,000 TWh assumption was determined.[212] Given that the working paper was published in February 2023, before the publication of the proposed rule which preceded the 2024 Multipollutant Rule, it clearly did not represent the impacts of the actual 2024 Multipollutant Rule. It appears to have been more of a "rule of thumb" example rather than an actual calculation or estimation of the expected change in electricity demand.

Relatedly, the Fitzgerald and Mulligan working paper and the DRIA also fail to account for the impact of the 2024 Multipollutant Rule on EV sales and electricity demand over time as they do not specify in which future year the 1,000 TWh of additional demand occurs. The unsupported 1,000 TWh assumption is clearly significantly too high, as EPA determined incremental demand

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[206] Lazard, *Levelized Cost of Electricity+* at 8 (June 2025), https://www.lazard.com/media/uounhon4/lazards-lcoeplus-june-2025.pdf.
[207] Fitzgerald, T. and Mulligan, C.B., *The Economic Opportunity Cost of Green Recovery Plans,* Figure 2 (February 2023), https://www.nber.org/papers/w30956.
[208] *See* Trieu Mai et al., *Envisioning a renewable electricity future for the United States*, Energy, Vol 65, pp. 374-386 (Feb. 1, 2014), https://www.sciencedirect.com/science/article/abs/pii/S0360544213009912.
[209] *Id* at Table 1.
[210] Joachim Seel et al., *Utility-Scale Solar, 2024 Edition – Data File*, Lawrence Berkeley National Laboratory, at "CapEx Trend (PV-only)" worksheet (Oct. 2024), https://emp.lbl.gov/sites/default/files/2024-10/Utility-Scale%20Solar%202024%20Edition%20Data%20File.xlsx.
[211] EPA appears to make a unit conversion error here. The text says, "The point a indicates the quantity and wholesale price of electricity produced from renewable sources under the proposed rule, assuming that the Biden administration's 80 percent renewable goal is realized. The point b corresponds to fossil-fuel produced electricity under the proposed rule. The points c and d are their analogues under the baseline of the 2024 vehicle rulemakings. Together, they involve 1 TWh more electricity usage than under the proposed rule." However, in the referenced Figure RIA-2, the difference between points a/b corresponding to the proposal and c/d corresponding to the 2024 GHG Vehicle Standards is 1 billion MWh, which is equivalent to 1,000 TWh. DRIA at 39, 40.
[212] Fitzgerald, T. and Mulligan, C.B. *The Economic Opportunity Cost of Green Recovery Plans*, at 8 (February 2023), https://www.nber.org/papers/w30956.

from EVs due to the rule would only reach 685 TWh annually by 2050,[213] and EPA's own updated analysis in the docket estimates the proposal would only save 570 TWh annually by 2050.[214] EPA seems to recognize that the full 1,000 TWh assumed demand for new EVs attributable cannot be attributable to the Proposal, stating only that only "part" of the benefits it calculates apply.[215] However, instead of simply using its own series of annual electricity savings of the Proposal as presented in the docket, EPA states that it attempts to scale down the impact using EV sales share relative to the 2024 Multipollutant Rule—an incorrect methodology as again there is no connection in fact between the 2024 Multipollutant Rule and the 1,000 TWh of additional EV demand simply assumed in the Fitzgerald and Mulligan paper.

Finally, the approach of determining marginal costs using a line drawn between two points is overly simplistic and completely misses the actual complexity in renewable costs. The supply curve for renewable electricity costs has been well explored and is known to be significantly concave in nature.[216] In other words, the marginal cost of adding more renewable electricity capacity is relatively flat until reaching very high levels of renewable electricity generation, at which point it becomes non-linear.[217] Assuming linear increase in marginal renewable costs from now until 80% renewable is reached will significantly over-estimate costs. As an illustrative example, the simple lines used in the DRIA imply that for every additional 100 TWh per year of renewable supply, the marginal cost of that supply increases by $2.3 per MWh. Since 2010 annual renewable supply has increased by 550 TWh, which using the Fitzgerald and Mulligan approach would imply that the marginal cost of new renewable supply should have risen by nearly $13 per MWh. Instead, renewable costs have declined dramatically during this time: wind costs decreased from $99-$148 per MWh in 2010 to $27-$73 in 2024, and similarly solar costs declined from $226-$270 per MWh in 2010 to $29-$92 per MWh in 2024.[218]

The above unsupportable assumptions alone are sufficient to demonstrate that EPA cannot rely on their proposed approach to estimating power sector impacts. However, further errors in the methodology would make it invalid even if the above assumptions were corrected. The Fitzgerald and Mulligan paper assumes that the initial marginal cost difference between renewable generation and fossil fuel generation is equal to the production tax credit subsidy of

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[213] Total electricity demand in 2050 in the no-action baseline is 5,893 TWh and in the final rule scenario is 6,578 TWh, with an incremental demand due to the rule of 685 TWh. 2024 Multipollutant Rule RIA at Tables 5-2 and 5-3.
[214] EPA Physical Effects at Table 7.3.
[215] DRIA, at 60.
[216] Lopez, Anthony, et al., *Renewable Energy Technical Potential and Supply Curves for the Contiguous United States: 2024 Edition*, National Renewable Energy Laboratory (Jan. 2025, revised June 2025), https://docs.nrel.gov/docs/fy25osti/91900.pdf.
[217] Denholm, Paul, Patrick Brown, Wesley Cole, et al., *Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035*, National Renewable Energy Laboratory, Figure 34 (Aug. 2022), https://docs.nrel.gov/docs/fy22osti/81644.pdf.
[218] Lazard, *Levelized Cost of Electricity+* at 15 (June 2025), https://www.lazard.com/media/uounhon4/lazards-lcoeplus-june-2025.pdf.

$22 per MWh.[219] This implies that without the tax credit the marginal cost of renewables and fossil generators are the same, which is demonstrably false.[220] The analysis makes no distinction between existing generators' costs and new generator costs, a key error as new capital needed to deploy new resources makes new generators' marginal cost more expensive than the marginal cost of existing generators. The analysis conflates energy (total annual electricity demand) with capacity (power available during peak periods), and simply assumes every increment of new EV energy demand requires new capacity. As noted above in the reliability section, EV demand is highly flexible and can be shifted away from peak demand times and avoid significant infrastructure needs.[221] Using the Fitzgerald and Mulligan (2023) assumptions means that even EV charging that occurs overnight when the system is close to minimum load would require new generators to be built, an illogical result. Proper resource adequacy analysis and associated cost impacts requires considering when demand materializes and how resources are dispatched, not simply comparing annual electricity consumption growth against marginal costs.

All of the deficiencies in the DRIA approach that relies on the Fitzgerald and Mulligan paper could be addressed simply by using the existing IPM power sector model that EPA has relied on for decades.

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[219] Fitzgerald, T. and Mulligan, C.B. *The Economic Opportunity Cost of Green Recovery Plans*, at 6 (February 2023), https://www.nber.org/papers/w30956.
[220] Lazard, *Levelized Cost of Electricity+* at 8 (June 2025), https://www.lazard.com/media/uounhon4/lazards-lcoeplus-june-2025.pdf.
[221] Muhammad Bashar Anwar, et al., *Assessing the value of electric vehicle managed charging: a review of methodologies and results*, Energy & Environmental Science 15:2, 466-98 (2022), https://pubs.rsc.org/en/content/articlehtml/2021/xx/d1ee02206g; Omid Sadeghian, et al., *A comprehensive review on electric vehicles smart charging: Solutions, strategies, technologies, and challenges*, Journal of Energy Storage 54, 105241 (2022), https://www.sciencedirect.com/science/article/pii/S2352152X22012403.

Appendix 1: LDV MSRP Analysis

This analysis used the desktop version of Argonne National Lab's TechScape tool to estimate EV and ICE vehicle MSRPs. TechScape provided estimated MSRPs of EVs and ICE vehicles in 2025, 2030, and 2035 by car segment (compact, midsize, small SUV, midsize SUV, pickup). A 300-mile range BEV was compared to a conventional spark ignition turbo vehicle identical in every way save the powertrain. The prices are based on base trim vehicles in the tool's low technology progress scenario, which assumes a low level of progress in efficiency for powertrain technologies. Instead of using TechScape's default battery costs for 2025, 2030, and 2035, the analysis substituted in EV battery cost projections from BNEF's 2025 Battery Price Outlook: $112 per kilowatt-hour in 2025 per the near-term outlook, $69 per kilowatt-hour in 2030, and $54 per kilowatt hour in 2035. A separate sensitivity was run using press reports of Goldman Sachs battery cost projections: $80 per kilowatt-hour in 2026, and $60 per kilowatt-hour in 2030. Finally, as BNEF's long-term projection methodology estimates 2025 battery costs at $100/kWh, consistent with observed market data on passenger EV battery costs in 2024 but below BNEF's near-term outlook methodology that factors in changes to raw material prices, the analysis included a scenario of only BNEF projections. All inputs were converted to constant 2023 dollars to remain consistent with TechScapes other data sources.

As TechScape uses bottom-up modeling of vehicle component costs based on Autonomie and BatPac outputs and a flat 1.5 retail price equivalent multiplier to arrive at an MSRP, these estimates are independent of consumer tax credits. Because TechScape provides estimates only for 2025, 2030, and 2035, the analysis interpolates vehicle costs for the years in between.