ORAL ARGUMENT NOT YET SCHEDULED

No. 20-1145 and consolidated cases

IN THE UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

COMPETITIVE ENTERPRISE INSTITUTE, *et al.*,
Petitioners,

v.

NATIONAL HIGHWAY TRAFFIC AND SAFETY ADMINISTRATION, *et al.*,
Respondents.

On Petitions for Review of Final Agency Action of the
National Highway Traffic and Safety Administration and United States
Environmental Protection Agency,
85 Fed. Reg. 24,174 (Apr. 30, 2020)

PROOF BRIEF OF ANDREW DESSLER, PHILIP DUFFY, MICHAEL MACCRACKEN, JAMES MCWILLIAMS, NOELLE ECKLEY SELIN, DREW SHINDELL, JAMES STOCK, KEVIN TRENBERTH, AND GERNOT WAGNER AS *AMICI CURIAE* IN SUPPORT OF STATE, LOCAL GOVERNMENT, AND PUBLIC INTEREST ORGANIZATION PETITIONERS

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CERTIFICATE OF COUNSEL AS TO PARTIES, RULINGS, AND RELATED CASES

Pursuant to D.C. Circuit Rule 28(a)(1) and Federal Rule of Appellate Procedure 26.1, counsel for *amici curiae* Andrew Dessler, Philip Duffy, Michael MacCracken, James McWilliams, Noelle Eckley Selin, Drew Shindell, James Stock, Kevin Trenberth, and Gernot Wagner certify as follows:

All parties and intervenors appearing in this case are listed in the Brief of Public Interest Organization Petitioners. Notices of intent to participate as *amici curiae* have been filed by the Coalition to Protect America's National Parks, National Parks Conservation Association, and New Mexico Wilderness Alliance; the American Thoracic Society, American Lung Association, American Medical Association, Medical Society of the District of Columbia; the National League of Cities, U.S. Conference of Mayors, Annapolis, Boulder County, Glen Rock, Harris County, TX, Houston, Minneapolis, Pittsburgh, Providence, Saint Paul, Salt Lake City, Santa Fe, Mayors of Durham, Fayetteville, Las Cruces, and Phoenix; Michael Greenstone; Consumer Reports; and the Institute for Policy Integrity at New York University School of Law.

References to the rulings under review and related cases appear in the Brief of Public Interest Organization Petitioners.

Dated: January 21, 2021

/s/ Shaun A. Goho
Shaun A. Goho

CERTIFICATION REGARDING CONSENT TO FILE, SEPARATE BRIEFING, AUTHORSHIP, AND MONETARY CONTRIBUTIONS

All parties have consented to the filing of this brief. A single joint brief is not practicable because the other *amicus* briefs do not address the unique perspective of *amici* as experts on the science and economics of climate change.

Under Federal Rule of Appellate Procedure 29(a)(4)(E), *amici* state that no party's counsel authored this brief in whole or in part, and no party or party's counsel contributed money intended to fund the preparation or submission of this brief. No person—other than the *amici* or their counsel—contributed money intended to fund the preparation or submission of this brief.

Dated: January 21, 2021

/s/ Shaun A. Goho
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TABLE OF CONTENTS

Page

TABLE OF AUTHORITIES

Page(s)

GLOSSARY

FEIS	Final Environmental Impact Statement
EPA	Environmental Protection Agency
IPCC	Intergovernmental Panel on Climate Change
MY	Model Year
NHTSA	National Highway Traffic Safety Administration
NOAA	National Oceanic and Atmospheric Administration
ppm	Parts Per Million
°C	degrees Celsius

INTERESTS OF *AMICI CURIAE*

Amici are scientists and economists who have made significant contributions to research on the science and economics of climate change. They are alarmed that the Environmental Protection Agency ("EPA") and National Highway Traffic and Safety Administration ("NHTSA") (together, "Agencies") ignore the scientific record and fail to take even a single step to address the harms caused by anthropogenic emissions of greenhouse gases—indeed they magnify those harms. This brief shares *amici*'s decades of collective experience. The names, institutional affiliations, and brief biographies for *amici* are attached as an addendum to this brief.

PERTINENT STATUTES AND REGULATIONS

All applicable statutes and regulations are contained in the addendum to State and Local Government Petitioners' brief.

SUMMARY OF ARGUMENT

In promulgating the Safer Affordable Fuel Efficient Vehicles Rule ("the Rule"), the Agencies ignored decades of science and their own conclusions regarding the perils of climate change. The Agencies recognize that emissions of carbon dioxide and other greenhouse gases from the use of fossil fuels are accumulating in the atmosphere and warming the Earth. They also acknowledge the significant role that the transportation sector plays in U.S. emissions and global

warming. As global temperatures increase, glaciers and ice sheets are melting, and sea levels are rising. Changes in the weather and related Earth system components are already contributing to floods, storms, wildfires, and droughts that have killed Americans and cost billions of dollars. Without dramatic emissions reductions, the risk of major impacts will worsen. The next decade offers a critical opportunity to stabilize the climate and avoid irreparable harms.

The Agencies acknowledge these harms and yet, despite having the statutory authority to take meaningful action, promulgated a rule that does nothing to address them, and indeed represents a substantial step backwards from the standards that one of them (EPA) had previously adopted. This abdication of the Agencies' duties is especially concerning given the realistic prospect that the global climate will exceed tipping points in the coming decades, which would result in even more extreme impacts than those the Agencies project. The Agencies' do-nothing approach is thus contrary to law, science, and common sense and will exacerbate climate change harms for decades to come.

ARGUMENT

I. THE AGENCIES ACKNOWLEDGE THAT GREENHOUSE GAS EMISSIONS FROM THE TRANSPORTATION SECTOR ARE HARMING AMERICANS

A. The Agencies Acknowledge that Greenhouse Gas Emissions Are Causing Climate Change

The Agencies do not dispute the basic physics of climate change or the human contribution to it. Greenhouse gases absorb infrared radiation in the portion of the electromagnetic spectrum in which thermal radiation is normally released from Earth back into space. As a result, much like a greenhouse retains heat, greenhouse gases trap energy in Earth's atmosphere that would otherwise escape. Because of Earth's complex climate system, shifts in the energy balance caused by this trapped heat lead not only to increasing temperatures, but also a variety of significant changes in the atmosphere, the oceans, and ice mass.

Since the beginning of the Industrial Revolution, humans have disrupted the natural balance of the atmosphere by emitting ever higher volumes of greenhouse gases, resulting in an enhanced "greenhouse effect." In 2018, the United States accounted for 15% of global carbon dioxide emissions, making it the second largest emitter in the world.[1] Cumulatively, the United States has emitted more

[1] Union of Concerned Scientists, *Each Country's Share of CO2 Emissions* (2020), https://www.ucsusa.org/resources/each-countrys-share-co2-emissions.

carbon dioxide than any other country—including the entire European Union combined.[2]

Fossil fuel combustion is the primary source of carbon dioxide emissions both globally and in the United States.[3] Indeed, as the Final Environmental Impact Statement for the Rule ("FEIS") states, "[h]uman activities, particularly fossil-fuel combustion, lead to the presence of increased concentrations of [greenhouse gases] in the atmosphere." JA_[NHTSA-2017-0069-0738_5-5]. The FEIS cites the Intergovernmental Panel on Climate Change's ("IPCC") conclusion that it is "*extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20th century." JA_[NHTSA-2017-0069-0738_5-6].

As a result of anthropogenic emissions, atmospheric concentrations of carbon dioxide have increased from pre-Industrial Revolution levels of 278 parts

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[2] Hannah Ritchie, Our World in Data, *Who Has Contributed Most to Global CO_2 Emissions?* (2019), https://ourworldindata.org/contributed-most-global-co2.

[3] EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018*, at ES-7 (2020), https://www.epa.gov/sites/production/files/2020-04/documents/us-ghg-inventory-2020-main-text.pdf [hereinafter EPA, *Inventory*]; *Global Greenhouse Gas Emissions: Global Emissions by Gas*, EPA, https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data#Gas (last visited Jan. 21, 2021).

per million ("ppm") to a global average of 411 ppm in October 2020.[4] These increasing levels of atmospheric carbon dioxide, along with other greenhouse gasses, have warmed the planet, with average global temperatures in 2018 estimated to be 0.8°C to 1.2°C above pre-Industrial levels.[5] The FEIS notes that 2016 was the hottest year ever recorded, JA_[NHTSA-2017-0069-0738_5-12], before 2020 tied it for the record.[6] All six of the hottest years on record have occurred since 2015.[7]

B. The Agencies Acknowledge that the Transportation Sector Is a Major Contributor to Greenhouse Gas Emissions

The agencies recognize the major role that the transportation sector plays in greenhouse gas emissions. JA_[NHTSA-2017-0069-0738_S-12]. The transportation sector is responsible for a larger proportion of U.S. greenhouse gas emissions than any other sector—28% in 2018.[8] Transportation sector emissions

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[4] *Trends in Atmospheric Carbon Dioxide: Global Monthly Mean CO_2*, NOAA Global Monitoring Laboratory, https://www.esrl.noaa.gov/gmd/ccgg/trends/global.html.

[5] IPCC, *Global Warming of 1.5ºC* 6 (Valérie Masson-Delmotte et al. eds., 2018), https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_Low_Res.pdf.

[6] Henry Fountain, *2020 Ties 2016 as Hottest Yet, European Analysis Shows*, N.Y. Times (Jan. 8, 2021), https://www.nytimes.com/2021/01/08/climate/hottest-year-ever.html.

[7] *Id.*

[8] EPA, *Inventory*, *supra* note 3, at 2-32.

grew 23% between 1990 and 2018.[9] Passenger cars and light trucks account for 59% of U.S. transportation sector greenhouse gas emissions.[10] If emissions from U.S. passenger cars and light trucks were considered as coming from their own country, the emissions would rank 7th-largest in the world.[11]

C. The Agencies Acknowledge that Climate Change Is Harming Americans and that these Impacts Will Worsen over the Course of this Century

According to the "climate trajectory" assumed in the FEIS, global carbon dioxide concentrations under the Rule are anticipated to increase to at least 479 ppm by 2040, 566 ppm by 2060, and 790 ppm by 2100. JA_[NHTSA-2017-0069-0738_5-40]. Such elevated atmospheric carbon dioxide concentrations have not occurred in millions of years.[12] The FEIS projects that, under the Rule, global surface air temperature will rise alongside these greenhouse gas concentrations and

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[9] EPA, *Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions, 1990-2018*, at 2 (2020), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100ZK4P.pdf.

[10] EPA, *Inventory*, *supra* note 3, at 2-32.

[11] *See* European Commission, Emission Database for Global Atmospheric Research, *Fossil CO2 & GHG Emissions of all World Countries, 2017* (2017), http://edgar.jrc.ec.europa.eu/overview.php?v=CO2andGHG1970-2016&dst=GHGemi&sort=des9.

[12] IPCC, *Climate Change 2013: The Physical Science Basis* 385 (Thomas F. Stocker et al. eds., 2013) https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf (noting "atmospheric [carbon dioxide] concentrations between 350 ppm and 450 ppm" were last seen "3.3 to 3.0 million years ago").

increase by 1.3°C by 2040, 2.0°C by 2060, and 3.5°C by 2100. JA_[NHTSA-2017-0069-0738_5-40].[13] A world with 3.5°C of warming will be profoundly different from the one in which we live today, with drastic changes in sea level, extreme weather, flooding, and other impacts that will harm public health and the economy.

As the Agencies acknowledge, JA_[NHTSA-2017-0069-0738_5-16_to_5-18], global warming is causing sea levels to rise. Global mean sea level has risen between seven and eight inches since 1900. JA_[NHTSA-2017-0069-0803_107]. Over the last 60 years, high tide floods have become "5 to 10 times more frequent . . . in several U.S. coastal cities." JA_[NHTSA-2017-0069-0803_99].

The federal government projects that sea levels will continue to rise this century. According to the Fourth National Climate Assessment, one to four feet of sea level rise is "very likely" by 2100, and an excess of eight feet is "physically plausible." JA_[NHTSA-2017-0069-0803_85]. At the six-foot mark, almost all of New Orleans, more than 30% of Miami, and 10% of New York City would be

[13] The increase in temperature is relative to the average of the years between 1986 and 2005, which does not account for warming that occurred beforehand.

lost.[14] This amount of sea level rise would flood the homes of more than 13 million Americans in coastal counties, forcing their relocation.[15]

Climate change is also intensifying precipitation and destructive storms. The National Oceanic and Atmospheric Administration ("NOAA") has reported that 2019 was the second-wettest year ever recorded in the United States[16] and estimated that the total damage from extreme weather events between 2016 and 2018 exceeded $450 billion in the United States.[17] A recent study estimated that approximately one-third of the increased cost of U.S. flood damages between 1988 and 2017 is due to changes in precipitation that are consistent with modeling of the human impact on the climate.[18] Research has demonstrated that Hurricane Harvey,

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[14] Jeremy L. Weiss et al., *Implications of Recent Sea Level Rise Science for Low-Elevation Areas in Coastal Cities of the Coterminous U.S.A.*, 105 Climatic Change 635, 640 (2011).

[15] Mathew E. Hauer et al., *Millions Projected To Be at Risk from Sea-Level Rise in the Continental United States*, 6 Nature Climate Change 691, 691–695 (2016) (including projected population changes).

[16] NOAA, *2019 Was the 2nd Wettest Year on Record for the U.S.*, NOAA: News & Features (Jan. 21, 2020), https://www.noaa.gov/news/2019-was-2nd-wettest-year-on-record-for-us.

[17] NOAA, *U.S. Billion-Dollar Weather and Climate Disasters: Time Series*, NOAA: National Centers for Environmental Information (2020), https://www.ncdc.noaa.gov/billions/time-series.

[18] Frances V. Davenport, Marshall Burke & Noah S. Diffenbaugh, *Contribution of Historical Precipitation Change to US Flood Damages*, 118 Proc. Nat'l Acad. Sci. 1, 1 (2021).

which directly killed 68 people and inflicted an estimated $125 billion of damage in Texas and Louisiana,[19] produced more severe rainfall than it otherwise would have because of human-induced climate change.[20] One recent study used a physics-based risk assessment to evaluate how climate change will influence the probability of Harvey-like storms. The study found that, in the late 20th century, accumulated rainfall exceeding 500mm in Texas was about a once in 100 years event; by the end of this century, it is predicted to occur approximately once every 5.5 years on average.[21]

Tropical storms are not only becoming more intense, but they are also gaining intensity at a faster rate, resulting in forecasting errors and increased human and financial costs.[22] Scientists have developed a rapid intensification

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[19] NOAA, *Service Assessment: August-September 2017 Hurricane Harvey* iv (June 2018), https://www.weather.gov/media/publications/assessments/harvey6-18.pdf.

[20] *See* Kevin E. Trenberth et al., *Hurricane Harvey Links to Ocean Heat Content*, 6 Earth's Future 730, 730 (2018); Mark D. Risser & Michael F. Wehner, *Attributable Human-Induced Changes in the Likelihood and Magnitude of the Observed Extreme Precipitation During Hurricane Harvey*, 44 Geophysical Rsch. Letters 12,457, 12,457 (2017).

[21] Kerry Emanuel, *Assessing the Present and Future Probability of Hurricane Harvey's Rainfall*, 114 Proc. Nat'l Acad. Sci. 12681, 12683 (2017). This assumes that the area covered by individual storms does not change much due to climate change.

[22] Kieran Bhatia et al., *Recent Increases in Tropical Cyclone Intensification Rates*, 10 Nature Communications 1, 1 (2019); Kerry Emanuel, *Will Global Warming Make Hurricane Forecasting More Difficult?*, 98 Bull. Am. Meteorological Soc'y 495, 495 (2019).

threshold: storms gaining 35 mph in wind speed within 24 hours.[23] One study found a statistically significant increase in the proportion of storms that rapidly intensified in the Atlantic between 1982 and 2009, which a comparison to climate modeling suggested was related to human influence on the climate.[24] Nine Atlantic hurricanes, tying the most ever, crossed this dangerous rapid intensification threshold in 2020.[25] The number of tropical storms that rapidly intensify before U.S. landfall is projected to significantly increase by the late 21st century as a result of global warming.[26]

Warming also exacerbates air pollution in a variety of ways. In general, warmer temperatures increase ground-level ozone, and changes in weather patterns can result in higher concentrations of fine particulate matter. JA_[NHTSA-2017-

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[23] *Glossary of NHC Terms: Rapid Intensification*, National Hurricane Center & Central Pacific Hurricane Center, https://www.nhc.noaa.gov/aboutgloss.shtml#r (last visited Jan. 21, 2021).

[24] Bhatia, *supra* note 22, at 1.

[25] Kasha Patel, *A Destructive Abundance*, NOAA Earth Observatory (Dec. 10, 2020), https://earthobservatory.nasa.gov/images/147643/a-destructive-abundance.

[26] Kerry Emanuel, *Will Global Warming Make Hurricane Forecasting More Difficult?*, 98 Bull. Am. Meteorological Soc'y 495, 499-500 (2019).

0069-0803_516].[27] Global warming also dries organic forest matter,[28] which contributes to record-breaking wildfire seasons like those in Colorado, Oregon, and California in 2020.[29] In addition to their direct harms, wildfires release massive amounts of smoke into the air, which contains fine particulate matter.[30] Such air pollution causes severe short- and long-term health consequences, including respiratory issues, cardiovascular disease, and even premature death.[31]

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[27] Although this brief focuses on climate impacts, weaker emissions and fuel economy standards affect air pollution and exacerbate the associated health impacts in other ways as well.

[28] *See* John T. Abatzoglou & A. Park Williams, *Impact of Anthropogenic Climate Change on Wildfire Across Western US Forests*, 113 Proc. Nat'l Acad. Sci. 11,770, 11,770 (2016).

[29] Stephen Miller, *"This Season Is Off the Charts": Colorado Fights the Worst Wildfires In Its Recent History*, The Guardian (Oct. 30, 2020), https://www.theguardian.com/us-news/2020/oct/30/colorado-fires-cameron-peak-east-troublesome; Christopher Flavelle & Henry Fountain, *In Oregon, a New Climate Menace: Fires Raging Where They Don't Usually Burn*, N.Y. Times (Sept. 12, 2020), https://www.nytimes.com/2020/09/12/climate/oregon-wildfires.html; Melissa Alonso & Ray Sanchez, *California's Record-Breaking Wildfires Consume Nearly 1 Million Acres in a Month*, CNN (Oct. 17, 2020), https://www.cnn.com/2020/10/17/us/california-wildfires-saturday/index.html.

[30] Teresa J. Feo et al., California Council on Science & Technology, *The Costs of Wildfire in California: An Independent Review of Scientific and Technical Information* 5 (Oct. 2020), https://ccst.us/wp-content/uploads/The-Costs-of-Wildfire-in-California-FULL-REPORT.pdf.

[31] *Id.* In addition to air pollution caused by climate change, increased greenhouse gas emissions directly and negatively impact air quality.

Climate change also causes other adverse public health impacts that will worsen in the coming decades. Exposure to extreme heat is the leading cause of environmental deaths in the United States.[32] The FEIS acknowledges that anthropogenic warming will increase morbidity and mortality for Americans, especially for minority and low-income populations. JA_[NHTSA-2017-0069-0738_7-13. For example, warmer temperatures, harsher storms, and rising sea levels create the perfect environment for a flesh-eating bacteria called *Vibrio* to thrive: data show that *Vibrio* infections in the United States doubled between 2007 and 2016, causing alarm in coastal towns from Texas to Connecticut.[33] The Agencies themselves recognize that the Rule, "compared to the previous standards[,] are projected to result in . . . $5 billion or $3 billion (in 2018$, and reflecting, respectively, either a 7 percent or 3 percent discount rate) in foregone public health benefits." 85 Fed. Reg. 24,174, 25,113 (Apr. 30, 2020).

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[32] Samantha Ahdoot & Susan E. Pacheco, *Global Climate Change and Children's Health*, 136 Pediatrics e1468, e1471 (2015).

[33] Ali Raj et al., *Deadly Bacteria Lurk in Coastal Waters. Climate Change Increases the Risks* (Center for Public Integrity and Mother Jones 2020), https://publicintegrity.org/environment/hidden-epidemics/vibrio-deadly-bacteria-coastal-waters-climate-change-health/?utm_campaign=Hot%20News&utm_medium=email&_hsmi=97907266&_hsenc=p2ANqtz-81BGU54G2P5fjkV2PHIuMjZDxU-zff6DEbpDtWmLjB21Ud2iR2a5TfxXS-ScdCNGF0g-kIbrSXetipN5m6joYvEzMTVw&utm_content=97907266&utm_source=hs_email.

Temperature increases, and the associated weather effects,[34] create a number of risks for agriculture in the United States, especially in rural areas. JA_[NHTSA-2017-0069-0803_746. In the Midwest, "increases in growing-season temperature . . . are projected to be the largest contributing factor to declines in the productivity of U.S. agriculture." JA_[NHTSA-2017-0069-0803_875]. Climate change is also projected to prolong and intensify droughts in the Ogallala Aquifer region, placing additional pressure on the region that produced 12% of the market value of American agricultural products as of 2007. JA_[NHTSA-2017-0069-0803_402].

As these examples indicate, for every degree Celsius that the Earth warms, the United States incurs additional, significant economic losses. Agricultural productivity is projected to decrease by roughly 9% per degree of warming, electricity demand increase by roughly 5%, and mortality rates rise by roughly 5.4 deaths per 100,000.[35] Cumulatively, climate impacts are projected to cost approximately 1.2% of U.S. Gross Domestic Product per degree Celsius increase

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[34] Climate change increases the likelihood of multiple kinds of extreme weather events in addition to those already mentioned. *See, e.g.*, James Hansen, Makiko Sato & Reto Ruedy, *Perception of Climate Change*, 109 Proc. Nat'l Acad. Sci. E2415-E2423, E2415 (2012).

[35] Solomon Hsiang et al., *Estimating Economic Damage from Climate Change in the United States*, 356 Science 1362, 1363-64 (2017).

in global average temperature.[36] The IPCC predicts that a 2.0°C increase in warming by 2100 would lead to $69 trillion in global economic losses.[37]

II. THE AGENCIES HAVE DONE NOTHING TO ADDRESS THESE HARMS

As described above, the Agencies recognize the serious harms that will occur in the absence of aggressive efforts to reduce greenhouse gas emissions. Congress has granted both EPA and NHTSA the authority to take meaningful action to reduce those harms. And yet, the Rule is weaker than EPA's previous standards and NHTSA's augural standards, can be easily met by the industry, and provides no pressure to move towards a more fuel-efficient fleet. Recognizing a serious problem and then choosing to do nothing about it (and, indeed, to make it worse) is the definition of an arbitrary and capricious action.

A. The Agencies Have the Legal Authority To Take Stronger Action

Section 202 of the Clean Air Act gives EPA authority to regulate greenhouse gas emissions from motor vehicles of air pollutants that "endanger public health or welfare." 42 U.S.C. § 7521(a)(1). EPA must consider technological feasibility, cost, and safety when promulgating such regulations. The Supreme Court has held that the Clean Air Act "and common sense . . . demand regulatory action to prevent

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[36] *Id.* at 1362.

[37] IPCC, *supra* note 5, at 264. The cited number refers to the mean net present value of indirect and direct damages in 2100, relative to 1961-1990.

harm, even if the regulator is less than certain that harm is otherwise inevitable." *Massachusetts v. EPA*, 549 U.S. 497, 506 n.7 (2007) (citation and internal quotation marks omitted).

Separately, the Energy Policy and Conservation Act of 1975, as amended by the Energy Independence and Security Act of 2007, authorizes NHTSA to establish corporate average fuel economy standards for cars and trucks. The 2007 revisions of the statute required NHTSA to set standards for cars and light trucks through 2030 at "the *maximum feasible* average fuel economy standard for each fleet for that model year." 49 U.S.C. § 32902(b)(2)(B) (emphasis added).[38] Regarding other provisions of the Energy Policy and Conservation Act, Congress has stated that "[t]he term feasibility is used in the strict sense, namely 'capable of being carried out.'"[39]

The Agencies acknowledge that they have the legal authority to adopt stricter standards than those included in the Rule. In the preamble, the Agencies assert that they retain significant authority to balance the statutory factors, 85 Fed.

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[38] The statute adds that, "When deciding maximum feasible average fuel economy under this section, the Secretary of Transportation shall 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." 49 U.S.C. § 32902(f).

[39] H.R. Rep. No. 94-700 (94th Cong., 1st Sess.) (1975), at 172.

Reg. at 24,177, 24,222, as well as to identify and consider other factors, *id.* at 25,121, 25,106. The Agencies acknowledge using this discretion to make value judgments that deviated from those employed in past rulemaking discussions and led them to implement less stringent standards. For example, the Agencies moved away from the approach taken in the 2012 rulemaking of asking "how stringent can NHTSA set standards before economic practicability considerations intercede?" *Id.* at 25,144. In fact, EPA specifically acknowledged that it "retained full discretion in this rulemaking to revise standards or not revise them," *id.* at 24,212, meaning it had full authority to leave the pre-existing standards untouched.

These statutory authorities give the Agencies broad power to advance solutions that match the extreme dangers posed by climate change, which they identified in the FEIS. And yet there is a staggering mismatch between the harms identified by the Agencies and the do-nothing approach of the Rule.

B. The Rule Does Nothing to Address the Acknowledged Harms and Represents a Significant Step Backwards

The Rule is significantly weaker than the pre-existing EPA emissions standards and NHTSA's augural fuel economy standards. Even if the Rule is considered in isolation rather than in comparison to these standards, it increases stringency by only 1.5% per year from model year ("MY")2021 to MY2026—significantly less than what the industry is able to do. Several lines of evidence confirm this point.

First, in recent years the industry has shown itself capable of producing annual increases in fuel economy at a faster rate than mandated by the Rule. For example, the unadjusted laboratory fuel economy of passenger cars and light trucks improved by an average of 2.4% annually between MY2011 and MY2016.[40]

Second, some automakers themselves have specifically stated their intentions to continue achieving more aggressive emissions reductions than those required by the Rule. In their motion to intervene in this litigation, five major automakers stated that they each "intend[] to achieve greater greenhouse gas emissions reductions for light duty automobiles than would be required by SAFE Rule Part Two."[41] Some automakers have also expressed their intentions to continue increasing production of electric vehicles in order to comply with other countries' regulations[42]—further indicating their ability and willingness to comply with more stringent standards than those proposed by the Agencies.

Third, in addition to their stated intentions, several automakers' actions indicate that they are capable of and willing to do more than the Rule requires. In

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[40] EPA, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2017*, at 122 (2018), https://nepis.epa.gov/Exe/ZyPDF.cgi/P100Z8SD.PDF?Dockey=P100Z8SD.PDF.

[41] Mot. to Intervene of Automobile Manufacturers, 2, *Competitive Enterprise Inst., et al. v. NHTSA, et al.*, No. 20-1145 (D.C. Cir. 2020).

[42] International Council on Clean Transportation Comments, at 9 (Oct. 25, 2018), https://theicct.org/news/comments-safe-regulation-2021-2026.

2018, Ford, Volkswagen, Honda, and BMW—which collectively represent approximately 30% of the U.S. auto market—entered into an agreement with California that would establish a 3.7% average annual increase in fuel economy standards between MY2022 and MY2026.[43] These annual increases would achieve an average fuel economy of 51 miles per gallon by 2026,[44] compared to 38 miles per gallon under the Rule. JA_[NHTSA-2017-0069-0178-S-4].

Lastly, the global nature of the auto industry exposes the deficiencies of the proposed rule. The Rule is so out of step from other nations' regulations that it contributes essentially nothing to global emissions reduction efforts. This discrepancy is even more irrational considering most automakers produce and sell the same products across the globe. Automakers themselves have expressed concern that, absent an incentive to produce more fuel-efficient vehicles in the United States, their global sales will suffer.[45] Industry experts back up those fears:

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[43] Coral Davenport & Hiroko Tabuchi, *Automakers, Rejecting Trump Pollution Rule, Strike a Deal with California*, N.Y. Times (July 25, 2019), https://www.nytimes.com/2019/07/25/climate/automakers-rejecting-trump-pollution-rule-strike-a-deal-with-california.html.

[44] *Id.*

[45] Timothy Cama, *Automakers Fight Trump's Auto Emissions Rollback*, The Hill (Oct. 29, 2018), https://thehill.com/policy/transportation/automobiles/413729-automakers-fight-trumps-auto-emissions-rollback (Honda stating that the original proposal "invites litigation and regulatory uncertainty, stalls long-term strategic industry planning, puts at risk American global competitiveness, exacerbates climate-related environmental impacts, and slows industry readiness for a widely

Susan Helper, a professor at Case Western University and a former chief economist at the U.S. Department of Commerce, has stated that decreasing American emissions standards significantly below those of other countries will lead to "less innovation and less competitiveness for automakers competing in other markets."[46] This result also hurts the American economy because companies have an incentive to move factories and jobs overseas.[47]

III. IT IS URGENT TO ACT NOW AND NOT DELAY

The do-nothing approach of the Rule has potentially catastrophic implications. Stringent emissions standards have a proven record of spurring technological innovation, which allows for the implementation of even more rigorous standards over time. The Rule interrupts this cycle by essentially eliminating all requirements on the auto industry. This abdication is particularly harmful because it comes during a critical window and affects a sector with especially slow turnover time. Failing to act with the requisite urgency increases the already realistic prospect of climate catastrophe.

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acknowledged—but extremely difficult to implement—transition to vehicle electrification.").

[46] Tara Law, *Trump Says Cutting Regulations Is Good for Business. But His New Battle on Car Emission Standards Could Hurt the Auto Industry*, Time (Sept. 18, 2019), https://time.com/5680692/auto-industry-cars-california-trump/.

[47] *Id.*

A. Regulatory Standards Spur Innovation and Decrease Compliance Costs

The implementation of strict emissions and fuel economy standards now will spur innovation and decrease compliance costs in the future, which makes aggressive climate goals more achievable.[48] Indeed, over the past 15 years, technological innovations have significantly improved the fuel efficiency of the U.S. automobile fleet.

The development and dissemination of new technologies will make compliance with fuel efficiency standards less expensive than the Agencies have predicted. Historically, models have consistently overestimated the cost of compliance with emissions standards.[49] The International Council on Clean Transportation predicts that the Agencies' analysis underlying this rule is likely to be no different, predominantly due to its flawed modeling of technology costs.[50] For example, the Agencies' cost-benefit analysis does not allow for the use of

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[48] Hannah Pitt, Kate Larsen & Maggie Young, Rhodium Group, *The Undoing of US Climate Policy: The Emissions Impact of Trump-Era Rollbacks* (2020), https://rhg.com/research/the-rollback-of-us-climate-policy/.

[49] Nic Lutsey, et al., *Efficiency Technology and Cost Assessment for U.S. 2025-2030 Light-duty Vehicles* iv (2017), https://theicct.org/sites/default/files/publications/US-LDV-tech-potential_ICCT_white-paper_22032017.pdf.

[50] Aaron Isenstadt & Nic Lutsey, *Summary of the Trump Administration's Fatally Flawed U.S. Light-Duty Vehicle Efficiency Standards* 6-7, 12 (2020), https://theicct.org/sites/default/files/publications/US-CAFE-stds-final_20200806.pdf.

high-compression ratio engine technology in combination with other technologies, despite at least three automakers currently employing such combinations.[51]

The experience of the auto industry itself over the last fifteen years confirms this general lesson. According to EPA, since MY2004, "technology has been used to increase fuel economy (up 30%) and power (up 14%), while . . . reducing [carbon dioxide] emissions (down 23%)."[52] For example, new technology such as turbocharged engines, gasoline direct injection, and stop/start technology all help engines operate more efficiently and thus use less fuel and save drivers money.[53] Based on preliminary data, EPA estimated that almost all major automakers incorporated all three of those technologies in at least some of their MY2019 vehicles.[54] As these technologies become widespread, they become less expensive, which allows them to further penetrate the auto market.[55]

Technological innovation has also allowed for more fundamental changes in the auto industry, including shifting away from fossil fuels. Most major

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[51] *Id.*

[52] EPA, *The 2019 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975*, at 31 (2020), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100YVFS.pdf [hereinafter EPA, *Automotive Trends*].

[53] *Id.* at 38-39.

[54] *Id.* at 38.

[55] Lutsey, *supra* note 49, at iv.

automakers have announced plans for investments in an electric future, cumulatively totaling $200 billion in funding for electric vehicles and more than 15 million electric vehicle sales per year by 2025.[56] Both the Draft Economic Impact Statement and the FEIS state that achieving significant GHG reductions from the passenger car and light truck vehicle fleet "would require the economy and the vehicle fleet to substantially move away from the use of fossil fuels." JA_[NHTSA-2017-0069-0178-5-30]; JA_[NHTSA-2017-0069-0738_5-39]. A change between the draft and final environmental impact statements amounts to an implicit acknowledgement that this transition is a viable possibility: the draft included an additional clause—"which is not currently technologically feasible or economically practicable," JA_[NHTSA-2017-0069-0178-5-30]—that was subsequently removed from the FEIS.

The Agencies recognize that stringent emissions standards play a role in promoting the development of new technologies. EPA explicitly attributes recent improvements in technology, at least in part, to the "increasing stringency of NHTSA light-duty car and truck . . . standards."[57] Similarly, the FEIS notes that EPA's tightening of emissions standards for passenger cars, light trucks, and

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[56] International Council on Clean Transportation Comments, at 14 (Oct. 25, 2018) (NHTSA-2018-0067-11741).

[57] EPA, *Automotive Trends*, *supra* note 52, at 31.

heavy-duty vehicles in response to the development of more fuel-efficient technology is "responsible for the declines in total criteria pollutant emissions from motor vehicles." JA_[NHTSA-2017-0069-0738_4-12].

B. Delayed Action Creates Additional Costs

The window to prevent the immense health, ecological, and economic damage of climate change is narrow, and delay increases the cost of the eventual response by billions or trillions of dollars. As the FEIS notes, because greenhouse gases accumulate in the atmosphere, global warming and the harms of climate change will continue for centuries even if all anthropogenic emissions ceased today. JA_[NHTSA-2017-0069-0738_8-76]. The Agencies have not provided any reason for their decision to delay a meaningful response to this urgent problem.

Delay creates two distinct risks. First, as the FEIS acknowledges, delay "results in a greater accumulation of [carbon dioxide] in the atmosphere, thereby increasing the risk of crossing tipping points and triggering abrupt changes." JA_[NHTSA-2017-0069-0738_8-76]. Second, delay reduces the time remaining to achieve a particular target, making future action more costly than action in the present.[58] A White House Council of Economic Advisers analysis estimated that

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[58] Council of Economic Advisers, *The Cost Of Delaying Action To Stem Climate Change* 5 (2014), https://obamawhitehouse.archives.gov/sites/default/files/docs/the_cost_of_delaying_action_to_stem_climate_change.pdf; *see generally* Joeri Rogelj et al.,

the costs of addressing climate change increase 41% for each decade of delay.[59] Those cost increases are associated only with the timing of action, not the total amount of emissions reduced. They are the costs of making up for lost time.

The next two decades are critical. All of the IPCC's pathways to avoid the worst impacts of climate change require substantial annual reductions in greenhouse gas emissions between 2020 and 2030.[60] Because "the reaction time to achieve net zero emissions is 30 years at best,"[61] the United States may be running out of time to change course.

The Agencies themselves have recognized that action is imperative. In 2009, EPA concluded that there was "good reason to act now."[62] As EPA wrote then, "[t]here continues to be no reason to expect that, without substantial and near-term efforts to significantly reduce emissions, atmospheric levels of greenhouse gases will not continue to climb, and thus lead to ever greater rates of climate change."[63]

Probabilistic Cost Estimates for Climate Change Mitigation, 493 Nature 79 (2013).

[59] Council of Economic Advisers, *supra* note 58, at 18.

[60] IPCC, *supra* note 5, at 119.

[61] Timothy M. Lenton et al., *Climate Tipping Points—Too Risky to Bet Against*, 575 Nature 592, 595 (2019).

[62] Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496, 66,500 (Dec. 15, 2009).

[63] *Id.* at 66,518.

The 2018 National Climate Assessment, to which EPA contributed, concluded that "[e]arly and substantial mitigation offers a greater chance for achieving a long-term [climate stabilization] goal." JA_[NHTSA-2017-0069-0803_1351]. These arguments have only strengthened in force, and the agencies do not explain their basis for rejecting them or attempt to reconcile them with the approach they have adopted in the Rule.[64]

The nature of the transportation sector introduces additional costs associated with delay. First, it can take many years for new technologies to achieve widespread adoption. In an analysis of seven new technologies for passenger cars, EPA found that, on average, new technologies take between 15 and 20 years to reach maximum penetration across the auto industry.[65] Second, the vehicle fleet in the United States turns over slowly. The average age of American vehicles on the road is increasing, reaching nearly 12 years in 2019.[66] Because of this slow turnover time, it can take more than a decade before most vehicles on the road

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[64] *See, e.g.*, Philip B. Duffy et al., *Strengthened Scientific Support for the Endangerment Finding for Atmospheric Greenhouse Gases*, 363 Science 597, 601 (2019).

[65] EPA, *Automotive Trends*, *supra* note 52, at 65.

[66] Nathan Bomey, *Old Cars Everywhere: Average Vehicle Age Hits All-Time High*, USA Today (June 28, 2019), https://www.usatoday.com/story/money/cars/2019/06/28/average-vehicle-age-ihs-markit/1593764001/.

meet the fuel economy standards applicable to a given model year. Regulations must be implemented early and strengthened consistently in order to establish the regulatory certainty necessary for automakers to create long-term plans to meet ambitious climate goals.

In spite of the weight of scientific evidence that supports an immediate response to warming, the Rule defers action on transportation emissions without explanation. This abdication comes at a critical juncture. The Agencies never explain, and cannot explain, why the Rule meanders around the emissions reduction problem when scientists warn that a direct path to immediate reductions is needed to escape disaster.

C. The Agencies Entirely Fail To Consider the Realistic Prospect of Climate Catastrophe

The deferral of meaningful action is even more concerning because the Agencies' analysis entirely neglects another dimension that adds to the urgency of the problem: there is a realistic prospect that continued emissions could lead to much more serious consequences than those described above. These climate disaster scenarios are well-founded in the scientific literature,[67] and yet the Agencies did not realistically consider their likelihood in the rulemaking process.

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[67] *See, e.g.*, Gernot Wagner & Martin L. Weitzman, *Climate Shock: The Economic Consequences of a Hotter Planet* 48–80 (2015); Kevin E. Trenberth, *Climate*

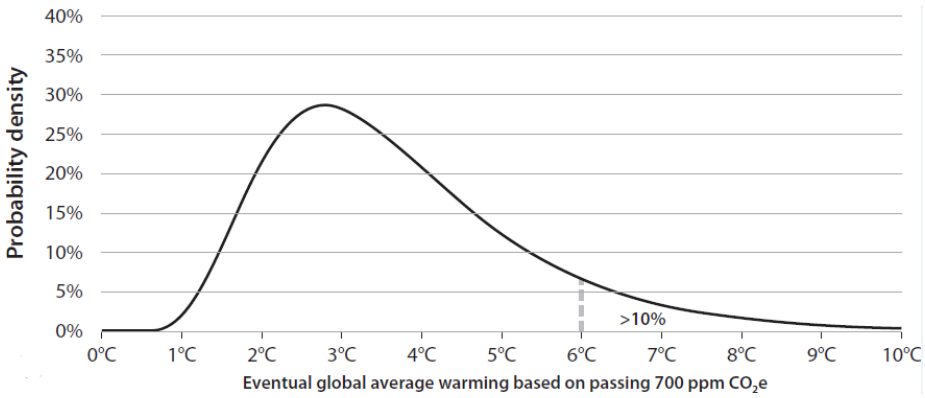

Figure 1. Probability distribution of climate sensitivity to 700 ppm carbon dioxide equivalent, showing the "fat tail" of scenarios above 6°C that have a greater than 10% probability. Source: Wagner & Weitzman at 53.[68]

One might expect the odds that temperature will increase sharply or extreme impacts will occur to be vanishingly small, with the right end of the distribution flattening into a skinny tail. Instead, the sensitivity and extremity distributions have what scientists call "fat tails"[69]: the likelihood of catastrophe is substantial. *See* Figure 1. Two uncertainties of climate models make this phenomenon even more concerning.

Change Caused by Human Activities Is Happening and it Already Has Major Consequences, 36 J. Energy & Nat. Res. L. 463, 463 (2018).

[68] This model is based on the IPCC's 2013 "likely" warming range and could be an underestimate given the significant uncertainty in estimating the probability of serious warming scenarios.

[69] *See, e.g.*, Martin L. Weitzman, *Fat-Tailed Uncertainty in the Economics of Catastrophic Climate Change*, 5 Rev. Envtl. Econ. & Pol'y 275, 277–80, 286 (2011).

First, there is a significant possibility that the atmospheric carbon dioxide levels predicted by the Agencies will result in much more extreme warming than projected. At the 789 ppm concentration projected in the FEIS, JA_[NHTSA-2017-0069-0738_S-14], the probability of extreme warming is significant. Given a 700 ppm concentration, economists Martin Weitzman and Gernot Wagner estimated the probability of warming greater than 6°C as about 10%.[70] Thus, under the Agencies' 789 ppm premise, there is a roughly 10 percent chance of "the end of the human adventure on this planet as we now know it."[71] A 10% chance of an event is meaningful; if someone's home had a 10% chance of suffering catastrophic loss, it would likely be uninsurable in the private market. Yet the Agencies completely failed to consider this intolerable risk of catastrophe in adopting the Rule.

Second, for a given amount of warming, there is a heightened risk of crossing "tipping points," leading to rapid, irreversible events that would have major negative consequences for natural and human systems. JA_[NHTSA-2017-0069-0738_5-33] (defining "tipping point" as points beyond which Earth's climate will experience "disproportionately large or singular response[s] . . . as a result of a

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[70] *See* Wagner & Weitzman, *supra* note 67, at 55.

[71] *Id.* at 58.

moderate additional change in the inputs to [the climate system]"). "Exceeding one or more tipping points" could lead to climate change that occurs "so quickly and unexpectedly that human systems would have difficulty adapting to [it]." JA_[NHTSA-2017-0069-0738_5-33]. Tipping points are not separate and discrete; rather, one can feed into another. Recent studies suggest both that "cascading effects" leading to a "less habitable 'hothouse' climate . . . might be common,"[72] and that they pose "an existential threat to civilization."[73]

As the effects of climate change have manifested more rapidly in recent years than previously anticipated,[74] a tipping point cascade seems increasingly possible. Consider the West Antarctic Ice Sheet, which has been showing increasing signs of structural weakness as warming ocean waters contribute to melting the base of its ice shelves.[75] Measurements of melting processes show them outpacing theoretical predictions by two orders of magnitude.[76] Should a warming ocean erode the sheet's support, it could disintegrate, triggering meters of

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[72] Lenton et al., *supra* note 61, at 594.

[73] *Id.* at 595.

[74] *See, e.g.*, Lijing Cheng et al., *How Fast Are the Oceans Warming?*, 363 Science 128, 128 (2019).

[75] Johannes Feldmann et al., *Stabilizing the West Antarctic Ice Sheet by Surface Mass Deposition*, 5 Sci. Advances 1, 1 (2019).

[76] D.A. Sutherland et al., *Direct Observations of Submarine Melt and Subsurface Geometry at a Tidewater Glacier*, 365 Science 369, 369 (2019).

sea level rise in the coming centuries.[77] Other possible tipping points include biotic interactions causing the extinction of marine and terrestrial species, JA_[NHTSA-2017-0069-0738_8-76], and the release of methane, a potent greenhouse gas, from warming permafrost and tundra in the Arctic. JA_[NHTSA-2017-0069-0738_8-78].

The federal government has affirmed the scientific consensus that "the further and faster Earth's climate system is changed, the greater the risk of unanticipated changes," JA_[NHTSA-2017-0069-0803_102], that could lead to extreme climate impacts. Indeed, EPA itself acknowledged in its earlier Endangerment Finding the possibility of "low probability, high impact" events, 74 Fed. Reg. at 66,524, and the FEIS mentions a number of potential tipping points. JA_-_[NHTSA-2017-0069-0738_8-73_to_8-79]. However, the Agencies fail to acknowledge the long-tailed nature of the risk curve, and their recognition of tipping points plays no discernable role in their decisionmaking.

According to the IPCC's recent report, *Global Warming of 1.5ºC*, the difference between 1.5°C and 3°C of warming could significantly increase the likelihood of passing a tipping point.[78] For example, with warming of 1.5°C or

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[77] Feldmann et al., *supra* note 75, at 1.

[78] *See* IPCC, *supra* note 5, at 261 (listing differences).

less, the report indicates it is "likely" that Arctic summer sea ice could continue to exist; however, 3°C of warming would "very likely" result in ice-free summers in the Arctic.[79] Because the federal government projects 3.49°C of warming under the Rule by the end of the century, JA_[NHTSA-2017-0069-0738_5-40], these IPCC projections for 3°C of warming are conservative.

For a decade, EPA has recognized the role of mitigating extreme risk in guiding rational approaches to climate regulation. The FEIS acknowledges the existence of tipping points, but it does not even come close to reckoning with their reasonable likelihood. A rational regulator would at least consider buying "'climate insurance' taken out against the most severe and irreversible potential consequences of climate change."[80]

CONCLUSION

For the foregoing reasons, *amici* urge the Court to grant the State and Local

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[79] *Id.*

[80] *See* Council of Economic Advisers, *supra* note 58, at 2. The Interagency Working Group on Social Cost of Greenhouse Gases adopted precisely such an approach, recommending that agencies include a 95th percentile estimate of the social cost of carbon when assessing the costs and benefits of their actions, because "there is extensive evidence in the scientific and economic literature of the potential for lower-probability, higher-impact outcomes from climate change, which would be particularly harmful to society and thus relevant to the public and policymakers." Interagency Working Group on Social Cost of Greenhouse Gases, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*, at 15 (2016).

Government and Public Interest Organization Petitioners' petitions for review.

Dated: January 21, 2021

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMIT

1. Pursuant to Federal Rule of Appellate Procedure 29(a)(4)(G), I hereby certify that this brief complies with the type-volume limitations of Fed. R. App. P. 32(a)(7)(B) and Fed. R. App. P. 29(a)(5) because it contains 6442 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(f).

2. I further certify that this brief complies with the typeface requirements of Fed. R. App. P. 32(a)(5) and the type-style requirements of Fed. R. App. P. 32(a)(6) as it has been prepared in Microsoft Word 2016 using 14-point Times New Roman typeface and is double-spaced (except for headings, footnotes, and block quotations).

Dated: January 21, 2021

/s/ Shaun A. Goho
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ADDENDUM: DESCRIPTION OF *AMICI CURIAE*

Amicus Dr. Andrew Dessler is the Reta A. Haynes Chair in Geosciences and professor of atmospheric sciences at Texas A&M University. His research focuses on climate change, remote sensing, and climate change policy.

Amicus Dr. Philip B. Duffy is President and Executive Director of the Woodwell Climate Research Center. He is a former senior policy analyst in the Obama White House.

Amicus Dr. Michael MacCracken has served on a pro bono basis for 18 years as Chief Scientist for Climate Change Programs at the Climate Institute in Washington DC. His primary career involved leading the climate change research program at the Lawrence Livermore National Laboratory and then serving as Senior Scientist and Executive Director at the Office of the U.S. Global Change Research Program and for the first U.S. National Climate Change Assessment. From 2003-07, he was president of the International Association of Meteorology and Atmospheric Sciences.

Amicus Dr. James C. McWilliams is the Louis B. Slichter Professor of Earth Sciences in the Department of Atmospheric and Oceanic Sciences at the University of California Los Angeles.

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Amicus Dr. Drew Shindell is the Nicholas Distinguished Professor of Earth Science at Duke University. He served as Coordinating Lead Author both on the IPCC's Fifth Assessment Report in 2013 and on the IPCC Special Report on Global Warming of 1.5C in 2018.

Amicus Dr. James Stock is the Harold Hitchings Burbank Professor of Political Economy at Harvard University. He served as Chair of the Harvard Economics Department from 2007 to 2009. From 2013 to 2014, he was a member of the White House Council of Economic Advisers, where his portfolio included energy and environmental policy.

Amicus Dr. Kevin Trenberth, from New Zealand, is a Distinguished Scholar at the National Center of Atmospheric Research (NCAR) in Boulder and an Honorary Academic in the Department of Physics, Auckland University in Auckland, New Zealand. As a climate scientist, he has played a major leadership role in the Intergovernmental Panel on Climate Change and the World Climate Research Programme for more than 20 years.

Amicus Dr. Gernot Wagner is a Clinical Associate Professor at New York University's Department of Environmental Studies and Associated Clinical Professor at New York University's Wagner School of Public Service. He was the

founding Executive Director of Harvard's Solar Geoengineering Research Program.

CERTIFICATE OF SERVICE

I hereby certify that on this 21st day of January, 2021, I electronically filed with the Clerk of the Court for the United States Court of Appeals for the District of Columbia Circuit via the CM/ECF System the foregoing Amicus Brief. All participants in the case are registered CM/ECF users, and service will be accomplished by the appellate CM/ECF system.

Dated: January 21, 2021

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