COMMENTS

submitted on behalf of

THE ILLINOIS, INDIANA, IOWA, KANSAS, KENTUCKY, MICHIGAN, MISSOURI, NEBRASKA, and WISCONSIN CORN GROWERS ASSOCIATIONS, OHIO CORN & WHEAT GROWERS ASSOCIATION, TEXAS CORN PRODUCERS, URBAN AIR INITIATIVE, INC., and AMERICAN COALITION FOR ETHANOL

Concerning the U.S. Environmental Protection Agency's

Vehicle Test Procedure Adjustments for Tier 3 Test Fuel;

Docket ID No. EPA-HQ-OAR-2016-0604

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GLOSSARY

1975 test fuel ....The gasoline emissions test fuel used to certify motor vehicle compliance with the Clean Air Act for model year 1975

ASTM D3338/D3338M....................Standard test method for estimation of net heat of combustion of aviation fuels

ASTM D4052 ....Standard test method for density, relative density, and API gravity of liquids by digital density meter

Btu ....British thermal unit, a unit of energy equal to the quantity of heat required to raise the temperature of one pound of liquid water from 59.5 degrees to 60.5 degrees Fahrenheit at standard pressure

CAFE ....The automobile manufacturer Corporate Average Fuel Economy program required by Chapter 329 of Title 49 of the U.S. Code

Comparability requirement ....EPA's duty under subsection 32904(c) of Title 49 of the U.S. Code to ensure that fuel economy test procedures for passenger vehicles be the same as 1975 test procedures or "yield comparable results" for fuel economy

CREE ....Carbon-related exhaust emissions

CWF ....Carbon weight fraction, the percentage of carbon in a substance by mass

DOT ....Department of Transportation

E0 ....Fuel blends consisting of gasoline and no ethanol

E10 ....Fuel blends consisting of gasoline and 9 to 10 percent ethanol

FTP ....The Federal Test Procedure, also known as the city drive cycle, a certification test cycle described in section 1066.801(c) of Title 40 of the Code of Federal Regulations

g/gal ....Grams per gallon g/mi ....Grams per mile

mpg ....Miles per gallon

HFET ....The Highway Fuel Economy Test procedure, a certification test cycle described in section 1066.40 of Title 40 of the Code of Federal Regulations

NHC ....Net heat of combustion, the energy released when a mass of fuel is burned in oxygen in a constant volume enclosure, with all the products, including water, being gaseous. NHC is often expressed in British thermal units per pound (Btu/lb) or megajoules per kilogram (MJ/kg)

R factor..A measure of a vehicle's response to changes in the volumetric energy density of two different test fuels, determined by dividing the change in vehicle fuel economy by the change in the volumetric energy density of the test fuels

S.G. ....Specific gravity, the density of a substance relative to water at a given temperature, often 60 degrees Fahrenheit

Tier 2 test fuel ....The E0 emissions test fuel specified in Table 1 of section 86.113-04 of Title 40 of the Code of Federal Regulations, and commonly known as "indolene"

Tier 3 test fuel ....The E10 emissions test fuel specified in Table 1 of section 1065.710 of Title 40 of the Code of Federal Regulations

VED ....Volumetric energy density, the energy per volume of a substance (e.g., British thermal units per gallon or megajoules per liter)

INTRODUCTION & EXECUTIVE SUMMARY

For the first time in the history of the Clean Air Act (CAA), EPA seeks to penalize a test fuel, not because the fuel's carbon emissions are too high, but because they are *too low*. EPA's proposed *Vehicle Test Procedure Adjustments for Tier 3 Certification Test Fuel* rule would artificially inflate the CO_2 emissions of vehicles certified using the Tier 3 E10 test fuel instead of the Tier 2 E0 test fuel.

This distortion is perverse. Penalizing the E10 test fuel for producing *fewer* carbon emissions than other test fuels would deter innovation and thwart the CAA's goal of reducing greenhouse gas emissions. The proposed distortion of reality would set a pernicious precedent that would obstruct the adoption of low-carbon fuels—like high-octane mid-level ethanol blends—that could provide a cost-effective pathway for future reductions in vehicle carbon emissions. By eliminating the natural advantage of low-carbon test fuels, the proposed rule places a thumb on the scale in favor of electrification and against clean, low-carbon fuels, ultimately harming both the environment and the consumer. EPA should not depart from its longstanding "fuel-neutral" approach to setting emission standards and test procedures.

The proposed rule also proposes a fuel economy adjustment factor (R_a) of 0.81, far lower than the adjustment factor found in *every* empirical study since the early 1990s. As a result, vehicles certified with the E10 test fuel will have significantly lower fuel economy than vehicles certified with the current E0 test fuel. This will increase the effective stringency of the fuel economy standards, undermining the balance struck by the Department of Transportation.

The proposed rule exceeds EPA's authority, and it is arbitrary and capricious for numerous reasons.

1. CO_2 Adjustment. The proposed distortion of measured CO_2 emissions exceeds EPA's authority under CAA § 206 to determine vehicle test procedures. EPA justifies its test procedure distortion as a way to "maintain the stringency" of the CO_2 standards given the change in test fuels. But EPA's only authority to adjust the *stringency of emissions standards* is CAA § 202, which allows the Agency to directly amend emissions standards. By contrast, CAA § 206 is focused on maintaining the *accuracy of test procedures*, not the stringency of emission standards. Under CAA § 206, EPA must promulgate test procedures that accurately reflect actual vehicle emissions. EPA exceeds that limited authority—and evades the requirements of CAA § 202—when it adopts test procedures that are *less accurate* simply to "maintain the stringency" of the standards.

But the rule does not even "maintain stringency." Instead, the adjustment effectively increases the stringency of the CO_2 standards for vehicles certified on the E10 test fuel, and, in doing so, violates requirements for changing emissions standards under CAA § 202. If EPA believes CO_2 standards are now too lenient considering the test fuel change, it should change emissions standards using its standard-setting authority, as EPA ordinarily does when circumstances change. Given that mandatory certification of all vehicles using the E10 test fuel will be delayed until 2025 or 2026, there is no need to shortcut the normal regulatory process by distorting vehicle test procedures. EPA has ample time to properly, and lawfully, adjust the standards if desired.

2. Fuel Economy Adjustment. EPA's proposed fuel economy adjustment factor (R_a) of 0.81 is far too low, underestimating calculated fuel economy and effectively changing the fuel economy standards. Unlike for CO_2 emissions, EPA has no authority to set the *stringency of fuel economy standards*; that authority is exclusively vested in the Department of Transportation. EPA's mandate under the Corporate Average Fuel Economy Program is limited to the *comparability of test procedures*, that is, EPA is required to promulgate test procedures that provide "comparable results" to the original 1975 test procedures. Because its proposed R_a factor does not provide comparable results, but rather effectively changes the standards, the proposed rule exceeds EPA's limited authority to revise fuel economy test procedures and unlawfully usurps the Department of Transportation's sole power to amend fuel economy standards.

The proposed R_a factor is too low because EPA derived it based on the results of an inadequate vehicle test program that is contradicted by all other available data. EPA's test program has two fatal flaws, either of which prevents a determination of an acceptable R_a factor from its results. First, the vehicles are not representative of the future fleet. Second, and relatedly, there are not enough vehicles to determine R_a *for the entire fleet* with any reasonable level of statistical confidence.

The vehicles are not representative. The test program's vehicles are not representative of the Tier 3 vehicles to which the R_a factor will be applied. The test program vehicles range in model year from 2013 to 2016 and use already-outdated technologies, while the determined R_a factor will be applied to vehicles for model years 2025 and later. Moreover, the mix of fuel-efficient technologies among the older test program vehicles does not reflect the likely technology distribution of the future fleet. Finally, all but *one* of the test vehicles were certified to older, Tier 2 standards, violating EPA's own prior assertion that the Tier 3 R_a factor must be determined based on testing of Tier 3-certified vehicles. Without a representative distribution of representative vehicles and future fuel-efficiency technologies, EPA's test program cannot provide the data necessary to determine an appropriate R_a factor for the future fleet.

There are not enough vehicles. The test program tested only eleven vehicles—and EPA used results from only ten vehicles—far too few to determine an R_a factor with enough statistical certainty to represent the entire light-duty vehicle fleet. Given the small number of vehicles tested and the variation in performance among those vehicles, the uncertainty in EPA's proposed value is unacceptably large to adjust fuel economy values, a deficiency that can only be remedied by testing more vehicles. In fact, EPA previously admitted that it would need results from nearly ten times as many vehicles as it tested to determine an accurate R factor with satisfactory confidence.

Even beyond these fatal deficiencies, EPA's analysis of the limited test program results is flawed. EPA selectively includes and excludes vehicle data to lower the determined R_a factor. As a result, EPA's proposed R_a factor is far lower than the it would be if the test program's data were properly analyzed. Indeed, EPA's proposed R_a factor is far lower than that found by *all* previous EPA and Department of Energy studies, which have consistently determined that the R factor for vehicles using ethanol blends is closer to 1.

3. EO 13,771 Compliance. By failing to account for the significant costs associated with the change in emissions and fuel economy standards that would result from the adjustments, the proposed rule fails to comply with Executive Order 13,771.

Conclusion: EPA should withdraw its proposed CO_2 adjustment and set a fuel economy R_a factor of at least 0.95—consistent with previous studies and vehicle technology trends—to ensure fuel economy comparability for vehicles certified using the Tier 3 E10 test fuel.

BACKGROUND

I. THE FUEL ECONOMY EQUATION

A. The Corporate Average Fuel Economy Program

The Energy Policy and Conservation Act of 1975 (EPCA) required the Secretary of the Department of Transportation (DOT) to establish mandatory corporate average fuel economy (CAFE) standards applicable to manufacturers of new passenger cars and light-duty trucks.[1] By 1985, each automobile manufacturer had to meet a sales-weighted passenger car fuel economy standard of 27.5 miles per gallon (mpg).[2] For light-duty trucks, DOT was required to set sales-weighted fuel economy standards at "the maximum feasible average fuel economy level."[3]

Congress increased the stringency of the CAFE program in the 2007 Energy Independence and Security Act, requiring a fuel economy standard of "at least 35 miles per gallon" by 2020 for the combined fleet of automobiles, and the "maximum feasible average fuel economy standard" by 2030.[4] When setting maximum feasible fuel economy standards, DOT must consider "technological feasibility, economic practicability, the effect of other motor vehicle standards of the Government on fuel economy, and the need of the United States to conserve energy."[5]

[1] *Ctr. for Auto Safety v. NHTSA*, 793 F.2d 1322, 1324 (D.C. Cir. 1986).

[2] Energy Policy and Conservation Act of 1975, Pub. L. 94-163 § 502(a)(1), 89 Stat. 871, 902 (1975) (EPCA).

[3] *Id.* § 502(a)(4), (b), 89 Stat. at 903.

[4] 49 U.S.C. § 32902(b)(2), Energy Independence and Security Act of 2007, Pub. L. 110-140 § 102(b)(2) (2007).

[5] *Id.* § 32902(f).

B. The "Comparability" Requirement

While EPCA put DOT in charge of setting fuel economy standards, it put EPA in charge of promulgating fuel economy "testing and calculation procedures."[6] But EPCA circumscribed EPA's ability to set test procedures. For passenger cars, EPA had to use the emission testing procedures that were in place in 1975 under the Clean Air Act, "or procedures which yield comparable results."[7] This "comparability requirement" is intended "to insure that auto manufacturers be credited only with real fuel economy gains, not illusory gains [or losses] generated by changes in test procedures."[8] The comparability requirement ensures that the stringency of the fuel economy targets set by Congress (27.5 mpg by 1985, or 35 mpg by 2020) does not change as a result of EPA changes to vehicle test procedures.[9] It also preserves DOT's role as the standard-setting agency for fuel economy standards, ensuring that changes to the stringency of fuel economy standards happen only after consideration of all the relevant factors.

C. The Gasoline Fuel Economy Equation

1. The 1976 test procedures used a "carbon-balance" method to estimate fuel economy.

Historically, there was no simple way to measure vehicle fuel economy directly, so EPA required automakers to measure fuel economy using a "carbon-balance" method: by measuring carbon in the test fuel and then measuring carbon in tailpipe emissions per mile, automakers could indirectly estimate how fast a vehicle was consuming fuel based on how rapidly the vehicle was consuming the fuel's carbon.[10] The form of a carbon-balance fuel economy equation is as follows:

$$MPG = \frac{Carbon\ (g/gal)_{t.fuel}}{Carbon\ (g/mi)_{exh.}} \qquad \text{Eq. (1)}$$

Where the numerator is the grams of carbon per gallon in the test fuel, and the denominator is the grams of carbon per mile emitted through the vehicle exhaust.

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[6] EPCA § 503(d)(1), 89 Stat. at 907.

[7] *Id.*

[8] *Ctr. for Auto Safety v. Thomas*, 847 F.2d 843, 846 (D.C. Cir.) (en banc) (Wald, C.J., concurring), *reh'g granted and opinion vacated*, 856 F.2d 1557 (D.C. Cir. 1988) (per curiam); *see also* H.R. Rep. 94-340, at 92 (1975), *reprinted in* 1975 U.S.C.C.A.N. 1762, 1854 ("1975 House Report") ("The words 'or procedures which yield comparable results' are intended to give EPA wide latitude in modifying the 1975 test procedures to achieve procedures that are more accurate or easier to administer, so long as the modified procedure does not have the effect of substantially changing the average fuel economy standards.").

[9] 1975 House Report, *supra* note 8, at 92.

[10] Aron Butler et al., Analysis of the Effects of Changing Fuel Properties on the EPA Fuel Economy Equation and R-Factor, at 1, Memorandum to the Tier 3 Docket, EPA-HQ-OAR-2011-0135 (Feb. 28, 2013).

EPA codified the following carbon-balance equation in 1976:[11]

$$MPG = \frac{2{,}421}{0.866*HC+0.429*CO+0.273*CO_2} \qquad \text{Eq. (2)}$$

Where the numerator, 2,421, represents the grams of carbon per gallon of a typical 1975 gasoline test fuel.[12] The equation's denominator is the mass of carbon-related exhaust emissions emitted per mile—hydrocarbons (HC), carbon monoxide (CO), and carbon dioxide (CO_2)—multiplied by their respective carbon-weight fractions to exclude mass attributable to hydrogen and oxygen.

2. The 1988 test procedures introduced an adjustment to account for the effect of changes in test fuel energy density on fuel economy.

In 1979, Ford Motor Company (Ford) and General Motors (GM) "filed petitions for rulemaking with the EPA."[13] The petitions "alleged that changes in the EPA's testing procedures since [model year] 1975 had caused their CAFE ratings to be lower than they would have been under original testing procedures."[14]

EPA denied the administrative petitions, and the companies sued in the Sixth Circuit.[15] "That court remanded the case to the EPA to initiate a rulemaking that would establish an 'adjustment factor' reconciling current test procedures with previous ones."[16] On remand, EPA published a proposed rule to ensure fuel economy results are "comparable" to results obtained using 1975 test procedures.[17]

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[11] *See Fuel Economy Testing for 1978 Model Year Automobiles and Calculation Procedures for 1977 and Subsequent Model Year Automobiles: Exhaust Emissions Test Procedures for 1978 Model Year Automobiles and Light-Duty Trucks*, 41 Fed. Reg. 38,674, 38,689, 38,695 (Sept. 10, 1976). For a sample calculation using this equation, see 40 C.F.R. § Part 600, App'x II(a).

[12] This estimate is based on the product of the fuel's Carbon Weight Fraction (CWF), 0.866, and Specific Gravity (S.G.), 0.739, multiplied by 3,783, the density of water in grams per gallon, to convert to grams per gallon: $0.866 \times 0.739 \times 3{,}783 = 2{,}421$ g/gal. *Fuel Economy Test Procedures; CAFE Adjustments To Compensate for Changes in 1975 Test Procedures*, 50 Fed. Reg. 27,172, 27,179 (July 1, 1985) (1985 CAFE Adjustment Rule).

[13] *Ctr. for Auto Safety*, 847 F.2d at 846.

[14] *Id.* at 846.

[15] *Id.*

[16] *Id.* (citing *General Motors Corp. v. Costle*, Nos. 80–3271, 80–3272, & 80–3655, mem. order (6th Cir.1982)); *see also General Motors Corp. v. Costle*, 698 F.2d 1219 (6th Cir. 1982).

[17] *Fuel Economy Test Procedures; Proposed Procedures for Adjustment to Test Results To Compensate for Changes in 1975 Test Procedure*, 48 Fed. Reg. 56,526 (Dec. 21, 1983).

A year later, EPA issued a supplemental notice of proposed rulemaking to "account for changes in the properties of the test fuel used for gasoline-powered vehicles."[18] EPA acknowledged that "test fuel properties gradually shifted in the period between 1979 and June 1984."[19] In particular, there had been an increase in the gasoline test fuel's volumetric energy density (VED).[20] This fuel property has a significant impact on fuel economy. Indeed, the fuel economy of gasoline internal combustion engines is largely determined by VED and engine efficiency.[21]

Adjusting fuel economy to account for changes in the test fuel's VED is not, however, straightforward: VED effects on fuel economy vary by vehicle. EPA has traditionally incorporated a correlation factor that estimates how vehicle fuel economy will, on average, respond to changes in VED. This correlation is known as the "R factor," which is the percentage change in fuel economy divided by the percentage change in a test fuel's VED.

Based on limited test data of vehicles from the 1970s and 1980s equipped with open-loop, carbureted engines, GM suggested an R factor of 0.6, implying that for each percentage change in test fuel VED, vehicles respond with a 0.6% change in fuel economy.[22] EPA agreed with this R factor after Ford submitted additional limited data that corroborated this result.[23] Ford, however, warned that the R factor should "be reevaluated in the future when wider application of fast burn, low friction concepts or other technological improvements can be expected to increase the value of the 'R' factor."[24]

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[18] *Fuel Economy Test Procedures; Additional Proposed Procedures for Adjustment of CAFE Results To Compensate for Changes in Test Procedures*, 49 Fed. Reg. 48,024 (Dec. 7, 1984).

[19] *Id.* at 48,024.

[20] *Id.* Fuel VED is often expressed in British thermal units per gallon of fuel (Btu/gal). It can be derived by multiplying a fuel's net heating content (NHC) by pounds per gallon of fuel. Btu/gal = (Btu/lb) * (lb/gal). EPA established a NHC for the 1975 test fuel of 18,507 Btu/lb (43.047 MJ/kg) and a S.G. of 0.739. 1985 CAFE Adjustment Rule, 50 Fed. Reg. at 27,179.

[21] *See* Leone et al., *The Effect of Compression Ratio, Fuel Octane Rating, and Ethanol Content on Spark-Ignition Engine Efficiency*, Envtl. Sci. & Tech. 10,778, 10,785, eq. 7 (2015).

[22] 1985 CAFE Adjustment Rule, 50 Fed. Reg. at 27,179; *see also* T.M. Fisher, General Motors, EPA Dkt. No. A-85-16, II-D-1, at 4 (Aug. 15, 1984) ("Results of testing reported in SAE Paper 740522 indicate an average value of 0.67. General Motors testing on more recent systems yields R values ranging from 0.1 to 0.9 with an average of 0.5. An overall average of 0.6 is suggested for purposes of this analysis.").

[23] 1985 CAFE Adjustment Rule, 50 Fed. Reg. at 27,179 ("Ford submitted data from over 200 vehicle tests which substantiated the value 'R' used by GM"). While the preamble references "200 vehicle tests," Ford appears to have submitted data from "192 tests" of only "four current model year vehicles;" hardly enough vehicles to represent the light-duty fleet in 1980. Donald R. Buist, Ford Motor Co., EPA Dkt. No. A-85-16, II-D-2, at 5 (Jan. 22, 1985).

[24] *Fuel Economy Test Procedures; Revised Fuel Economy Calculation Equation and Light Truck Mileage Accumulation Limits*, 51 Fed. Reg. 37,847 (Oct. 24, 1986) ("E0 Test Fuel Equation Rule").

In 1986, EPA finalized the amended gasoline fuel economy equation for 1988 and later model years to "adjust for changes in energy density relative to the 1975 test fuel."[25] The form of the amended equation is as follows:

$$MPG = \frac{Carbon\ (g/gal)_{t.fuel}}{Carbon\ (g/mi)_{exh.}} \times \frac{VED_{1975}}{(R \times VED_{t.fuel}) + ((1-R) \times VED_{1975})} \qquad \text{Eq. (3)}$$

The blue portion on the left is a "carbon-balance" equation, which gives unadjusted (true) fuel economy. The red portion on the right represents the adjustment for changes in VED,[26] relative to the 1975 reference test fuel, with the R factor visible in the denominator. The output is adjusted fuel economy.

The equation codified by EPA for calculating adjusted fuel economy, calibrated using an R factor of 0.6, is reproduced below:[27]

$$MPG = \frac{CWF_{t.fuel} \times SG_{t.fuel} \times 3{,}783 \times 1.3677 \times 10^4}{(CWF_{exh} \times HC + 0.429 \times CO + 0.273 \times CO_2)(0.6 \times NHV_{t.fuel} \times SG_{t.fuel} + 5{,}471)} \qquad \text{Eq. (4)}$$

The blue portion represents the "carbon-balance" equation. The red portion purportedly represents the adjustment necessary to account for fuel economy changes due to changes in test fuel VED since 1975, using an R factor of 0.6.[28]

3. Subsequent studies suggested that EPA's 1988 fuel economy equation is inaccurate.

When EPA promulgated the 1988 fuel economy equation for the gasoline test fuel with no ethanol (E0), it acknowledged that "as technological improvements allow an engine to more efficiently convert the heat energy content of the fuel to mechanical energy, the 'R' value may increase. If these sorts of technological improvements become predominant throughout the automobile industry, an 'R' value of 0.6 may not be representative and, thus, may require revision."[29] EPA committed to "initiate a future regulatory review of the 'R' value if appropriate."[30]

[25] E0 Test Fuel Equation Rule, 51 Fed. Reg. at 37,844. The equation also required automakers to measure the actual carbon content of the test fuel instead of using a "typical" value. *Id.* at 37,845-46

[26] VED = NHC × SG.

[27] 40 C.F.R. § 600.113-12(h)(1).

[28] The numerator, 1.3677×10^4, is the VED of the 1975 test fuel: 18,507 Btu/lb × 0.739 = 1.3677×10^4. 5,471, calibrates the equation to an R factor of 0.6, obtained as follows: $5{,}471 = (1 - 0.6) \times 1.3677 \times 10^4$.

[29] E0 Test Fuel Equation Rule, 51 Fed. Reg. at 37,847. For a sample calculation using this equation, see 40 C.F.R. § Part 600, App'x II(b).

[30] *Id.*

Studies soon suggested that the R factor of 0.6 for the E0 test fuel was far too low. A 1993 study exploring fuel composition effects on fuel economy estimated an R factor of 0.93±0.05 for 1989 model year vehicles, and 0.92±0.21 for 1983 to 1985 model year vehicles.[31] Subsequent studies using a variety of fuels similarly yielded R factors much higher than 0.6. A 2013 EPA memorandum estimated "an R-factor between 0.8 and 0.9."[32] And a 2014 statistical analysis of three different test programs by EPA and Oak Ridge National Laboratory scientists concluded "that R factor values for modern vehicles are closer to unity than the 0.6 value originally established in the 1980s."[33] Studies "that have attempted to measure R values experimentally [for a variety of fuel blends] have obtained values that are in the range of 0.93 to 0.95."[34]

4. The erroneous R factor had little effect on Tier 2 fuel economy results.

Despite acknowledging that its R factor of 0.6 was wrong, EPA never corrected it.[35] In any event, this had little effect on fuel economy results because the VED of the current E0 ("Tier 2") test fuel is only about 0.25% higher than the VED of the 1975 gasoline test fuel.[36] As a result, even though the low R factor *overestimates* fuel economy for the Tier 2 test fuel, the effect on fuel economy is relatively trivial (≤0.05 mpg).[37]

But as the VED of test fuel "moves further from that of the reference fuel, the difference in the [adjusted] 1975 fuel economy value resulting from [erroneous] values of R becomes larger."[38]

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[31] A. Hochhauser et al., *Fuel Composition Effects on Automotive Fuel Economy - Auto/Oil Air Quality Improvement Research Program*, SAE Tech. Paper 930138 (1993).

[32] Butler et al., *supra* note 10, at 5.

[33] C. Scott Sluder et al., *Determination of the R-factor for Fuel Economy Calculations Using Ethanol-Blended Fuels over Two Test Cycles*, SAE Tech. Paper 2014-01-1572.

[34] C. Scott Sluder, *Analytical Examination of the Relationship between Fuel Properties, Engine Efficiency, and R Factor Values*, SAE Tech. Paper 2019-01-0309.

[35] *See* 40 C.F.R. § 1065.710, Table 2 (specifications to Tier 2 or neat gasoline test fuel).

[36] Based on the Tier 2 test fuel published by EPA: 18,446 Btu/lb, obtained with ASTM D3338/D3338M, and SG 0.744, obtained with ASTM D4052. EPA-HQ-OAR-2016-0604-0028.

[37] Even for the most fuel-efficient vehicle in EPA's test program, the Honda Civic, the change in adjusted fuel economy when using an R factor of 1.0 rather than an R factor of 0.6 is only approximately 0.05 mpg. *See Vehicle Test Procedure Adjustments for Tier 3 Certification Test Fuel*, 85 Fed. Reg. 28,564, 28,574, Table IV-2 (May 13, 2020) (Proposed Rule). For less fuel-efficient vehicles, the change in adjusted fuel economies is even less.

[38] Sluder et al., *supra* note 33, at 2.

II. THE CARBON-RELATED GREENHOUSE GAS EMISSIONS EQUATION

A. EPA's Regulation of Motor Vehicle Carbon Dioxide

Under § 202(a)(1) of the Clean Air Act (CAA), EPA must regulate "any air pollutant from" new motor vehicles which in its judgment "cause[s], or contribute[s] to, air pollution which may reasonably be anticipated to endanger public health or welfare."[39] EPA traditionally exercised this authority to regulate vehicle emissions that are detrimental to air quality.

In 1999, a group of environmental non-profits petitioned EPA to find that CO_2 and other greenhouse gas emissions from motor vehicles were endangering public health and welfare because they contribute to global climate change.[40] EPA rebuffed this petition,[41] but in *Massachusetts v. EPA*, the Supreme Court held that EPA had to decide whether motor vehicle greenhouse gas emissions were endangering public health or welfare by contributing to climate change.[42]

On remand, EPA concluded that motor vehicle greenhouse gas emissions were endangering public health and welfare.[43] As CO_2 emissions are intertwined with vehicle fuel economy (Eq. (4)), in 2010 and 2012, EPA and DOT jointly promulgated standards to implement their (now) overlapping obligation to regulate fuel economy and CO_2 emissions for model year 2012 to 2025 motor vehicles.[44] When it promulgated these standards, EPA promised to revise the fuel economy equation if it decided to change the test fuel in a future rule.[45]

B. The Carbon-Related Exhaust Emissions Calculation

To calculate carbon dioxide emissions under the greenhouse gas standards, EPA measures CO_2 and all other carbon-related exhaust emissions (CREE) in grams per mile. This ensures

[39] CAA § 202(a)(1), 42 U.S.C. § 7521(a)(1).

[40] *See* EPA-HQ-OAR-20001-0002-0001; *Massachusetts v. EPA*, 549 U.S. 497, 505 (2007).

[41] *Control of Emissions From New Highway Vehicles and Engines*, 65 Fed. Reg. 52,922, 52,933 (Sept. 8, 2003).

[42] *Id.* at 532.

[43] *Endangerment and Cause or Contribute Finding for Greenhouse Gases Under Section 202(a) of the Clean Air Act*, 74 Fed. Reg. 66,496 (Dec. 15, 2009).

[44] 40 C.F.R. § 86.1818-12. Because DOT lacks authority to promulgate standards for more than five years in a row, the fuel economy standards for model years 2022 to 2025 were non-binding "augural" standards. 49 U.S.C. § 32902(b)(3)(B).

[45] *2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards*, 77 Fed. Reg. 62,624, 62,777–78 (Oct. 15, 2012) ("If the certification test fuel is changed to include ethanol through a future rulemaking, EPA would be required under EPCA to address the need for a test procedure adjustment to preserve the level of stringency of the CAFE standards.").

that automakers are not able to report lower CO_2 emissions by emitting other carbon pollution.[46]

The CREE equation is as follows:[47]

$$CREE = (CWF_{t.fuel} \div 0.273 \times HC) + (1.571 \times CO) + CO_2 \qquad \text{Eq. (5)}$$

III. THE TIER 3 E10 TEST FUEL

A. EPA's Delay in Implementing E10 Test Fuel for Fuel Economy and Greenhouse Gas Emissions Compliance

In the 2014 Tier 3 Rule, EPA changed the emissions certification test fuel from E0 to E10 to reflect the widespread use of E10 in the marketplace.[48] Under the Tier 3 Rule, some light-duty vehicles began using E10 for emissions testing in model year 2017, and beginning in 2020, all gasoline light-duty vehicles must be certified for emissions testing with the E10 fuel.

EPA, however, deferred the use of the E10 test fuel for fuel economy and greenhouse gas emissions compliance, requiring the continued use of the Tier 2 E0 test fuel until model year 2020.[49] EPA argued that it lacked sufficient data to develop a fuel economy equation for the new E10 test fuel, but noted that it intended to use future certification data from new vehicles tested with both E0 and E10 test fuel to develop an appropriate equation.[50] EPA rejected comments by the International Council for Clean Transportation and the Alliance for Automobile Manufacturers suggesting that an R factor of 0.96 for the E10 test fuel would be justified based on the available data from EPA and DOE test programs.[51] EPA reasoned that

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[46] CREE and CO_2 emissions are nearly identical because CO_2 accounts for nearly all the carbon mass in gasoline-vehicle exhaust emissions. *See, e.g.*, 40 C.F.R. App'x II(b)(1) (Reporting a sample of "HC = .139 grams/mile. CO = 1.59 grams/mile. CO_2 = 317 grams/mile," or 99.5% CO_2 mass emissions).

[47] *Id.* § 600.113-12(h)(2)(i). 0.273 is the carbon weight fraction of CO_2, and 1.571 converts CO to CO_2-equivalent emissions by accounting for the additional mass of the additional oxygen molecule.

[48] *Id.* §§ 86.113-15(a)(1), 1065.710(b); *see also Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle and Fuel Standards*, 79 Fed. Reg. 23,414, 23,526 (Apr. 28, 2014) (Tier 3 Rule) ("[W]e are requiring all light-duty . . . gasoline vehicles to be certified to Tier 3 standards on federal E10 test fuel.").

[49] 40 C.F.R. § 600.117(a).

[50] Tier 3 Rule, 79 Fed. Reg. at 23,531 ("While there has been some data evaluated to assess the impact of changing the emission test fuel on the 'R' factor, EPA did not propose a value in the NPRM and specifically stated that we would continue to investigate this issue and if necessary address it as part of a future action, as opposed to changing it in the Tier 3 final rule."); *id.* at 23532 (stating that current studies "will provide data need to assess the 'R' value" and stating that "EPA expects to have the needed data in early to mid 2015 and will then be in a position to conduct a thorough assessment of the impacts of different emission test fuels on Tier 3/LEV III vehicles and develop any appropriate adjustments and changes, in consultation and coordination with NHTSA.").

[51] EPA, Summary and Analysis of Comments for Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards, EPA-420-R-14-004, 4-352 (Feb. 2014) (Tier 3 Response to Comments) ("We do not agree with ICCT that a value of 0.96 is appropriate because it is not based on the results for Tier 3/LEV III technology vehicles tested on Tier 3/LEV III fuels."); *id.* at 4-357 ("Test data based

these R factor datasets were based on vehicles certified to comply with Tier 2 emission standards, and not the Tier 3 emission standards that would apply beginning in model year 2017.[52]

B. The E10 Test Fuel's Effect on Fuel Economy and Carbon Dioxide

1. The E10 test fuel has a significantly lower energy density than the 1975 test fuel, reducing fuel economy.

Due to changes in the test fuel specifications (primarily lower aromatic hydrocarbons and higher ethanol content), the Tier 3 E10 test fuel's VED is approximately 2.65% lower than the VED of the 1975 test fuel.[53] The following table, developed using the test fuels used in the proposed rule, illustrates the relevant differences in fuel properties between the 1975, Tier 2 (E0), and the Tier 3 (E10) test fuels:

Table 1 - Test Fuel Properties[54]

	1975 Test Fuel	Tier 2 Test Fuel	Tier 3 Test Fuel
NHC (Btu/lb)	18,507	18,446	17,785
S.G.	0.7394	0.7437	0.7490
VED (Btu/gal)	114,089	114,374	111,061
ΔVED		**0.25%**	**-2.65%**

As a result of its lower VED, changing to the Tier 3 test fuel will have a significant effect on fuel economy results. Consequently, if the goal is to ensure fuel economy results that are comparable to 1975, it is important to develop an R factor that accurately reflects how future Tier 3 vehicle fuel economy will tend to respond to the changes in test fuel VED relative to the 1975 fuel.

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on Tier 3/LEVIII fuel in Tier 3/LEVIII technology vehicles will provide the data needed to determine any appropriate test procedure changes. The data available now such as that discussed in Appendix 8 of the Alliance and Global Automakers comments may inform the analysis but are not sufficient to meet the needs of the assessment since it does not focus fully on the fuels and vehicles of interest.").

[52] *Id.*

[53] *See* EPA-HQ-OAR-2016-0604-0028; Proposed Rule, 85 Fed. Reg. at 28,583; *see also* Leone et al., *supra* note 21, at 10,785 ("Increased content of aromatic hydrocarbons or ethanol tend to have opposite effects: aromatics typically yield an increase in volumetric energy content (LHVv = LHVm × ρ; MJ/L) and carbon intensity or energy-based carbon content (Ce = Cm/LHVm; kg C/MJ), while ethanol tends to result in a decrease in these properties.").

[54] *See* Exhibit A.

2. The E10 test fuel has a significantly lower carbon-intensity than the gasoline test fuel, reducing carbon dioxide emissions.

Vehicles tested using the Tier 3 E10 test fuel will have significantly lower CO_2 emissions than vehicles tested with Tier 2 gasoline test fuel, primarily because the Tier 3 E10 test fuel has a significantly lower carbon intensity (approximately 1.33% less carbon per unit of energy).[55]

IV. THE SAFE RULE

DOT and EPA adjusted the fuel economy and greenhouse gas standards in April 2020 as part of the Safer Affordable Fuel-Efficient (SAFE) Vehicles final rule.[56] EPA could have used the rulemaking as an opportunity to consider the effect of the E10 test fuel on the stringency of the standards, as automobile manufacturers urged during the comment period.[57] As the Auto Alliance argued, "considerations that could affect stringency should not be considered as separate issues but should be handled together as a comprehensive evaluation.[58] But EPA did not consider the effect of the E10 test fuel in the final rule.

V. THE PROPOSED RULE

A. The Tier 3 Certification Fuel Impacts Test Program

Instead of using Tier-3-vehicle certification data to determine the new R factor, in 2018, EPA finalized a report for a test program it conducted to determine the change in fuel economy and CO_2 emissions attributable to the transition from Tier 2 E0 to Tier 3 E10 test fuel (the "Tier 3 Test Program").[59]

For the Test Program, EPA borrowed eleven (primarily Tier-2 certified) vehicles from other test programs, which EPA asserted "represent a variety of technologies likely to be used . . . in the future."[60] The tested vehicles ranged in model year from 2013 to 2016 and included seven passenger cars, three light-duty trucks, and one heavy-duty Class 2b truck (the Chevrolet Silverado 2500).[61] EPA conducted emissions testing on each vehicle over the

[55] *See* Tier 3 Certification Fuel Impacts Test Program, EPA-420-R-18-004, 5, Table 3.1 (Jan. 2018) (Tier 3 Test Fuel Program).

[56] *The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks*, 85 Fed. Reg. 24,174 (Apr. 30, 2020) (SAFE Rule).

[57] Auto Alliance Comments, NHTSA-2018-0067-12073, at 40–41 (Oct. 26, 2018).

[58] *Id.*

[59] *See generally* Tier 3 Test Fuel Program, *supra* note 55.

[60] *Id.* at 5. All except one test vehicle (the 2016 Honda Civic) were certified to Tier 2 instead of Tier 3 standards.

[61] *Id*. at 6-7.

Federal Test Procedure (FTP) and Highway Fuel Economy (HFET) drive cycles, using both Tier 2 E0 and Tier 3 E10 test fuels.[62]

Based on the Test Program results, EPA calculated the change in emissions and fuel economies for each vehicle for each drive cycle when using the Tier 2 and Tier 3 fuels. EPA then used these calculations to determine the adjustment factors included in the test procedures of the proposed rule.

B. The Proposed Fuel Economy Equation

In the proposed rule, EPA revises the fuel economy equation in several respects. First, EPA proposes to update the denominator of the carbon balance equation by replacing the measurement of total hydrocarbon emissions with a measurement of the non-methane organic gases (NMOG) and a weighted methane emission term.[63] Second, the agency proposes to update the test methods used to determine several quantities required for the calculation.[64] EPA expects these changes to have only a small effect on the calculated fuel economy.[65] Finally, and most significantly, EPA proposes to replace the R factor with a new "R_a factor."[66] The new R_a factor is intended to account for the change in fuel economy that results from changing the test fuel (as the existing R factor does), as well as any changes that result from the proposed adjustments to test methods and carbon-balance determinations.[67] The proposed fuel economy equation is:[68]

$$FE_{CAFE} = CB \times AF \qquad \text{Eq. (5)}$$

where the blue portion, *CB*, is the new carbon-balance fuel economy:

$$CB = \frac{CMF_{t.fuel} \times SG_{t.fuel} \times \rho_{H2O}}{(CMF_{exh} \times NMOG + 0.749 \times CH_4 + 0.429 \times CO + 0.273 \times CO_2)} \qquad \text{Eq. (6)}$$

And the red portion, *AF*, is the new test-fuel-specific adjustment factor:

$$AF = \frac{SG_{b.fuel} \times NHC_{b.fuel}}{\left(R_a \times SG_{t.fuel} \times NHC_{t.fuel} + \left(SG_{b.fuel} \times NHC_{b.fuel} \times (1-R_a)\right)\right)} \qquad \text{Eq. (7)}$$

[62] *Id.* at 7.

[63] Proposed Rule, 85 Fed. Reg. at 28,575.

[64] *Id.*

[65] *Id.*

[66] *Id.*

[67] *Id.*

[68] *Id.*

The adjustment factor *AF* includes the new R_a factor introduced by EPA. Based on its analysis of the results of the Tier 3 Test Program, EPA proposes an R_a value of 0.81.[69] EPA's proposed value is significantly lower than the R factor that has been repeatedly found in other EPA and DOE studies.[70]

C. The Proposed CO_2 Emissions Adjustment

In the proposed rule, EPA also proposes, for the first time, to apply an adjustment factor to the measured CO_2 emissions. Based on results from the Tier 3 Test Program showing that vehicles emitted, on average, 1.66% less CO_2 when tested using Tier 3 fuel than when using Tier 2 fuel, EPA proposes to multiply CO_2 emissions produced by the Tier 3 test fuel by a factor of 1.0166 "to produce the expected CO_2 performance had the vehicle been tested over the same test cycles while operating on Tier 2 fuel."[71]

D. The Proposed Timeline for Implementation

To avoid disruptions in vehicle testing, EPA proposes a delayed, phased implementation of the Tier 3 test fuel.[72] Specifically, EPA proposes that the use of the Tier 3 test fuel be optional for model year 2021 and 2022 vehicles, required for new testing on model year 2023 and 2024 vehicles except in vehicle models that remain "essentially unchanged," and required for all model year 2025 vehicles.[73]

This phase-in schedule was developed based on EPA's assumption that it would be "issuing a final rule . . . for this proposal later in 2019."[74] Remarkably, EPA failed to update the proposed phase-in schedule even though a final rule is now unlikely to be published until at least late in 2020. Automobile manufacturers will begin selling model year 2022 vehicles as early as January 2, 2021.[75] The automobile industry would thus have only a single year of lead time before the E10 test fuel is required, much shorter than the phase-in period EPA had planned when drafting the proposal.

ARGUMENT

I. THE PROPOSED CO_2 ADJUSTMENT FACTOR VIOLATES THE CLEAN AIR ACT.

In the proposed rule, EPA, for the first time ever, proposes applying an adjustment factor to measured vehicular CO_2 emissions for the purpose of adjusting CAA emission standards

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69 *Id*. at 28,575.

70 *See* Sluder, *supra* note 33, at 11 (analyzing results from three previous EPA studies of ethanol blend fuels on vehicle performance and determining average R factors ranging from 0.891 to 0.949).

71 Proposed Rule, 85 Fed. Reg. at 28,573.

72 *Id*. at 28,577.

73 *Id*.

74 *Id*.

75 *See* 40 C.F.R. § 85.2304 (defining the "annual production period").

to a new test fuel. EPA's proposed CO_2 adjustment factor of 1.0166 artificially inflates the CO_2 emissions of vehicles certified on Tier 3 test fuels by making their CO_2 emissions appear 1.66% higher than they are. By misusing its limited authority to promulgate *accurate test procedures* to instead adjust the *stringency of the CO_2 standards*, EPA violates the CAA and evades statutorily prescribed requirements for changing emissions standards.

A. The Clean Air Act Does Not Allow EPA to Adjust Test Procedures to Artificially Distort CO_2 Emissions from Vehicles Using Tier 3 Test Fuel.

While EPA has discretion under the CAA to define and execute appropriate emissions test procedures, EPA's proposed CO_2 adjustment, which artificially distorts the CO_2 emissions measured on vehicles certified using Tier 3 test fuel, exceeds that discretion.

Title II of the CAA directs EPA to "prescribe (and from time to time revise) . . . standards applicable to the emission[s] . . . from any class or classes of new motor vehicles," including CO_2 emissions.[76] To establish compliance with the prescribed emission standards, EPA is authorized to test, or require manufacturers to test, vehicles "in such manner as [the agency] deems appropriate."[77] EPA can further revise those tests "[f]rom time to time . . . as deem[ed] appropriate."[78]

EPA's authority to adjust emissions test procedures under Title II is not, however, unbounded. Congress unequivocally indicated its desire that test procedures reflect actual vehicle emissions, directing EPA to "review and revise" test procedures "to insure that vehicles are tested under circumstances which *reflect the actual current driving conditions under which motor vehicles are used*, *including conditions relating to fuel*, temperature, acceleration, and altitude."[79]

Moreover, the CAA limits EPA to defining test procedures that are "*appropriate* . . . to determine whether [a vehicle] conforms with" the emissions standards set under CAA § 202(a).[80] While the term "appropriate" may "leave[] agencies with [some] flexibility," the term still must be "[r]ead naturally in the [] context" of the statute.[81] The most natural understanding of the term "appropriate" in the context of CAA § 206 is that test procedures

[76] CAA § 202(a)(1), 42 U.S.C. §7521(a)(1); *Massachusetts*, 549 U.S. at 528.

[77] CAA §§ 206(a)(1), a(3)(B), 42 U.S.C. §§ 7525(a)(1), (a)(3)(B).

[78] CAA § 206(a)(4)(B), 42 U.S.C. §7525(a)(4)(B).

[79] CAA § 206(h), 42 U.S.C. § 7525(h) (emphasis added); *see also Energy Future Coalition v. EPA*, 793 F.3d 141, 147 (D.C. Cir. 2015) ("[T]he Clean Air Act provides that EPA's test fuel regulations must 'reflect the actual current driving conditions under which motor vehicles are used, including conditions relating to fuel.'").

[80] CAA § 206(a)(1), 42 U.S.C. § 7525(a)(1) (emphasis added).

[81] *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015); *see also City of Boerne v. Flores*, 521 U.S. 507, 517 (1997) (legislation is "appropriate" if it is "adapted to carry out the objects the amendments have in view") (quoting *Ex Parte Virginia*, 100 U.S. 339, 345–46 (1879)).

should reflect accurate, *actual*, real-world vehicle emissions. It is not appropriate to *distort* measured emissions simply to maintain stringency.

Indeed, EPA itself has historically interpreted its authority to set test procedures as requiring test procedures that reflect actual, not scaled, tailpipe CO_2 emissions. For each test fuel that EPA currently allows in certification—gasoline, diesel, methanol, natural gas, ethanol, liquified petroleum gas, and related fuel blends—EPA's procedures for determining CREE reflect the actual—not "adjusted"—vehicle CO_2 emissions.[82] EPA's proposed CO_2 adjustment, which artificially inflates CO_2 emissions of vehicles certified with the Tier 3 test fuel by 1.66%, would be unprecedented. It would single out the Tier 3 E10 test fuel and perversely penalize it alone for its lower carbon output.

Under the CAA, changes in vehicle emissions due to changes in test fuels are properly addressed by adjusting emission standards, not by changing test procedures. This is, in fact, what EPA has proposed to do in a recent notice of proposed rulemaking for heavy-duty engines and other engines.[83] In that notice, EPA proposes allowing certification of certain marine engines, nonroad engines, recreational vehicles, and motorcycles using the E10 test fuel instead of E0.[84] Recognizing that the change to E10 could have "significant effects on the HC, NO_x, and CO emissions," EPA states that it "would generally expect to adopt adjusted standards . . . [to] maintain[] equivalent stringency."[85] There is no compelling reason why EPA should depart from this approach of adjusting standards, not test procedures, in addressing any changes to CO_2 emissions of light-duty vehicles due to the use of the Tier 3 test fuel.

EPA's contrary argument here is unpersuasive. In the preamble to the proposed rule, EPA claims, without support, "that for testing for CO_2 emissions compliance under the Clean Air Act, the statute allows, but does not require [CO_2 emissions] adjustments back to 1975 test procedures, including for changes in test fuel properties."[86] The relevant Title II provisions, however, make no reference to scaling vehicle emissions test procedures to align with decades-old test procedures.[87] Indeed, as CO_2 emissions were first regulated in model year 2012,[88] EPA's theory is a pure anachronism: there are no 1975 CO_2 test procedures EPA could adjust to.

EPA nevertheless claims that the CO_2 adjustment is necessary "to produce the expected CO_2 performance had the vehicle been tested over the same test cycles while operating on

[82] *See* 40 C.F.R. § 600.113-12(h)–(m).

[83] *Improvements for Heavy-Duty Engine and Vehicle Test Procedures, and Other Technical Amendments*, 85 Fed. Reg. 28,140, 28,153–54 (May 12, 2020) (Heavy-Duty Engine Rule).

[84] *Id*. at 28,154.

[85] *Id*.

[86] Proposed Rule, 85 Fed. Reg. at 28,567.

[87] *See* CAA §§ 202 to 219, 42 U.S.C. §§ 7521 to 7554.

[88] 40 C.F.R. § 86.1818-12(c).

Tier 2 fuel."[89] However, unlike the EPCA, which expressly states that compliance with fuel economy standards is tied to the 1975 test fuel,[90] Title II nowhere suggests that the greenhouse gas vehicle emissions used for compliance purposes are tied to a particular (i.e., Tier 2) baseline.[91] Instead, the most natural reading of the CAA's requirement that "emission[s] . . . from any . . . new motor vehicles or new motor vehicle engines" must meet prescribed standards[92] is that *actual* measured tailpipe emissions—not some scaled version of them—must meet the imposed standards.

Had Congress intended EPA to develop test procedures that scale emissions tailpipe measurements in order to align with some predetermined model year baseline, it could have said so—as it did in the EPCA.[93] The absence of any such language in the CAA suggests that Congress meant exactly what it said: that emissions test procedures should "reflect the *actual* current driving conditions under which motor vehicles are used, including conditions relating to fuel,"[94] meaning the actual CO_2 emissions generated by tested vehicles using a particular test fuel that is representative of market fuel.

Furthermore, the proposed adjustment is based on a fundamental misconception of EPA's statutory role under § 202(a) of the CAA. EPA asserts that its CO_2 adjustment is "predicated on a view of [greenhouse gas] . . . stringency as relating to vehicle efficiency rather than tailpipe emissions in a market representative fuel mix."[95] But unlike with CAFE, the purpose of CO_2 regulation is not improving vehicle "efficiency," but protecting the health and welfare of the people of the United States.[96] As the Supreme Court observed in *Massachusetts v. EPA*, "EPA has been charged with protecting the public's 'health' and 'welfare,' a statutory obligation wholly independent of DOT's mandate to promote energy efficiency."[97] Yet the proposed CO_2 adjustment is unlawfully predicated on the notion that § 202(a) is an energy-efficiency mandate no different from DOT's obligation to increase fuel economy, in contravention of the Supreme Court's interpretation of the Act.

Finally, EPA's interpretation of the scope of § 206 has no principled limitation. If EPA may conjure up fake carbon molecules to the emissions of E10 simply to "maintain stringency," EPA would also be able to make measured carbon molecules disappear if

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[89] Proposed Rule, 85 Fed. Reg. at 28,573.

[90] 49 U.S.C. § 32904(c).

[91] *See* CAA §§ 202 to 219, 42 U.S.C. §§ 7521 to 7554.

[92] *See* CAA § 202(a)(1), 42 U.S.C. § 7521(a)(1).

[93] 49 U.S.C. § 32904(c).

[94] CAA § 206(h), 42 U.S.C. § 7525(h) (emphasis added).

[95] Proposed Rule, 85 Fed. Reg. at 28,566; *id.* at 28,570 (claiming the proposed CO_2 adjustment is "necessary to realign test results to maintain efficiency controls at the vehicle manufacturer level.").

[96] CAA § 202(a)(1), 42 U.S.C. § 7521(a)(1).

[97] *Massachusetts*, 549 U.S. at 532 (citation omitted).

regulatory changes or other factual circumstances make the standards more difficult to achieve than initially planned. This kind of hocus-pocus has no basis in the statute.

EPA has no discretion to bias the test procedures against a test fuel to adjust the stringency of the CO_2 standards. It should abandon its novel and flawed view of the CAA and adopt test procedures that measure real tailpipe CO_2 emissions.

B. The Proposed CO_2 Adjustment Evades Statutory Requirements for Changing Emissions Standards.

The proposed rule evades EPA's statutorily prescribed obligations by changing the CO_2 emissions standard without considering the economic costs of compliance, as required by CAA § 202(a).[98] While EPA cannot artificially distort tailpipe emissions through its test procedures to maintain some extratextual efficiency baseline, § 202(a) of the CAA does give EPA the authority to directly revise emissions standards "from time to time."[99] Indeed, as noted above, changing emissions standards is the way EPA has traditionally addressed changes in test fuels, vehicle technologies, and consumer behavior.[100] Section 202(a) requires, however, that any changes to emissions standards can only take effect "after such period as [EPA] finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."[101] This provision requires EPA to consider, and thus justify, the economic costs of compliance when implementing new vehicle emissions standards or increasing stringency.[102] As the Supreme Court has noted, "[n]o regulation is 'appropriate' if it does significantly more harm than good."[103]

The proposed rule changes the CO_2 emissions standards for Tier 3 vehicles tested on E10. It does so by artificially inflating CO_2 emissions for vehicles certified using the Tier 3 E10 test fuel. Vehicles certified on the Tier 3 E10 test fuel will have to meet a CO_2 emissions standard

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[98] *See* CAA § 202(a)(2), 42 U.S.C. § 7521(a)(2).

[99] CAA § 202(a), 42 U.S.C. § 7521(a).

[100] *See, e.g.,* Heavy-Duty Engine Rule, 85 Fed. Reg. at 28,154; *see also* Tier 3 Final Rule, 79 Fed. Reg. at 23,449 (noting that EPA "adopt[ed] more stringent standards [for] non-methane organic gases (NMOG), NO_x, and PM and evaporative hydrocarbon emissions" based on the recent development of "a wide range of improved technologies capable of reducing [these] emissions"); SAFE Rule NPRM, 83 Fed. Reg. at 42,991 (observing that the proposed CO_2 and fuel economy standard changes were motivated, in part, because "previous assumptions about how much fuel can be saved or how much emissions can be reduced by employing various technologies may not have played out as prior analyses suggested," specifically citing lower-than-expected adoption rates of particular vehicle technologies).

[101] CAA § 202(a)(2), 42 U.S.C. § 7521(a)(2).

[102] *See Motor & Equipment Mfrs. Assoc. v. EPA*, 627 F.2d 1095, 1118 (D.C. Cir. 1979) (*MEMA*) (observing that section 202(a)'s "cost of compliance" provision "requires that emission regulations be technologically feasible within economic parameters"); *see also* SAFE Rule, 85 Fed. Reg. at 25,105 (noting that, when promulgating standards under CAA section 202(a), "EPA must consider costs to those entities which are directly subject to the standards") (citing *MEMA*, 627 F.2d at 1118).

[103] *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015).

that is effectively 1.63% more stringent than the current standard for vehicles certified on the Tier 2 E0 test fuel.[104] This represents a significant change. Under the SAFE Rule, CO_2 emissions standards increase in stringency at a rate of approximately 1.5% per year.[105] EPA's proposed adjustment factor effectively advances CO_2 emissions standards by over a year for vehicles certified using Tier 3 test fuel.

But instead of using its standard-setting authority under § 202(a), EPA attempts to institute that change by manipulating the test procedures. This error is not harmless: it evades EPA's requirement to examine and justify the economic costs of compliance, circumventing the requirements of § 202(a). If EPA wishes to adjust stringency to maintain "vehicle efficiencies" in CO_2 emissions, it must do so through the comprehensive and transparent evaluation required by CAA § 202(a), not through a backdoor test procedure adjustment that will distort emission results.

Historically, EPA has considered all the relevant factors before adjusting the stringency of the standards. EPA's past changes to emissions standards have included extensive analyses of the economic impact of the proposed changes. EPA most recently adjusted the CO_2 emissions standards in April 2020 as part of the SAFE Rule.[106] The preamble for that rule included detailed modeling justifying its proposed CO_2 emissions standard change, as well as detailed joint EPA-NHTSA regulatory impact analyses considering all of the relevant costs and benefits.[107]

The proposed rule deviates from this pattern. In contrast to the SAFE Rule or prior standards, EPA's preamble here contains only cursory statements that the proposed rule "should not result in . . . any significant changes in the projected incremental technology costs of the standards to manufacturers,"[108] and that the rule "is expected to result in no more than de minimis costs."[109] These cursory statements are inadequate. They are also only true if the adjustments effect no change in the standards, which, as demonstrated below, is not the case, given the significant shortcomings of the Tier 3 Test Program.[110]

The preamble includes no substantive discussion of the costs of the effective change in standards.[111] As a result, EPA's perfunctory discussion of the proposed rule's costs falls far short of its statutory and legal obligation to consider all of the relevant factors and at least pay

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[104] Inflating the measured CO_2 emissions by 1.66% results in an effective lowering in the CO_2 standard of 1.63%. *See* Exhibit C.

[105] SAFE Rule, 85 Fed. Reg. at 24,175; 40 CFR § 86.1818-12.

[106] SAFE Rule, 85 Fed. Reg. at 25,268.

[107] *See generally id*.

[108] Proposed Rule, 85 Fed. Reg. at 28,579.

[109] *Id.* at 28,580; *see also id.* at 28,578.

[110] *See infra* Section V.

[111] *See* Proposed Rule, 85 Fed. Reg. 28,564.

"some attention to cost" when adjusting CO_2 emissions standards under the CAA to take into account regulatory changes.[112]

II. THE PROPOSED CO_2 ADJUSTMENT IS AN ARBITRARY AND CAPRICIOUS DEPARTURE FROM THE AGENCY'S POLICY OF FUEL NEUTRALITY.

EPA's proposed CO_2 adjustment is also an arbitrary and capricious departure from the Agency's policy of fuel neutrality. When it departs from precedent, an "agency must at least 'display awareness that it is changing position' and 'show that there are good reasons for the new policy.' "[113]

By singling out the Tier 3 E10 test fuel for a CO_2 penalty, EPA departs from its historic approach of applying emissions standards and related test procedures in a way that is "fuel neutral," so that "vehicles certified to operate on any fuel (e.g., gasoline, diesel fuel, ethanol blends, compressed natural gas, liquefied natural gas, hydrogen, and methanol) are all subject to the same standards."[114] In doing so, it eliminates the natural advantage of low-carbon test fuels in the certification process and discourages the development and future adoption of cleaner, lower-carbon fuels and technologies, cutting-off a promising pathway for achieving lower emissions and lower cost vehicles.

EPA's proposed rule effectively places a thumb-on-the-scale in favor of electrification and against clean, low-carbon fuels, ultimately harming both the environment and the consumer. Moreover, by discouraging adoption of low-carbon fuels like high-octane mid-level ethanol blends as an option to reduce CO_2 emissions, EPA's approach only endangers the public health and welfare, contrary to EPA's statutory duty.[115] To advance its mandate, EPA should be encouraging *all* fuel and vehicle low-carbon solutions, not picking winners and losers by erecting barriers to particular fuels.

And yet, EPA fails to even acknowledge its departure from the principle of fuel neutrality. That is arbitrary and capricious.

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[112] *Michigan*, 135 S. Ct. at 2707.

[113] *Encino Motorcars, LLC v. Navarro*, 136 S. Ct. 2117, 2126 (2016) (quoting *FCC v. Fox Television Stations*, Inc., 556 U.S. 502, 515 (2009)).

[114] Cong. Research Serv., Tier 3 Motor Vehicle Emission and Fuel Standards 4 (Apr. 28, 2014); *see also* Tier 3 Rule, 79 Fed. Reg. at 23,558 ("Consistent with the Tier 2 principle of vehicle and fuel neutrality, the same Tier 3 standards apply to all LDVs, LDTs, or MDPVs, regardless of the fuel they use, as proposed. That is, vehicles certified to operate on any fuel (e.g., gasoline, diesel fuel, E85, CNG, LNG, hydrogen, and methanol) are all subject to the same standards.").

[115] *See* CAA § 202(a)(1), 42 U.S.C. § 7521(a)(1).

III. THE PROPOSED CO_2 ADJUSTMENT IS UNNECESSARY GIVEN THE LEAD TIME PROVIDED BY EPA.

Under EPA's current phase-in schedule, the E10 test fuel will not be required for all vehicles until model year 2025.[116] Because the phase-in schedule is based on the erroneous assumption that EPA would be "issuing a final rule . . . for this proposal later in 2019," the phase-in of the E10 test fuel should be extended by at least an additional model year, if not more.[117] In the final rule, consistent with the original intent of the phase-in schedule, the E10 test fuel should not be required until at least model year 2026, the very last year covered by the SAFE Rule.

This phase-in schedule for the E10 test fuel belies EPA's professed need to adjust test procedures in order to maintain the stringency of the SAFE Rule. If the E10 test fuel will only be required for the very final years of the SAFE Rule, then there is no need for any adjustment whatsoever. EPA could simply delay the use of the E10 test fuel for an additional year or two until it has an opportunity to set new greenhouse gas standards, as it will likely do again long before model year 2026. At that time EPA could consider the use of the E10 test fuel as part of the ordinary standard-setting process, as the CAA requires.

Even if it wanted to transition to CO_2 certification with the E10 test fuel long before model year 2026, EPA has sufficient lead time to properly revise the CO_2 emissions standards using its authority under CAA § 202(a).[118] If EPA believes that existing CO_2 emissions standards are too lenient as a result of the new Tier 3 E10 test fuels, the agency should change the CO_2 emissions standards while maintaining fuel neutral test procedures.[119]

IV. THE PROPOSED CO_2 ADJUSTMENT MAY BE WITHDRAWN WITHOUT A SUPPLEMENTAL NOTICE OF PROPOSED RULEMAKING.

Because elimination of the CO_2 adjustment is a logical outgrowth of the proposed rule, EPA can withdraw the adjustment without issuing a Supplemental Notice of Proposed Rulemaking (SNPRM). "[N]otice and comment requirements are met when an agency issues rules that do not exactly coincide with the proposed rule so long as the final rule is the 'logical outgrowth' of the proposed rule."[120] A final rule is "the logical outgrowth of a proposed rule if a new round of notice and comment would not provide commenters with 'their first occasion to offer new and different criticisms which the agency might find convincing.' "[121]

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[116] Proposed Rule, 85 Fed. Reg. at 28,577.

[117] *Id.*

[118] CAA § 202(a), 42 U.S.C. § 7521(a).

[119] *Id.*

[120] *Association of Battery Recyclers, Inc. v. EPA*, 208 F.3d 1047, 1058–59 (D.C. Cir. 2000) (citation and quotation marks omitted).

[121] *Id.* at 1059 (quoting *Fertilizer Inst. v. EPA*, 935 F.2d 1303, 1311 (D.C. Cir. 1991)).

In the preamble to the proposed rule, EPA expressly "requests comment on whether the Agency should consider a regulatory approach where [it] require[s] the use of Tier 3 gasoline certification fuel without any test procedure adjustment for CO_2."[122] Withdrawal of the CO_2 adjustment is clearly a contemplated option, and parties are unambiguously invited to comment on that alternative approach. A SNPRM would not provide any new opportunity for different or unexplored criticisms beyond that which exists in the present round of comment, so it is unwarranted.

V. THE PROPOSED R_A FACTOR EXCEEDS EPA'S AUTHORITY TO ADJUST FUEL ECONOMY TEST PROCEDURES.

Under the existing statutory framework, Congress granted exclusive authority to DOT to "prescribe by regulation average fuel economy standards for automobiles."[123] EPA has no authority to change the stringency of standards set by DOT. Rather, EPA is limited to prescribing fuel economy test procedures that give "comparable results" to the procedures used for model year 1975.[124]

There is ample evidence that EPA's proposed R_a factor of 0.81 is too low and that an accurate R_a factor is closer to 1.[125] Imposing an R_a factor that is too low yields adjusted Tier 3 fuel economy results that are too low compared to the results that would be generated under 1975 vehicle test procedures, violating the comparability requirement.

Moreover, EPA's improperly low proposed R_a factor makes the fuel economy standards harder to meet, effectively raising their stringency and exceeding EPA's limited authority to adjust fuel economy test procedures. [126]

A simple example illustrates this increase in stringency: if the accurate R_a factor is 1—a value that is close to values suggested by previous studies[127]—EPA's proposed R_a of 0.81 results in an adjusted Tier 3 fuel economy that is 0.52% lower than the accurate adjusted fuel economy, effectively increasing the standard that a vehicle certified with a Tier 3 test fuel must meet by the same amount.[128]

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[122] Proposed Rule, 85 Fed. Reg. at 28,566.

[123] 49 U.S.C. § 32902(a).

[124] *See* 49 U.S.C. § 32904(c).

[125] *See, e.g.,* Sluder, *supra* note 33, at 11; *see also infra* Section V.

[126] The effect of an inaccurate R_a factor on adjusted Tier 3 fuel economy is apparent from the Adjustment Factor (AF) portion (Eq. (7)) of the EPA's proposed fuel economy equation. For the Tier 3 test fuel, which has a NHC less than that of the 1975 base fuel, lowering R_a beyond the accurate value lowers the resultant AF, which then lowers the calculated adjusted fuel economy. Increasing R_a above the accurate value has the reverse effect.

[127] *See, e.g.,* Sluder, *supra* note 33, at 11.

[128] *See* Exhibit B.

This increase in stringency will also be expensive. Given the difficulty of improving fuel economy, this 0.52% increase in stringency is significant. Current fuel economy standards set by DOT require an annual increase in fleet average fuel economy of approximately 1.5%.[129] The additional increase imposed by EPA's inaccurate R_a factor amounts to a one-time stringency increase of over 0.5%, in addition to the annual 1.5% increase. This change will likely impose significant additional costs on automobile manufacturers and new motor vehicle purchasers.[130]

DOT has not analyzed the effect of this increase in stringency. DOT last adjusted the fuel economy standards in April 2020 as part of the SAFE final rule.[131] The standards were changed only after an extensive cost-benefit analysis, consideration of multiple alternatives, and opportunity for public comment.[132] EPA undertakes no such cost-benefit analysis or consideration of alternatives in its notice of proposed rulemaking,[133] and regardless, EPA has no authority to make any such change. Only DOT has legal authority to promulgate regulations that increase the stringency of fuel economy standards.

EPA's authority in this instance is limited to promulgating an R_a factor that gives "comparable results" to the test procedures used for model year 1975.[134] Because EPA's proposed R_a factor of 0.81 is erroneous, the proposed rule changes fuel economy standards, just as the SAFE rule did, and thus it exceeds EPA's statutory authority to adjust test procedures.

VI. THE PROPOSED RULE IS ARBITRARY AND CAPRICIOUS BECAUSE IT IS BASED ON A FLAWED TEST PROGRAM.

EPA's proposed rule is based exclusively on its analysis of the test results of the Tier 3 Test Program. But both the underlying Test Program as well as EPA's analysis of the Test Program's results are defective. EPA's determined adjustment factors are thus arbitrary and capricious, and subject to judicial reversal.[135]

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[129] SAFE Rule, *supra* note 56, 85 Fed. Reg. at 24,188.

[130] *See id.* at 24,201, Table II-20 (cataloging the costs of alternative annual percentage increases in CAFE stringency).

[131] *Id.*at 25,272–74.

[132] The notice of proposed rulemaking for the SAFE Rule was published on Aug. 24, 2018, and consisted of 515 pages in the Federal Register. 83 Fed. Reg. 42,986 (Aug. 24, 2018). (SAFE Rule NPRM). After receiving more than 750,000 comments, 85 Fed. Reg. at 24,181, and holding three public hearings, https://www.regulations.gov/document?D=EPA-HQ-OAR-2018-0283-0757, the SAFE Rule was finalized on April 20, 2020. 85 Fed. Reg. 24,174. The publication of the final rule ran 1105 pages, which included an extensive cost-benefit analysis and discussion of considered alternatives. *Id.*

[133] *See* Proposed Rule, 85 Fed. Reg. 28,564.

[134] *See* 49 U.S.C. § 32904(c).

[135] *See* 5 U.S.C. § 706(2)(A). For the same reason, the fuel economy adjustment violates EPCA's "comparability" requirement. 49 U.S.C. § 32904(c).

The Tier 3 Test Program's design is defective because it did not use representative Tier 3 vehicles, nor did it test enough vehicles. As a result, EPA is unable to determine accurate adjustment factors for the E10-certified Tier 3 light-duty vehicle and truck fleet with enough statistical certainty.

EPA's analysis of the Test Program data was also flawed. Specifically, EPA systematically elected to include unreliable and unrepresentative vehicle data that lowered the determined R_a factor, while unnecessarily excluding vehicle data that would increase the determined R_a factor. The result is that EPA's proposed R_a factor is far lower than the R_a factor would be if the Test Program's data were properly analyzed.[136]

Finally, EPA's conclusions from the Test Program are inconsistent with the results of its own prior studies, casting further doubt on the accuracy and reliability of its proposed adjustment factors.

In short, EPA should not finalize an R_a that will govern fuel economy testing for years or decades to come based on an egregiously faulty Test Program and a faulty data analysis that is contradicted by other available data.

A. The Test Program Did Not Use Representative Tier 3 Vehicles.

Because the Tier 3 Test Program did not include representative Tier 3 Vehicles, by EPA's own standard, the Test Program cannot yield accurate Tier 3 adjustment factors.

In the Tier 3 Final Rule, EPA stated that "emission test data generated by [] early Tier 3/LEVIII vehicles covering both Tier 2 and Tier 3 test fuel will provide data needed to assess the "R" value."[137] Indeed, EPA expressly rejected suggestions that the Tier 3 R factor could be determined based on tests performed on non-Tier 3-certified vehicles (i.e., on Tier 2-certified vehicles), stating that an R factor that is "not based on the results for Tier 3/LEV III technology vehicles tested on Tier 3/LEV III fuels" would not be appropriate for future vehicles.[138]

Of the eleven vehicles in the Tier 3 Test Program, only one was certified to Tier 3 standards. The remainder are certified according to Tier 2 standards. By EPA's own criterion, then, the test vehicles it selected for the Tier 3 Test Program cannot be used to determine the Tier 3 R_a factor because they were not Tier 3 or LEVIII certified.

[136] For the same reasons, the CO_2 adjustment is higher than it would be, if the data were properly analyzed.

[137] Tier 3 Final Rule, 79 Fed. Reg. at 23,532.

[138] *See* Tier 3 Response to Comments, *supra* note 51, at 4-353; *see also id.* 4-352 ("We do not agree with ICCT that a value of 0.96 is appropriate because it is not based on the results for Tier 3/LEV III technology vehicles tested on Tier 3/LEV III fuels.").

Moreover, the eleven test vehicles do not, as EPA desires, "represent how the fleet will look in the future."[139] Vehicle technologies, especially those related to fuel efficiency, advance rapidly. Between 2012 and 2016, for example, efficient Atkinson Cycle engines, previously "limited to [hybrid and plug-in hybrid electric vehicles] . . . have been introduced into non-hybrid applications."[140] In that same time frame, "[a] new generation of [continuously variable transmissions] CVTs has been introduced," which "have significant improvements in the areas of efficiency, integration, and customer acceptance over the previous generation."[141] Indeed, at least three of the eleven test vehicles include engines that are no longer available in the 2020 model lines.[142]

There is no reason to believe that continued improvements in vehicle technology will stall. The oldest vehicles in the Tier 3 Test Program were 2013 models, the newest are 2016 models.[143] EPA's proposed rule thus locks-in dated effects: fuel economies of model year 2023 vehicles, the first for which the rule would be mandatory,[144] would be adjusted based on the performance of decade-old technologies.

EPA asserts that it selected vehicles "to cover a wide range of engine configurations and cylinder displacements, and related technologies," and "focused on specific technologies . . . instead of on specific vehicles [because the] distribution of specific vehicles [that will be part of the fleet] over the 2025 and later time period is . . . difficult to anticipate."[145] But the distribution of EPA's selected technologies in the future fleet is also difficult to anticipate. Without market projections—which EPA does not provide—it is impossible to know whether the Tier 3 Test Program includes enough vehicle technologies to "represent how the fleet will look in the future."[146]

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[139] Proposed Rule, 85 Fed. Reg. at 28,568.

[140] EPA et al., Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhous Gas Emissions Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025, 5-31, EPA-420-D-16-900 (July 2016).

[141] *Id*. at 5-6.

[142] The 2013 Chevrolet Malibu's 2.4L I4 GDI engine, the 2013 Nissan Altima's 2.5L I4 PFI engine, and the 2016 Chevrolet Silverado 2500's 6.0L V8 PFI engine are no longer offered in the 2020 model lines. *See* 2020 Chevrolet Malibu Specifications, https://media.chevrolet.com/media/us/en/chevrolet/vehicles/malibu/2020.tab1.html; 2020 Nissan Altima Specifications, https://www.nissanusa.com/vehicles/cars/altima/specs/compare-specs.html#modelName=S|FWD; 2020 Chevrolet Silverado 2500HD Specifications, https://media.chevrolet.com/media/us/en/chevrolet/vehicles/silveradohd/2020.tab1.html.

[143] Tier 3 Test Fuel Program, *supra* note 55, at 7.

[144] Proposed Rule, 85 Fed. Reg. at 28,577.

[145] *Id*. at 25,568.

[146] *See id*.

In any event, as shown in Table 2, the distribution of technologies of the ten vehicles used to determine R_a are not even representative of model year *2019* vehicles, let alone 2023 and future model year vehicles.

Table 2 – Technologies Underrepresented in Test Program Compared to MY 2019

	CVT	7+Gears	Cylinder Deactivation	StopStart	Hybrid
Tier 3 Test Program[147]	20%	10%	10%	20%	0%
MY 2019[148]	24%	48%	13%	36%	6%

These fuel-efficiency technologies are likely to increase in the future fleet as the standards increase.[149] EPA's test program is thus not representative of future technologies and likely underpredicts R_a in future vehicles.[150]

B. The Test Program Used Too Few Vehicles.

The Tier 3 Test Program also used far too few vehicles to be able to determine an R_a factor with acceptable statistical accuracy. As a result, applying the values derived from the Test Program to the entire light-duty vehicle and truck fleet is scientifically indefensible and thus would be arbitrary and capricious.[151]

The Tier 3 Test Program evaluated only eleven vehicles, and EPA used data from only ten of those vehicles to determine an R_a factor. By contrast, when contemplating a similar test procedure change for California vehicles in 1995, EPA determined that "to reach a conclusion regarding the appropriate R factor for [the new test fuel], EPA would need city and highway

[147] Proposed Rule, 85 Fed. Reg. at 28,570, Table III-2; Tier 3 Test Fuel Program, *supra* note 55, at 8, Table 3.2 (excluding the 2016 Acura ILX, which EPA did not included in its analysis).

[148] EPA, Highlights of the Automotive Trends Report, Highlight 5#, https://www.epa.gov/automotive-trends/highlights-automotive-trends-report#Highlight5.

[149] *See* 2019 EPA Automotive Trends Report 50 ("The use of cylinder deactivation in gasoline vehicles has been steadily climbing, and in model year 2018 gasoline engines with cylinder deactivation were 13% of all vehicles. This trend is expected to continue."); *id.* at 61 ("[M]anufacturers are increasingly adopting transmissions with seven or more speeds and CVTs."); *id.* at 98 ("The implementation of stop/start has been increasing rapidly.").

[150] *See* Sluder, *supra* note 34, at 9 (R values "shift upwards as engine efficiency improves").

[151] *See* 5 U.S.C. § 706(2)(A).

tests . . . *for a minimum of 75 to 100 [ ] vehicles*."[152] EPA's own scientific experts further acknowledge that "[t]he R factor calculation is sensitive to experimental variability; hence large amounts of data are needed to examine R values with reasonable confidence intervals."[153]

EPA's experimental determination of a fleet-wide R_a factor has two primary sources of uncertainty: (1) variability in the measurement of R_a on any individual vehicle and (2) variability in the actual R_a across different vehicles. Reducing uncertainty arising from an individual vehicle (source (1)) requires taking *repeated measurements on the same vehicle*. Reducing uncertainty arising across different vehicles (source (2)) requires taking *measurements on many different vehicles*. If an insufficient number of replicate tests are taken on a given vehicle or an insufficient number of vehicles are tested, the resulting uncertainty in the determined R_a will be unacceptably large, and thus unable to predict an average R_a that will be accurate for the light-duty vehicle fleet.

EPA's Tier 3 Test Program Report presents both prospective and retrospective statistical power analyses showing that the agency performed enough replicate tests on each vehicle to reduce the uncertainty due to variability in individual vehicle measurements (i.e., source (1)) to an acceptable level.[154] EPA does not address, however, in either its Tier 3 Test Program Report or in the preamble, whether it tested a sufficient number of different vehicles to reduce the uncertainty due to the variation in R_a across vehicles (i.e., source (2)) to an acceptable level.[155]

Though EPA failed to present an uncertainty analysis for R_a, an estimate of the uncertainty in the Test Program results can be derived from EPA's data. Because of the small number of vehicles EPA tested and the significant variation in R_a across different vehicles, the resulting uncertainty in the proposed R_a factor is unacceptably large.

The uncertainty in EPA's proposed R_a value can be estimated by first calculating an R_a factor for each of the ten vehicles in EPA's data set, and then applying standard uncertainty analysis techniques to the ten calculated R_a values.[156] Performing this analysis using EPA's reported data and assuming a t-distribution with a 95% confidence interval[157] yields an estimated uncertainty of ±0.39 in EPA's proposed R_a value of 0.81. This uncertainty is

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[152] EPA Guidance Letter CD-95-09, at 3 (June 1, 1995) (EPA, CD-05-09); EPA's NPRM on Vehicle Test Procedure Adjustments for Tier 3 Test, Fuel Presentation Prepared for OMB OIRA Meeting, at 7 (May 28, 2019) (OIRA Meeting).

[153] Sluder, *supra* note 33, at 11.

[154] Tier 3 Test Fuel Program, *supra* note 55, at 14–16, 22–24.

[155] *See id.*; Proposed Rule, 85 Fed. Reg. at 28,564–86.

[156] *See, e.g.,* Richard DeVor et al., Statistical Quality Design and Control 592–600 (1992). A similar method was used by Sluder et al. in evaluating the uncertainty of R factors in previous EPA studies. *See* Sluder, *supra* note 33, at 8–9.

[157] *See* Exhibit D. Use of the t-distribution is appropriate due to the small sample size (i.e., ten vehicles) and the uncertainty in the underlying population variance. *See* DeVor, *supra* note 156, at 594–95.

considerable, as it suggests that EPA can only state, with 95% confidence, that an accurate fleet-wide R_a factor falls somewhere between 0.42 and 1.20.[158]

This level of uncertainty is unacceptably large in the context of fuel economy standards. With this uncertainty range, the adjusted fuel economies calculated using the proposed R_a factor of 0.81 could be expected to deviate from the accurate adjusted fuel economy by more than 1%,[159] a significant difference when the annual fuel economy increase required by the current CAFE standards is 1.5%.[160]

The unacceptably large uncertainty in EPA's proposed R_a conclusively establishes that the Tier 3 Test Program did not test enough vehicles to determine a representative R_a factor with a sufficient level of statistical certainty for the purpose of fuel economy standards. It also corroborates EPA's own previous conclusion that the agency must test nearly *ten times* as many vehicles to determine an R_a factor with satisfactory certainty.[161] Given the uncertainty in EPA's analysis, finalizing the proposed R_a factor of 0.81 and applying it to all light-duty vehicles and trucks would be arbitrary and capricious.[162]

C. EPA's Analysis of Test Program Data Was Flawed.

EPA's analysis of the limited data it had from the Test Program is also flawed. Specifically, EPA systematically includes outlier data and data from unrepresentative vehicles that lowers the determined R_a factor, while needlessly excluding other vehicle data that would increase the R_a factor. As a result, the adjustment factors calculated by EPA are arbitrary and capricious.

1. EPA's analysis included unreliable Malibu 1 results.

EPA's analysis inappropriately includes unreliable, outlier results from a faulty 2013 Chevrolet Malibu ("Malibu 1") test vehicle, which significantly skews EPA's calculations and leads to a proposed R_a factor that is far too low. The unreliability of the Malibu 1 results is evidenced both by EPA's own observations of the vehicle's behavior—recorded in the Tier 3 Test Program Report—and by the Test Program results.

The Tier 3 Test Program Report states that data from initial Malibu 1 highway cycle tests was discarded because it demonstrated an "inconsistent trend as compared to [city cycle] FTP

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[158] Strictly speaking, the uncertainty analysis indicates that, 95% of the time that an average R_a is determined from a set of ten vehicles (selected from the entire population of vehicles), that average R_a will fall between 0.42 and 1.2.

[159] The fuel economy Adjustment Factor (Eq. (7)) for R_z=0.42 is $AF_{0.42}$ 1.0113, for R_a=0.81 is $AF_{0.81}$=1.0220, and for R_a=1.20 is $AF_{1.2}$=1.0329. As a result, the difference between adjusted fuel economies determined using R_a=0.42 and R_a=0.81 is ($AF_{0.81}/AF_{0.42}$-1) = 1.06%, and the difference using R_a=1.20 and R_a=0.81 is ($AF_{0.81}/AF_{1.20}$-1) = -1.06%.

[160] SAFE Rule, 85 Fed. Reg. at 24,188.

[161] *See* EPA, CD-05-09, *supra* note 152, at 3; OIRA Meeting, *supra* note 152, at 7.

[162] *See* 5 U.S.C. § 706(2)(A).

data . . . [and because] [t]hese tests also had some repeatability issues."[163] Later testing on the Malibu 1 was also problematic. The Test Program Report notes that the Malibu 1 vehicle exhibited a "fault code" after being returned from another testing group.[164] Though "[n]ecessary actions were taken to resolve any issues" before subsequent testing, "an accelerator fault code occasionally occur[ed] on the Tier 2 [Malibu 1 highway cycle] HFET tests with a message indicating reduced engine power."[165] EPA retained—and includes in its analysis—the data from these later faulty Malibu 1 tests, however, since, despite the accelerator error, the Malibu 1's "speed trace" data indicated that the vehicle's speeds met the HFET cycle requirements during those tests.[166]

While EPA recorded no speed trace violation on those tests, the Test Program Report does note that the Malibu 1 data was "conspicuous for the [large] size of its standard deviations, particularly on the Tier 2 fuel" tests,[167] which included the very HFET tests on which the accelerator fault code had triggered. Indeed, the Malibu 1 Tier 2 and Tier 3 HFET drive quality metrics show *substantially* larger variance than the drive metrics for any other vehicle.[168] The inconsistency of the test data, the repeated triggering of engine fault codes during testing, and the substantially larger variation in drive quality metrics for HFET drive cycles all indicate that the Test Program's Malibu 1 data is unreliable and should be excluded from subsequent analyses.

The Test Program's results further confirm that the Malibu 1 result is an outlier that significantly skews the R_a value and CO_2 adjustments. One broadly accepted approach for identifying outlier data is the interquartile range test, which can be used to determine upper and lower bounds for "normal" (i.e., non-outlier) data.[169] Generally, data that fall outside of these bounds are considered outliers that should be excluded from subsequent analyses.

Under the interquartile range test, the Malibu 1 result is unambiguously an outlier. The percentage difference between the Malibu 1's Tier 3 and Tier 2 adjusted fuel economies,

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[163] Tier 3 Test Fuel Program, *supra* note 55, at 12.

[164] *Id.* at 12.

[165] *Id.* at 27.

[166] *Id.*

[167] *Id.* at 20.

[168] For example, the average absolute speed change recorded for the Malibu 1 during Tier 2 and Tier 3 testing was 9.82% and 10.12%, respectively. These variations are substantially larger than those recorded for the other ten vehicles: the average speed change of those other ten vehicles was 3.39%, with a maximum speed change of 6.26% for the Altima during Tier 2 testing, substantially less than that recorded for Malibu 1. Tier 3 Test Fuel Program, *supra* note 55, at 28, Table 4.4.2.

[169] Under the interquartile range test, a data point is considered an outlier if it falls more than 1.5 times the interquartile range above the third quartile (the upper bound) or more than 1.5 times the interquartile range below the first quartile (the lower bound). *See, e.g.,* Danial T. Larose & Chantal D. Larose, Discovering Knowledge in Data: An Introduction to Data Mining 35–36 (2nd ed., 2014). Note that the interquartile range test is considered to be more robust than other common outlier tests, such as approaches based on the standard deviation of the sample data. *Id.* at 36.

1.02%, falls well above the upper bound for "normal" percentage change in fuel economies.[170] The same conclusion follows when considering the individual R_a factors that can be calculated for each vehicle: the Malibu 1 R_a factor of 0.44 is well-below the lower bound for "normal" R_a factors determined by the interquartile range method.[171]

Because the Malibu 1's individual R_a factor is so much lower than those of the other vehicles tested, including the Malibu 1 results substantially lowers EPA's calculated R_a factor. If the Malibu 1 results are excluded, EPA's method of selecting an R_a factor that "produces a fleet average fuel economy difference very close to zero between the two test fuels"[172] for the remaining nine vehicles yields an R_a factor of 0.86, significantly higher than EPA's proposed value of 0.81.[173] For the same reason, EPA's failure to exclude the outlier Malibu 1 results also significantly inflates its proposed CO_2 adjustment factor.[174]

Excluding the outlier Malibu 1 results not only increases the determined R_a factor, but also yields an R_a that better aligns the Tier 3 and Tier 2 adjusted fuel economies (i.e., leads to a better "fit"). The effectiveness of a particular R_a factor at aligning Tier 3 and Tier 2 adjusted fuel economies can be evaluated by calculating the root mean square error (RMSE) of the data set. The RMSE is a generally accepted metric for assessing the "goodness of fit" of a model, that is, how well the model (i.e., the Tier 3 adjusted fuel economy equation) predicts the observed values (i.e., the 1975 fuel economies, as estimated by the Tier 2 adjusted fuel economies).[175] The lower the RMSE, the better the model is at predicting (i.e., aligning with) the observed values.

While EPA does not report RMSE, or any other estimate of fit, for its proposed R_a, the RMSE can be calculated from the data included in the preamble. Using EPA's proposed R_a factor of 0.81, determined by including the Malibu 1 data, yields a RMSE of 0.1492.[176] Alternatively, using an R_a factor of 0.86, determined by excluding the Malibu 1 data, yields an RMSE of 0.0940.[177] The significantly lower RMSE associated with the R_a factor of 0.86 indicates that the R_a factor of 0.86 better aligns the Tier 3 and Tier 2 adjusted fuel economies of the tested vehicles.

Even had the Malibu 1 data been reliable, the vehicle's inclusion in the Test Program would still be inappropriate because it is not representative of the vehicles to which the rule

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[170] *See* Exhibit E.

[171] *See id*.

[172] Proposed Rule, 85 Fed. Reg. at 28,575.

[173] *See* Exhibit F.

[174] If the Malibu 1 data is excluded from the analysis, the calculated average difference in CO_2 emissions would be only 1.56%. *See* Exhibit P.

[175] *See, e.g.*, Larose, *supra* note 169, at 279; Daniel Kaplan, Stats for Data Science, Chapter 16.1 (2019), https://dtkaplan.github.io/SDS-book/mean-square-error.html#mean-square-error.

[176] *See* Exhibit G.

[177] *See id*.

will apply. EPA observed in the preamble that, "because it was necessary . . . to estimate test fuel effects into future years, [EPA was] not able to base [its] vehicle selection solely on the vehicle fleet as it currently exists. In other words, it was critical that the agency select vehicles equipped with technologies that represent how the fleet will look in the future (rather than how the fleet looks today)."[178] As a 2013 model, the Malibu 1 is one of the oldest vehicles in the Test Program.[179] Beyond the now-common gasoline direct injection, which is also present in seven other test vehicles, the Malibu 1 does not include any of the technologies EPA cited as being "likely to be used to meet the [greenhouse gas] emission and fuel economy standards in the future."[180] And its 2.4L engine is no longer even available in the 2020 Malibu model line.[181] The 2013 Malibu 1 is thus unlikely to "represent how the fleet will look in the future,"[182] and is particularly unlikely to be representative of the model year 2023 and later vehicles for which the rule is mandated.[183] The Malibu 1 should not have been included as one of the Tier 3 Test Program test vehicles in the first place.

2. EPA's analysis arbitrarily excluded Acura results.

While EPA inappropriately included the unreliable, outlier results from the unrepresentative Malibu 1 test vehicle, it arbitrarily excluded from its analysis results from the 2016 Acura ILX (the "Acura") test vehicle simply because they were "unexpected."[184] By excluding the Acura results, EPA's determined R_a factor was lower than it would have been had it included all Test Program vehicles in its analysis.

EPA's rationale for excluding the Acura results from its analysis is unpersuasive. EPA states that "[t]he Acura showed a noticeably larger fuel economy difference than other vehicles on the highway cycle (HFET)" and "an unexpected level of fuel economy sensitivity to the test fuel's octane rating."[185] This octane-dependence was unexpected "[b]ecause the vehicle is not labeled by the manufacturer as requiring premium fuel."[186]

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[178] Proposed Rule, 85 Fed. Reg. at 28,568.

[179] *See* Tier 3 Test Fuel Program, *supra* note 55, at 7, Table 3.2.

[180] *See id.* at 5-7, Table 3.2.

[181] The 2013 Chevrolet Malibu's 2.4L DOHC I-4 VVC DI engine is no longer offered in the 2020 Chevrolet Malibu line. *See* 2013 Chevrolet Malibu Specifications, https://media.chevrolet.com/media/us/en/chevrolet/vehicles/malibu/2013.tab1.html; 2020 Chevrolet Malibu Specifications, https://media.chevrolet.com/media/us/en/chevrolet/vehicles/malibu/2020.tab1.html.

[182] *See* Proposed Rule, 85 Fed. Reg. at 28,568.

[183] Under the Proposed Rule, manufacturers have the option of using the Tier 3 test fuel (and the proposed adjustment factors) for testing of model years 2021 and 2022 vehicles and would be required to use the Tier 3 test fuel for testing of new 2023 and 2024 vehicles. Proposed Rule, 85 Fed. Reg. at 28,577.

[184] Proposed Rule, 85 Fed. Reg. at 28,572.

[185] *Id.*

[186] *Id.*

Excluding data simply because that data is "unexpected" runs contrary to sound scientific principles. There are likely many vehicles that are not "premium required" and yet exhibit some sensitivity to the higher octane of the Tier 2 test fuel. Throwing these results out thus makes the study less representative and further biases the results against the lower octane Tier 3 test fuel.

It also makes the Tier 3 Test Program less representative of future vehicles. Indeed, as a 2016 vehicle, the Acura is one of the newest vehicles in the Tier 3 Test Program.[187] It is also the only test vehicle to include a dual clutch transmission, a key technology for improving engine efficiency that is expected to proliferate in the coming years.[188] The Acura is thus more likely to be representative of the Tier 3 vehicles to which the proposed R_a factor would apply than many of the other vehicles in the Tier 3 Test Program; accordingly, the Acura's results should be included in any Test Program analysis.

If the Acura is included in the analysis with the other ten test vehicles, EPA's method[189] yields an R_a factor of 0.85,[190] significantly higher than EPA's proposed value of 0.81. Indeed, if the unreliable, unrepresentative 2013 Malibu 1 results are excluded, analysis of the remaining ten vehicles (including the 2016 Acura) yields an even higher R_a factor of 0.89.[191]

3. EPA's analysis was skewed by high-pumping loss vehicle results.

EPA's determination of an R_a factor was further skewed by the overrepresentation of inefficient high-pumping loss vehicles in the Test Program vehicle set. Four out of the eleven Tier 3 Test Program vehicles—the Nissan Altima, the 2013 Chevrolet Malibu (Malibu 1), the Dodge Ram 1500, and the Chevrolet Silverado 2500—include large displacement engines when compared to other vehicles in their class (e.g., mid-size sedans and full-size trucks). The larger displacements in these engines lead to higher pumping losses, reducing efficiency.[192] None of these engines include technologies, like cylinder deactivation, projected to be widely used in the near future to substantially reduce pumping and friction losses in the lightly loaded

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[187] Tier 3 Test Fuel Program, *supra* note 55 at 7, Table 3.2.

[188] *See id.*; Press Release, Market Watch, *Dual-Clutch Transmissions Market Growth Analysis by 2026 | Top 3 key trends that will fuel the industry outlook* (May 28, 2020), https://www.marketwatch.com/press-release/dual-clutch-transmissions-market-growth-analysis-by-2026-top-3-key-trends-that-will-fuel-the-industry-outlook-2020-05-28; *see also* Nat'l Research Council, Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles 24, Table 2.1 (2015) ("NRC Technology Report") (indicating that 56% of model year 2025 vehicles are expected to include 8-speed dual clutch transmissions based on EPA and NHTSA 2012 projections).

[189] EPA determined its R_a factor by selecting the value that "produces a fleet average fuel economy difference very close to zero between the two test fuels." Proposed Rule, 85 Fed. Reg. at 28,575.

[190] *See* Exhibit H.

[191] *See* Exhibit I.

[192] Pumping loss is energy lost to move air into and exhaust out of the cylinder. The losses account for about 5% of total fuel energy. NRC Technology Report, *supra* note 188, at 24.

fuel economy drive cycles.[193] Indeed, three of these engines are not even offered for the 2020 model year vehicles.[194] These test vehicles are thus not representative of the future vehicle fleet.

R factors drop as engine efficiencies drop.[195] Including these four inefficient vehicles in the Tier 3 Test Program thus significantly lowered the R_a factor calculated by EPA. If these four vehicles are excluded from the analysis and the Acura results are retained, EPA's method for selecting R_a yields an R_a factor of 0.94, a result that is consistent with other available science.[196]

D. The Test Program Results are Inconsistent with Previous EPA Studies.

EPA's analysis is also questionable because its determined R_a factor is inconsistent with the results of numerous other recent EPA studies that have determined R factors much closer to 1.

Within the past decade, EPA has sponsored or participated in at least three studies that have generated the data necessary to determine the R factor for vehicles operating using gasoline-ethanol fuel blends: the DOE Immediate Ethanol Effects Study, the EPAct/V2/E-89 Study, and the DOE Catalyst Durability Study.[197] These studies included vehicles spanning model years 1999 to 2009.[198]

While these studies were not designed specifically to measure R factor, the data they generated is nonetheless appropriate for doing so.[199] These previous EPA studies also have a significant advantage over the Tier 3 Test Program in that they evaluated a considerably larger number of vehicles and fuel blends, allowing determination of an R factor with much greater certainty than EPA is able to do based on the Tier 3 Test Program data.[200] So, while the vehicle selection and test method varied slightly compared to the Tier 3 Test Program, the results from these studies still provide a valuable reference point for corroborating EPA's conclusions from its Tier 3 Test Program.

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[193] *Id.* at 33–34.

[194] *See supra* note 142.

[195] *See* Sluder, *supra* note 34, at 9 (R values "shift upwards as engine efficiency improves.").

[196] *See* Exhibit J.

[197] Sluder, *supra* note 33, at 4.

[198] *See id*. at 5-8.

[199] *See id*. at 4.

[200] The Immediate Ethanol Effects Study included measurements on sixteen vehicle models and four fuel blends; the EPAct Study included measurements on fifteen vehicle models and a set of twenty-seven fuels; and the Catalyst Durability Study included 18 matched sets of vehicle models and four test fuels that produced data appropriate for R factor analysis. *See* Sluder, *supra* note 33, at 4–5. The estimated uncertainties (95% confidence) for the R factor determinations from these studies ranges from 0.010 to 0.075, *id*. at 9-10, significantly smaller than the uncertainty in EPA's analysis for the proposed rule. *See* Section V.C, *supra*.

These three previous studies uniformly found higher average R factors than EPA's proposed R_a of 0.81. Analysis of the Immediate Ethanol Effects Study results yielded an R factor ranging from 0.858 to 0.891, the EPAct Study yielded an R factor of 0.921, and the Catalyst Durability Study yielded an R factor of 0.935 to 0.958.[201] All of these studies had significantly lower uncertainties in their determined R factors than EPA has in its proposed R_a factor: the maximum R factor uncertainty among the three studies of ±0.087,[202] compared to an uncertainty of ±0.39 in EPA's proposed R_a.[203] The R factor derived from these studies can be compared directly to EPA's proposed R_a,[204] and their uniformly higher values confirm that EPA's Tier 3 Test Program analysis underestimates R.

VII. EPA SHOULD ADOPT AN R_A FACTOR OF 0.95 OR HIGHER

Instead of relying on its flawed analysis of its limited test data, in the absence of additional data from Tier 3-certified vehicles, EPA should adopt the findings of its most recent and most extensive previous study, the Catalyst Durability Study, which determined an R factor of approximately 0.95.[205] That study measured emissions of eighteen vehicle models in matched sets of three or four vehicles, with tests from fifty-nine vehicles analyzed to determine R.[206] Unlike the Immediate Ethanol Effects and EPAct studies, which used the LA92 drive cycle,[207] the Catalyst Durability Study used the same FTP city drive cycle required for Tier 3 certification.[208] Vehicles were tested using a variety of ethanol blends, including E10, and each vehicle was evaluated at three emissions test intervals—the beginning, middle, and end of the test program.[209]

The average R factor for Tier 2 vehicles was 0.94; when inconsistent results from one model were excluded, the average R factor was 0.96.[210] The large number of vehicles, fuel

[201] Sluder, *supra* note 33, at 9–10.

[202] The Immediate Ethanol Effects Tier 2 fleet estimate had an uncertainty of 0.087 and the overall fleet estimate had an uncertainty of 0.075, *id*. at 9. The EPAct Study's uncertainty was 0.010, *id*., and the Catalyst Durability Study's uncertainty ranged from 0.042 to 0.051. *Id*. at 10. All reported uncertainties are for a 95% confidence interval. *Id*. at 9.

[203] *See* Exhibit D; Section V.B., *supra*.

[204] While EPA's R_a factor includes a correction to account for the proposed changes in the carbon-balance calculation, Proposed Rule 86 Fed. Reg. at 28,575, that correction is minimal, as the proposed changes in the carbon-balance calculation have a very small effect on calculated fuel economy. *See* Exhibit K.

[205] Sluder, *supra* note 33, at 10; C. Scott Sluder & Brian H. West, *Preliminary Examination of Ethanol Fuel Effects on EPA's R-factor for Vehicle Fuel Economy* 12, ORNL/TM-2013/198 (June 2013) ("Catalyst Durability Study").

[206] *See* Catalyst Durability Study, *supra* note 205, at 3-4, 5, 7, Tables 2.3, 2.4.

[207] Sluder, *supra* note 33, at 4.

[208] Catalyst Durability Study, *supra* note 205, at 1.

[209] *Id*. at 4.

[210] Sluder, *supra* note 33, at 10; Catalyst Durability Study, *supra* note 205, at 12.

blends, and intervals tested yields estimated uncertainty in these values of less than ±0.06.[211] Because vehicle fuel economies are typically more sensitive to fuel VED for highway drive cycles than for city drive cycles, the R factor of approximately 0.95 determined by the Catalyst Durability Study for the FTP city cycle can be considered a lower bound for the weighted city-highway R.[212]

An R_a factor of 0.95 or higher would not only be more scientifically defensible than EPA's proposed value of 0.81, it would be consistent with EPA's Test Program data when appropriate vehicles are considered,[213] consistent with measurements on vehicles using ethanol blends over the last twenty-five years[214] and in line with expected technological trends: as vehicle engines become more efficient, their R factors will continue to increase.[215] An R_a factor of 0.95 or higher is thus justified and would likely be far more representative of the future fleet than the proposed R_a.

VIII. THE PROPOSED RULE FAILS TO COMPLY WITH EXECUTIVE ORDER 13771.

In addition to its legal and technical deficiencies, the proposed rule fails to comply with Executive Order (EO) 13,771. EO 13,771 requires that for "any new incremental costs associated with the new regulations shall . . . be offset by the elimination of existing costs associated with at least two prior regulations."[216] EO 13,771 applies to any "significant regulatory action," as defined by EO 12,866, "that has been finalized and that imposes total costs greater than zero,"[217] though "de minimis actions" "may qualify for a full or partial exemption from EO 13,771's" mandate.[218]

[211] Sluder, *supra* note 33, at 10.

[212] By definition, a greater sensitivity of fuel economy to fuel VED results in a larger R factor, since R is the percentage change in fuel economy divided by the percentage change in a test fuel's VED. The greater sensitivity of the highway cycle fuel economy to fuel VED is borne out in the Tier 3 Test Program results, which show that the average change in fuel economy between the Tier 2 and Tier 3 test fuels is larger for the HFET cycle (-2.98%) than for the FTP cycle (-2.29%). *See* Tier 3 Test Program Report at 21, Tables 4.2.1 and 4.2.1. *See also* Proposed Rule, 85 Fed. Reg. at 28,572, Figure III-2 (showing that the change in carbon balance fuel economy is greater for the HFET cycle than for the FTP cycle for nine of the eleven test vehicles).

[213] *See* Section VI.C.3.

[214] A 1993 study determined R factors ranging from 0.92 to 0.93 for vehicles tested using ethanol blends. Hochhauser, *supra* note 31, at 18.

[215] Sluder, *supra* note 34, at 7.

[216] Exec. Order No. 13,771, 82 Fed. Reg. 9339, § 2(c) (Jan. 30, 2017).

[217] OMB, Guidance Implementing Executive Order 13771, Titled "Reducing Regulation and Controlling Regulatory Costs," 3 (Q2) (Apr. 5, 2017).

[218] *Id.* at 13 (Q33).

While EPA acknowledges that the proposed rule is a "significant regulatory action,"[219] it claims that the rule is exempt from the EO 13,771 requirements because it "is expected to result in no more than de minimis costs."[220] This determination, however, is improper.

The economic impact of EPA's underestimate of the R_a factor is significant. One way to gauge the marginal economic impact of the rule is by looking at the fines payable under CAFE, which some automobile manufactures choose to pay in lieu of meeting the standards.[221] Under the current civil penalty rules, each 0.1 mpg below the CAFE standard carries a $5.50 fine for each automobile produced subject to the standard.[222] This fine could rise to $14 per vehicle per 0.1 mpg, depending on the outcome of pending litigation.[223] If an accurate R_a factor is close to 1, finalizing EPA's proposed R_a factor of 0.81 would underestimate adjusted fuel economy by about 0.2 mpg.[224] This underestimation could lead to a penalty of $11 to $28 per vehicle produced for a given standard. For a company like Fiat Chrysler, which produces about 1.5 million light-trucks per year,[225] the cost in fines of a 0.2 mpg increase would be $16.5 million under the current rules, or $42 million if the fine increases to $14 per vehicle per 0.1 mpg. For the 16 million new vehicles produced per year, the annual cost would be $176 million, or $448 million if the fine increases. Since companies are usually reluctant to pay fines, this approximation likely underestimates the compliance costs.

This also accounts only for the compliance costs of the R factor. EPA's proposed CO_2 adjustment also imposes additional costs. Though more difficult to calculate with certainty, manufacturers will incur additional compliance costs to satisfy the more stringent CO_2 emissions standards that result from the new CO_2 adjustment. Those costs are highly unlikely to be "de minimis."

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[219] Proposed Rule, 85 Fed. Reg. at 28,579.

[220] *Id.* at 28,580.

[221] Maxine Joselow, *Fiat Chrysler Faces $79M Fine for Fuel Economy Shortfall*, E&E News (Oct. 17, 2019).

[222] 49 C.F.R. § 578.6(h)(2).

[223] The fine level of $5.50 per 0.1 mpg is being challenged as inconsistent with the Inflation Adjustment Act. *New York v. NHTSA*, No. 19-2395 (2d Cir.). Oral argument was heard June 1. If these challenges succeed, the fine may be increased to $14 a day, as proposed under the Obama Administration. 81 Fed. Reg. at 43,526.

[224] If the accurate R_a factor is 1, EPA's proposed R_a of 0.81 results in an underestimate of the adjusted Tier 3 fuel economy by 0.52%. *See* Exhibit B. Under the current CAFE standards set by the SAFE rule, the average fuel economy standard for model year 2021 will be 37.3 mpg. *See* NHTSA & EPA, The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021-2026 Passenger Cars and Light Trucks Final Regulatory Impact Analysis 1315, Table VII-2 (July 1, 2020 Update). As a result, the underestimate in adjusted fuel economy for a vehicle fleet that just meets the average standard is approximately 37.3 mpg x 0.52% = 0.19 mpg ≈ 0.2 mpg. The average results must be rounded to the nearest decimal as required by CAFE. 49 U.S.C. § 32904(c) ("A measurement of fuel economy *or a calculation of average fuel economy* shall be rounded off to the nearest .1 of a mile a gallon.") (emphasis added).

[225] NHTSA, Projected Fuel Economy Performance Report, https://one.nhtsa.gov/CAFE_PIC/MY%202018%20and%202019%20Projected%20Fuel%20Economy%20Performance%20Report_v07%20-%20Final.pdf.

As a result, the rule remains subject to the mandates of EO 13,771.

CONCLUSION

To satisfy its obligations under the CAA and EPCA, EPA should reconsider its proposed rule and instead finalize a rule that eliminates the proposed CO_2 adjustment and that includes an R_a factor of not less than 0.95.