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 SAFETY ADMINISTRATION, *et al.*,
Respondents.

On Petition for Review of Joint Final Agency Action
of the United States Environmental Protection Agency
and National Highway Traffic Safety Administration

BRIEF OF PROFESSOR MICHAEL GREENSTONE AS AMICUS CURIAE IN SUPPORT OF PETITIONERS

Mark Norman Templeton
Robert Adam Weinstock
Andrew Maxfield (clinical law student)
Justin Taleisnik (clinical law student)
Abrams Environmental Law Clinic
6020 South University Avenue
Chicago, Illinois 60637
(773) 702-9611
templeton@uchicago.edu
rweinstock@uchicago.edu
Counsel for Amicus Curiae
Michael Greenstone

Dated: January 21, 2021

CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES

Except for the following, the Brief for Public Interest Organization Petitioners lists all parties, intervenors, and amici appearing in this case.

Amici Curiae for Petitioners:

In support of Petitioners: American Thoracic Society, American Lung Association, American Medical Association, Medical Society of the District of Columbia; Coalition to Protect America's National Parks, National Parks Conservation Association, and New Mexico Wilderness Alliance; Consumer Reports; Institute for Policy Integrity; Andrew Dessler, Philip Duffy, Michael MacCracken, James McWilliams, Noelle Eckley Selin, Drew Shindell, James Stock, Kevin Trenberth, and Gernot Wagner; Professor Michael Greenstone; and National League of Cities et al.

References to the rulings under review and related cases appear in the Brief of the State and Local Government Petitioners.

STATEMENT REGARDING SEPARATE BRIEFING

Professor Michael Greenstone files this separate amicus brief in compliance with the word limits set forth in the Court's Order of October 19, 2020 (Doc. 1867064). A single joint brief is not practicable in this case: Only Professor Greenstone's brief focuses predominantly on the Environmental Protection Agency's and the National Highway Traffic Safety Administration's flawed assessment of the climate impacts of the Rules through an incorrect calculation of the social cost of carbon, thereby rendering the Rules arbitrary and capricious. *See* D.C. Circuit Rule 29(d).

TABLE OF CONTENTS

TABLE OF AUTHORITIES

Cases

Statutes

Rules and Executive Orders

Other Authorities

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

CO_2	carbon dioxide
EPA	U.S. Environmental Protection Agency
NHTSA	National Highway Traffic Safety Administration

STATUTES AND REGULATIONS

The Addendum to the Brief of the State and Local Government Petitioners reproduces pertinent statutes and regulations.

STATEMENT OF IDENTITY, INTEREST IN CASE, AND SOURCE OF AUTHORITY TO FILE

Amicus Curiae Professor Michael Greenstone is the University of Chicago's Milton Friedman Professor in Economics, Director of its Energy Policy Institute, and Director of its Becker Friedman Institute for Research in Economics.[1] He previously served as the Chief Economist on the President's Council of Economic Advisers and is a former member of the U.S. Secretary of Energy's Advisory Board. He is an elected member of the American Academy of Arts and Sciences. He is currently leading teams of researchers, including those through the Climate Impact Lab, to estimate the economic and social costs of climate change.

When Professor Greenstone served as Chief Economist for the President's Council of Economic Advisers, he co-led the Interagency Working Group on Social Cost of Carbon ("Interagency Group") that developed a government-wide approach for assessing the environmental and economic impacts of carbon dioxide ("CO_2") emissions. This process led to what is commonly known as the "Social

[1] *See generally* https://www.michaelgreenstone.com.

Cost of Carbon Protocol," an expert-driven, consensus-based, scientifically validated methodology for assessing the impacts of marginal CO_2 emissions.

Professor Greenstone's interest stems from his desire that governmental decision-making monetize climate change impacts correctly. All parties consented to the filing of this brief. *See* Fed. R. App. P. 29(a)(2); Notice filed December 21, 2020.

RULE 29(a)(4)(E) STATEMENT

Under Federal Rule of Appellate Procedure 29(a)(4)(E), Professor Greenstone states 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. Supervised by Professor Greenstone, his counsel Clinical Professors Templeton and Weinstock authored this brief, with the assistance of law students Natalie Griffin, Andrew Maxfield, and Justin Taleisnik.

SUMMARY OF THE ARGUMENT

Professor Greenstone—a world-renowned expert on the social cost of carbon ("Social Cost")—submits this brief to explain how the U.S. Environmental Protection Agency ("EPA") and the National Highway Traffic Safety Administration ("NHTSA") (collectively, "the Agencies") departed from scientifically and economically appropriate methods for monetizing damages caused by CO_2 emissions when promulgating the Safer Affordable Fuel-Efficient

Vehicles Rules ("SAFE Rules").[2] The Agencies unjustifiably implemented a faulty methodology for valuing climate impacts ("Agencies' Social Cost") based on improper manipulations of the Interagency Group's Social Cost Protocol, upon which the Agencies relied in their 2012 Rules setting Corporate Average Fuel Economy standards and CO_2 emissions standards. As a result, the Agencies miscalculated the SAFE Rules' impacts by at least $33 billion, misrepresented the costs and benefits of the SAFE Rules when comparing them to the 2012 Rules, and wrongly presented the net benefits of the SAFE Rules as positive when in fact they are negative. By using faulty Social Cost calculations to justify the SAFE Rules, the Agencies promulgated the SAFE Rules arbitrarily and capriciously and undermined their statutory purposes.

ARGUMENT

The Agencies' Social Cost arbitrarily and capriciously departs from the best available science and widely accepted environmental economics in two ways.

First, the Agencies' Social Cost used a flawed "domestic-only" approach. This approach failed to account fully for international impacts that affect U.S. citizens and businesses, ignored how U.S. climate policy induces reciprocal actions in other nations that benefit the United States, and misapplied the integrated

[2] 85 Fed. Reg. 24,174 (Apr. 30, 2020) (codified at 40 C.F.R. pts. 86, 600; 49 C.F.R. pts. 523, 531, 533, 536, 537) [hereinafter SAFE Final Rules].

assessment models on which the Agencies relied. By considering only the costs within U.S. borders, the Agencies' Social Cost is only one sixth of the Interagency Group's Social Cost.[3]

Second, the Agencies' Social Cost discounted future climate harms using inappropriately high discount rates that none of recent financial markets, economic theory, or relevant government directives support. The Agencies also erred by using draft regulatory impact analysis data that the Agencies themselves superseded in their final regulatory impact analysis.

Ultimately, if the Agencies used the Social Cost Protocol with discount rates in line with the recent financial markets and the general economic consensus, the SAFE Rules' costs would always exceed the benefits.[4]

---

[3] *Compare* Interagency Working Group, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*, 4 (2016) [hereinafter Interagency Group 2016 Update] ($48 2020 global value using a 3% discount rate in 2016$), *with SAFE Final Rules*, 85 Fed. Reg. at 24,733 ($8 2020 domestic value using a 3% discount rate in 2016$). Interagency Group values are converted from 2007$ to 2016$ for comparison to EPA using U.S. Bureau of Labor Statistics Inflation Calculator.

[4] *See* SAFE Final Rules, 85 Fed. Reg. at 24,176 (conceding costs exceed benefits when using 3 percent discount rate). If the Agencies had lowered the rate to address the intergenerational nature of the climate change problem, as directed by the Office of Management and Budget's Circular A-4, the costs of the SAFE Rules would exceed the benefits even more. *See* Office of Mgmt. & Budget, Exec. Office of the President, Circular A-4 at 35 (2003) [hereinafter Circular A-4]; *see also infra* Section III.

Public comments alerted the Agencies to these mistakes. But the Agencies neither remedied these errors nor addressed substantively the comments.

The Agencies' departures from the best available science defied the Agencies' fundamental obligations to base rulemakings on credible and accurate cost-benefit analyses. Executive Order 12,866 requires an agency to "base its decision on the best reasonably obtainable scientific, technical, economic, and other information,"[5] and Executive Order 13,783 required that Agencies "use estimates of costs and benefits . . . based on the best available science and economics."[6] Office of Management and Budget Circular A-4 ("Circular A-4") directs Agencies to consider global repercussions and use low discount rates when considering problems like climate change,[7] instructions flouted by the Agencies.

By ignoring impacts occurring outside U.S. borders that affect U.S. interests and by using inappropriately high discount rates, the Agencies' Social Cost ignored the best available science and economics and misrepresented the SAFE Rules' impacts. Therefore, the SAFE Rules are arbitrary and capricious.

---

[5] Exec. Order No. 12,866, 58 Fed. Reg. 51,735, 51,736 (Oct. 4, 1993).
[6] Exec. Order No. 13,783, 82 Fed. Reg. 16,093, 16,095 (Mar. 31, 2017).
[7] Circular A-4, *supra* note 4, at 6.

I. BACKGROUND: THE SOCIAL COST PROTOCOL REPRESENTS THE BEST AVAILABLE SCIENTIFIC APPROACH TO ESTIMATE THE IMPACTS OF CO_2 EMISSIONS.

In 2010, an Interagency Group—five federal agencies, including EPA and the Department of Transportation, and six executive offices—synthesized decades of scientific research into the most accurate tool for estimating the impacts of marginal CO_2 emissions: the Social Cost Protocol. The Interagency Group employed a transparent and consensus-based process, drawing on expertise from climate scientists, economists, and other specialists to provide a standardized measure of the environmental impacts of CO_2 emissions.[8] By translating environmental impacts resulting from CO_2 emissions into a common language of dollars and cents, the Social Cost Protocol enables decision-makers to evaluate how environmental impacts compare to other aspects of a proposed action.

The Interagency Group based the Social Cost Protocol on results from three of the most advanced integrated assessment models for estimating global impacts of climate change. The Interagency Group selected these models, in part, based on their widespread endorsement in the expert community.[9] The three models account for global climate change impacts primarily in terms of human-health effects, net

---

[8] *See* Interagency Working Group, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*, 1 (2010) [hereinafter Interagency Group 2010 Report].
[9] *See id.* at 5.

agricultural productivity, property damages from increased flood risk, and the value of certain quantifiable ecosystem services like timber production and livestock grazing.[10]

The Interagency Group applied equal weight to the results of each of the three global models because each produces plausible values and has different limitations.[11] For example, one model excludes potentially severe effects, whereas the other two assume small probabilities of severe damages that increase with greater warming.[12] The Interagency Group provided each model a consistent set of input parameters—the temperature–greenhouse gas relationship and greenhouse-gas emissions trajectory[13]—developed through a transparent, consensus-based expert process.[14] Ultimately, the Interagency Group ran 10,000 scenarios over five sets of emissions and socioeconomic trajectories for the three different models, for a total of 150,000 scenarios of global impacts.[15] To convert the models' estimates of future global damages into current monetary values, the Interagency Group

---

[10] *Id.* at 2.
[11] *Id.* at 5.
[12] *Id.* at 31.
[13] *See id.* at 6, 15.
[14] *Id.* at 6–8.
[15] *See* Nat'l Acads. of Scis., Eng'g, and Med., Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide 28 n.15 (2017) [hereinafter National Academies Report].

discounted those estimates at three different rates: 2.5 percent, 3 percent, and 5 percent.[16]

Table 1: Social Cost of CO_2, 2010–2040 (in 2016$ per metric ton of CO_2) [17]

Year Emissions Occur	5% Discount Rate	3% Discount Rate	2.5% Discount Rate	High Impact (95th Percentile at 3% Discount Rate)
2010	$11	$36	$57	$99
2020	$14	$48	$71	$141
2030	$18	$57	$84	$175
2040	$24	$69	$97	$210

In addition to presenting Social Cost values that "average" all outcomes of the emissions scenarios, the Interagency Group also reported a value that focuses on severe but low-probability climate change outcomes, those that have a 1-in-20 chance of occurring—"95th percentile" outcomes.[18] While the Interagency Group included this 95th percentile value to present clearly the high costs of "lower-

[16] Interagency Group 2010 Report, *supra* note 8, at 23 (selecting 3 percent rate because it corresponded with then-current interest rates). While those Interagency Group's discount rates were appropriate in 2010, Section III explains that the best available methods applied by the Interagency Group now support substantially lower rates.

[17] *Id.* at 4. *See* discussion, *supra* note 3, describing conversion from 2007$ to 2016$.

[18] *Id.* at 1.

probability, higher-impact outcomes,"[19] the Agencies entirely failed to report any such value in the SAFE Rules.

Since the Interagency Group developed the Social Cost Protocol, researchers have continued to improve Social Cost calculations. In coordination with the National Academy of Sciences, the Interagency Group updated Social Cost Protocol inputs four times. For example, in 2013, the Interagency Group incorporated the newest versions of the three models after their peer-reviewed publication,[20] and published additional updates in 2016.[21] Researchers have also refined scientific understanding of the Social Cost along numerous dimensions.[22] This process of constant empirical refinement—incorporating new data into an established, accepted methodology—explains why, for example, appropriate discount rates today are lower than those selected by the Interagency Group in 2010.[23]

---

[19] *See* Interagency Group 2016 Update, *supra* note 3, at 3 (describing 2010 process).
[20] *Id.* at 6.
[21] *Id*.
[22] *See, e.g., Climate Change, Part IV: Current Economic Effects of Climate Change and the Costs of Inaction: Hearing Before the Subcomm. on the Env't of the H. Comm. on Oversight and Reform*, 116th Cong. 4 (2019) (statement of Michael Greenstone), https://epic.uchicago.edu/wp-content/uploads/2019/10/Greenstone-SCC-testimony-022717.pdf [hereinafter Greenstone Congressional Testimony] (showing climate-change impacts on global mortality are approximately ten times larger than indicated by initial data).
[23] *See infra* Section III.

During this period, courts and government bodies have endorsed the Social Cost Protocol. Courts have embraced the Social Cost Protocol as high-quality scientific information that regulatory analyses should use.[24] The Government Accountability Office scrutinized and endorsed the Social Cost Protocol, finding its approach credible because it used consensus-based decision-making, relied on existing academic literature and models, disclosed limitations, considered public comments, and revised estimates based on updated research.[25] All told, proper analyses using the Social Cost Protocol have supported approximately 150 federal regulations,[26] anticipated to provide more than $1 trillion in benefits.[27]

---

[24] *See, e.g.*, *Zero Zone, Inc. v. U.S. Dep't of Energy*, 832 F.3d 654, 678 (7th Cir. 2016); *High Country Conservation Advocs. v. U.S. Forest Serv.*, 52 F. Supp. 3d 1174, 1190–93 (D. Colo. 2014); *Mont. Envtl. Info. Ctr. v. U.S. Office of Surface Mining*, 274 F. Supp. 3d 1074, 1094–99 (D. Mont. 2017); *Sierra Club v. Fed. Energy Reg. Comm'n*, 867 F.3d 1357, 1375 (D.C. Cir. 2017).

[25] *See* U.S. Gov't Accountability Office, GAO-14-663, Regulatory Impact Analysis: Development of Social Cost of Carbon Estimates 12–20 (2014).

[26] *See* Greenstone Congressional Testimony, *supra* note 22, at 4.

[27] William D. Nordhaus, *Revisiting the Social Cost of Carbon*, 114 Proc. Nat'l Acad. Scis. 1518, 1523 (2017) [hereinafter Nordhaus Study]. Other countries, such as Canada and Mexico, have adopted the Social Cost Protocol or similar methods of monetizing CO_2 emissions. *See At What Cost? Examining the Social Cost of Carbon: Hearing Before the Subcomms. on Env't and Oversight of the H. Comm. on Sci., Space, and Tech.*, 115th Cong. 5 (2017) (statement of Michael Greenstone), https://epic.uchicago.edu/wp-content/uploads/2019/10/Greenstone-SCC-testimony-022717.pdf.

II. THROUGH THEIR DOMESTIC-ONLY METHODOLOGY, THE AGENCIES ARBITRARILY AND CAPRICIOUSLY IGNORED THE RULES' EXTRATERRITORIAL EFFECTS ON U.S. INTERESTS.

The evidence before the Agencies contradicts their explanation for their choice to limit their analysis to damages that occur within the United States.[28] Scientists designed the integrated assessment models—relied upon by both the Agencies and the Interagency Group—to generate global cost estimates, but the Agencies mangled the models' outputs to fashion domestic-only figures.[29] Even applying their erroneous domestic-only approach, the Agencies ignored at least two key aspects of the domestic problem—that (1) some effects that occur outside U.S. borders affect domestic U.S. interests, and (2) the United States realizes domestic benefits when other countries reduce their CO_2 emissions in response to United States' reduction commitments. The Agencies' Social Cost also contravenes the Agencies' legal authorities, which require them to consider the full benefits of CO_2 reductions, and the Agencies failed to explain reasonably why they changed from the global approach used in their 2012 Rules.

---

[28] SAFE Final Rules, 85 Fed. Reg. at 24,732.

[29] *See* Nat'l Highway Traffic Safety Admin. & U.S. Envtl. Protection Agency, Final Regulatory Impact Analysis: The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021–2026 Passenger Cars and Light Trucks 1060 (Mar. 2020) [hereinafter SAFE Regulatory Impact Analysis].

A. The Agencies' domestic-only approach ignores international climate-change effects on U.S. interests and misapplies the models upon which the Agencies relied.

The Agencies' Social Cost is incomplete on its own terms, as it overlooks international climate-change effects that impact U.S. interests, which is a significant aspect of the problem. The evidence before the Agencies also contradicted the Agencies' domestic-only approach.

1. The Agencies' domestic-only approach does not include all impacts on U.S. interests and is therefore incomplete on its own terms.

First, the Agencies ignored climate-change effects on U.S. interests outside U.S. borders. Their analysis did not account for the direct effects on the nine million U.S. citizens living abroad, foreign property owned by U.S. citizens, and U.S. corporations' overseas property, which the Commerce Department valued at $1.3 trillion in 2018.[30] The domestic-only analysis also ignores direct effects on overseas U.S. military assets, including military bases, such as the cost of

---

[30] *See* Circular A-4, *supra* note 4, at 15 ("Your analysis should focus on benefits and costs that accrue to citizens and residents of the United States."); N.C. Dep't of Envtl. Quality, Comments on Proposed Rulemaking and Draft Environmental Impact Statement for "The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks," NHTSA-2018-0067-12025, 39 (Oct. 26, 2018) [hereinafter NCDEQ Comment]; U.S. Bureau of Econ. Analysis, News Release, Activities of U.S. Multinational Enterprises, 2018, *8 (Aug. 21, 2020), https://www.bea.gov/sites/default/files/2020-08/omne0820_0.pdf.

fortifying installations against sea-level rise.[31] Although the Agencies addressed some comments regarding the scope of the domestic analysis, they did not respond directly to comments highlighting these omissions.[32]

Second, the Agencies' approach disregarded international climate effects on U.S. national security and migration. The Department of Defense has declared that climate effects "will aggravate stressors abroad such as poverty, environmental degradation, political instability, and social tensions—conditions that can enable terrorist activity and other forms of violence," and, as a result, "climate change may increase the frequency, scale, and complexity of future missions."[33] The Department has found, "[t]he effects of a changing climate are a national security issue."[34] Likewise, the World Bank stated that climate-change impacts on agricultural productivity have contributed to record northward migration from Central America.[35] Meanwhile, the U.S. government has invested billions of

---

[31] *See* Dep't of Def., *Report on Effects of a Changing Climate to the Department of Defense* 16, 17 (2019) [hereinafter Dep't of Defense 2019 Report] (stating about two-thirds of military installations are vulnerable to recurrent flooding, more than half to drought, and about half to wildfires).
[32] *See, e.g.*, NCDEQ Comment, NHTSA-2018-0067-12025 at 39; SAFE Final Rules, 85 Fed. Reg. at 24,734.
[33] Dep't of Def., Quadrennial Defense Review 2014 vi, 8 (2014).
[34] Dep't of Defense 2019 Report, *supra* note 31, at 2.
[35] World Bank Group, Groundswell: Preparing for Internal Climate Migration 99 (Mar. 2018).

dollars to stop Central American migrants from entering the United States.[36] By adopting a domestic-only approach and omitting these effects, the Agencies disregarded impacts that originate abroad, but that force the U.S. government to spend billions of taxpayer dollars in response.

2. The Agencies' domestic-only approach contradicted the scientific evidence on which the Agencies relied.

When calculating domestic-only damages, the Agencies arbitrarily contradicted the specific study—the 2017 National Academies Report—on which they purported to rely.[37] The report stated that any domestic analysis should include "international implications that impact the United States."[38] Although the report discussed the possibility of calculating a domestic-only value, it cautioned that "[t]horoughly estimating a domestic [value] would therefore need to consider the potential implications of climate impacts on, and actions by, other countries, which also have impacts on the United States."[39] The Agencies did not do this.

---

[36] *See, e.g.*, Kevin Sieff and Mary Beth Sheridan, *U.S., Mexico Pledge Billions to Reduce Migration from Central America*, Wash. Post (Dec. 18, 2018) (noting U.S. contribution of $10.6 billion).
[37] *See* SAFE Regulatory Impact Analysis, *supra* note 29, at 1057 n.2046.
[38] National Academies Report, *supra* note 15, at 53 ("Climate damages to the United States cannot be accurately characterized without accounting for consequences outside U.S. borders. . . . The current [climate models] do not fully account [] for the estimation of comprehensive impacts for the United States.").
[39] *Id.*

The Agencies also misused the outputs of models designed to generate global values to manufacture their domestic-only figure. The Agencies arbitrarily used 10 percent of the global damages figure generated from the Dynamic Integrated Climate-Economy model as representative of domestic damages. In the study the Agencies cited to support this choice, the author estimated the U.S. regional Social Cost at 15 percent, not 10 percent.[40] The study also stated "regional damage estimates" vary so much that they "are both incomplete and poorly understood" and "there is little agreement on the distribution of the [Social Cost] by region."[41] Commenters noted that the Agencies incorrectly used this model,[42] but the Agencies did not explain their departure from the study.[43]

B. The Agencies' domestic-only approach is arbitrary given that the United States' actions influence other countries' CO_2 emissions policies, which affect the United States.

The Agencies' domestic-only approach fails to account for the fact that presenting the global impacts of CO_2 emissions promotes action by foreign governments that benefits the United States. Because CO_2 emissions affect the

---

[40] *See* Nordhaus, *supra* note 27, at 1521.
[41] *Id.* at 1522.
[42] Institute for Policy Integrity *et al.*, Comments on Quantifying and Monetizing Greenhouse Gas Emissions in the Safer Affordable Fuel-Efficient Vehicles Proposed Rule and Preliminary Regulatory Impact Analysis, NHTSA-2017-0069-0559, 25 (Oct. 26, 2018).
[43] SAFE Regulatory Impact Analysis, *supra* note 29, at 1061.

climate regardless of where they are emitted, emissions reductions in other counties are essential to protect U.S. citizens.[44] "Using a global estimate of damages in U.S. regulatory analyses sends a strong signal to other nations that they too should base their emissions reductions strategies on a global perspective, thus supporting a cooperative and mutually beneficial approach to achieving needed reduction."[45]

Using the Social Cost Protocol's global approach promotes bi-lateral and multi-lateral agreements to reduce emissions, such as the U.S.-China accord and the Paris Agreement.[46] Such agreements induce other countries to implement carbon-reduction policies.[47] For example, "it is estimated that the United States

---

[44] *See* Tamma Carleton & Michael Greenstone, *Updating the United States Government's Social Cost of Carbon* 26 (Energy Policy Inst. at the Univ. of Chicago, Working Paper No. 2021-04), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3764255; Interagency Group 2016 Update, *supra* note 3, at 17.

[45] *See* Interagency Group 2016 Update, *supra* note 19, at 17; *see also* Interagency Group 2010 Report at 10 ("Even if the United States were to reduce its greenhouse gas emissions to zero, that step would be far from enough to avoid substantial climate change.").

[46] *See generally* Press Release, White House, U.S.-China Joint Announcement on Climate Change (Nov. 12, 2014), http://obamawhitehouse.archives.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change; Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104; *see also* Greenstone Congressional Testimony, *supra* note 22, at 6 ("[T]he Paris Climate Agreement followed where other countries made larger than expected pledged reductions.").

[47] *See* Interagency Group 2016 Update, *supra* note 29, at 17.

was able to leverage [between] 6.1 [and] 6.8 tons of CO_2 reductions from other countries for every ton that it pledged to cut in the Paris Climate Agreement."[48]

Further, "when the United States accounts for the full global cost of climate change it incentivizes other countries to reduce their own [reciprocal] emissions, which ultimately benefits the United States more than any purely domestic climate policy could."[49] When the United States used the Social Cost Protocol as a basis for the 2012 Rules, several countries, including Canada and Mexico, adopted U.S. standards wholesale or adjusted their fuel economy programs based on U.S. standards.[50] When those countries adopt stronger fuel economy standards based on U.S. standards, their residents are paying to reduce CO_2 emissions, and those emission reductions benefit U.S. residents. Therefore, the Agencies' domestic-only analysis undermines U.S. interests by making it less likely that other countries will further reduce emissions, thereby harming U.S. residents.

---

[48] Carleton & Greenstone, *supra* note 44, at 26.
[49] *Id*.
[50] Ziefei Yang & Anup Bandivadekar, Int'l Council on Clean Transportation, 2017 Global Update: Light-Duty Vehicle Greenhouse Gas and Fuel Economy Standards 7–8 (2017).

C. The Agencies' domestic-only approach does not comply with the Agencies' legal obligations.

The Agencies' Social Cost illegally treats all impacts experienced outside of U.S. borders as having zero value.[51] The Agencies arbitrarily acted inconsistently with Circular A-4 when they failed to quantify global benefits in their main analysis, and they failed to provide a reasoned explanation for departing from the methodology used in the 2012 Rules.

The Agencies conducted a cost-benefit analysis that arbitrarily treated as having "zero" value all benefits occurring outside U.S. boundaries and some indirect benefits experienced within U.S. borders, in contravention of the Clean Air Act and the Energy Policy and Conservation Act. The Clean Air Act authorizes EPA to set emissions standards to address harmful pollutants, including CO_2,[52] and provides that "a default assumption of zero value shall not be assigned to [regulatory] benefits unless supported by specific data."[53] Under the Energy Policy and Conservation Act, NHTSA must determine "maximum feasible" fuel economy standards by balancing several factors, including economic impacts.[54] The Ninth

---

[51] *Cf. Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1200 (9th Cir. 2008).
[52] *Massachusetts v. Envtl. Protection Agency*, 549 U.S. 497, 528 (2007); *see* 42 U.S.C. § 7521(a)(1).
[53] 42 U.S.C. § 7612(b) (requiring comprehensive analysis of "economic, public health, and environmental benefits" of each standard issued).
[54] 49 U.S.C. § 32902(a).

Circuit reviewed the "maximum feasible" analysis in NHTSA's 2006 fuel economy rule and held that the agency could not treat the benefits of carbon reduction as having zero value.[55] The Agencies' Social Cost arbitrarily treated a significant portion of carbon reduction benefits as having zero value, contradicting the Clean Air Act and Ninth Circuit precedent.

While the Agencies assert "[i]t would be inconsistent to report the global [Social Cost] while ignoring other global costs and benefits,"[56] including all quantifiable benefits in a cost-benefit analysis—even if other costs and benefits are non-quantifiable—is not "inconsistent." In fact, Circular A-4 directs the Agencies to include *all* quantifiable costs and benefits and to describe any remaining non-quantifiable information in the Regulatory Impact Analysis.[57] "[T]o address the global nature of the problem, the [Social Cost] must incorporate the full (global) damages caused by GHG [greenhouse gas] emissions."[58] Therefore, the Agencies arbitrarily acted inconsistently with Office of Management and Budget's directives when they failed to quantify global benefits.

The Agencies did not provide a reasoned explanation for why they changed the basis for their analysis from the Social Cost Protocol, which they used for the

---

[55] *Ctr. for Biological Diversity*, 538 F.3d at 1198, 1200.
[56] SAFE Final Rules, 85 Fed. Reg. at 24,234.
[57] Circular A-4, *supra* note 4, at 45.
[58] Interagency Group 2016 Update, *supra* note 3, at 10.

2012 Rules. Failing to provide "a reasoned explanation for [a] change of policy that is supported by record evidence" is arbitrary and capricious.[59] The Agencies state that their analysis changed in response to the directives in Executive Order 13,783.[60] However, that Executive Order directs agencies to adhere to Circular A-4, which calls for an analysis that matches the scope of the problem[61]—a global analysis for climate change.

III. THE AGENCIES' SOCIAL COST USES AN ARBITRARY DISCOUNT RATE THAT DOES NOT REFLECT FINANCIAL MARKETS OR INTERGENERATIONAL CONSIDERATIONS.

Using an appropriate discount rate is essential to calculating an accurate Social Cost. Discounting converts future costs of climate change into present-day values, and altering the discount rate can create significant variation in future costs estimates.[62] This is not an academic debate; changes in discount rates change the projected costs and benefits of the SAFE Rules by billions of dollars. Applying a 7 percent discount rate on the Agencies' domestic-only basis yields a Social Cost of only $1 per metric ton of CO_2 emissions, while the 3 percent and 2.5 percent

---

[59] *Nat'l Lifeline Ass'n* v. *Fed. Commc'ns Comm'n*, 921 F.3d 1102, 1105 (D.C. Cir. 2019); *cf. Motor Vehicles Mfrs. Ass'n of U.S. v. State Farm Mut. Auto Ins. Co.*, 463 U.S. 29, 42 (1983).
[60] SAFE Final Rules, 85 Fed. Reg. at 24, 733.
[61] Circular A-4, *supra* note 4, at 3.
[62] *See* SAFE Final Rules, 85 Fed. Reg. at 24,735.

discount rates yield values of $8 and $9 respectively (in 2016$).[63] Using the Agencies' domestic-only Social Cost, a change in discount rate from 2.5 percent to 7 percent reduces the SAFE Rules' net benefits by $7.3 billion dollars.[64] And if the correct global figures are used, changing from a 3 percent to 7 percent rate decreases net benefits by $37.3 billion.[65]

The Agencies' use of a 3 percent discount rate in their main analysis is improper. First, the Agencies failed to follow economic consensus and use the best available recent financial market data for appropriate discount rates, settling arbitrarily and wrongly on the 3 percent figure. Second, even though climate change has significant intergenerational impacts, the Agencies failed to consider properly an appropriate intergenerational discount rate as required by Circular A-4. To defend this failure, the Agencies ignored the evidence before them in their own Final Regulatory Impact Analysis and wrongly cited superseded draft information to claim this discount rate error made no difference to the final rule. These discount

---

[63] *See id.* at 24,733. By comparison, the Interagency Group valued the Social Cost at $48 in 2020 using a global scope and a 3 percent discount rate (in 2016$). *See* Table 1. Professor Greenstone now values the Social Cost at $125 using a 2 percent discount rate. *See* Carleton & Greenstone, *supra* note 44, at 40.

[64] *See* SAFE Regulatory Impact Analysis, 1803–04, tbl. VII-482 (showing this reduction for the final CAFE standards with a 3 percent overall discount rate for the cost-benefit analysis).

[65] *See id.*

rate mistakes caused the Agencies to misunderstand a key aspect of the problem and rendered their action arbitrary and capricious.

A. The Agencies' chosen discount rate does not reflect current economic consensus and recent financial markets.

Circular A-4 dictates that agencies use "the best reasonably obtainable . . . economic information available" when conducting cost-benefit analyses,[66] but the Agencies failed to do so for discount rates.[67] Circular A-4 states that the "real rate of return on long-term government debt" provides a "fair approximation" for discount rates used to assess regulations that affect private consumption,[68] such as the SAFE Rules. However, the Agencies ignored current financial market rates in determining the appropriate consumer discount rate. Instead, the Agencies arbitrarily applied mechanically an out-of-date 3 percent discount rate from Circular A-4 and deviated from Circular A-4's direction and reasoning without justification.

---

[66] Circular A-4, *supra* note 4, at 17.
[67] *See* SAFE Final Rules, 85 Fed. Reg. at 24734–35.
[68] *See* Circular A-4, *supra* note 4, at 33. Although the Interagency Group applied discount rates of 2.5 percent, 3 percent, and 5 percent, these numbers reflected economic consensus in 2010. Most economists today see the Interagency Group discount rates as too high. *See* Council of Econ. Advisers, Discounting for Public Policy: Theory and Recent Evidence on the Merits of Updating the Discount Rate 6 & n.6 (Jan. 2017). In any event, the Agencies do not cite the Interagency Group numbers to support their chosen discount rate.

Recent financial markets indicate an appropriate discount rate is significantly lower than the Agencies' 3 percent figure. In Circular A-4, OMB proffered the 3 percent consumer discount rate based on the average rate of return for long-term government debt in 2003.[69] However, between 2003 and 2020, the real rate of return on long-term government debt has almost never reached 3 percent, and it has been below 1.5 percent for the entirety of the past decade, including when the Agencies promulgated the SAFE Rules.[70] In a 2017 paper suggesting updates to Circular A-4, the Council of Economic Advisers stated that the appropriate consumer discount rate "should be *at most* 2 percent."[71] In a recent paper advocating an updated Social Cost, Professor Greenstone mirrored other economists and recommended using a discount rate no higher than 2 percent.[72] He based this rate on long-term U.S. Treasury rates and market trends—just as Circular A-4 did in 2003.[73]

---

[69] *See* Circular A-4, *supra* note 4, at 33. ("[T]he real rate of return on long-term government debt may provide a fair approximation [of the social rate of time preference]. Over the last thirty years, this rate has averaged around 3 percent.").
[70] *See* FRED, *10-Year Treasury Inflation-Indexed Security, Constant Maturity (DFII10)*, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/series/DFII10 (last visited Jan. 15, 2021).
[71] *See* Council of Econ. Advisers, *supra* note 68, at 3; *see also* Moritz A. Drupp et al., *Discounting Disentangled*, 10 Am. Econ. J. Econ. Pol'y 109, 111 (2018) (noting economists' consensus on 2 percent consumer discount rate).
[72] Carleton & Greenstone, *supra* note 44, at 25.
[73] *See id.* at 23–25.

By mechanically applying the 3 percent discount rate from Circular A-4, the Agencies arbitrarily failed to implement Circular A-4's methodology for calculating the correct consumer discount rate and provided no rational reasons for failing to do so. Consequently, the Agencies acted arbitrarily and capriciously by failing to follow Circular A-4's direction to use the best economic information available.

B. The Agencies used an arbitrarily high discount rate for the intergenerational climate change problem.

Despite acknowledging that climate change is an intergenerational problem, the Agencies used an inappropriately high discount rate for intergenerational impacts. A lower discount rate helps protect the future generations that will experience future costs and benefits but have no voice in current decision-making. As Circular A-4 explains, and the Agencies acknowledge,[74] "[s]pecial ethical considerations arise when comparing benefits and costs across generations. . . . Future citizens who are affected by such choices cannot take part in making them, and today's society must act with some consideration of their interest."[75] Applying a high discount rate to future benefits reduces the present value of those benefits to

[74] *See* SAFE Final Rules, 85 Fed. Reg. at 24,735 (referencing "OMB[ ] guidance . . . to employ an even lower [discount] rate . . . [for] tradeoffs between improving the welfare of current and future generations.").
[75] *See* Circular A-4, *supra* note 4, at 35.

an inappropriately low figure, such that it wrongly undermines the welfare of future generations.

Here again, the Agencies contradicted Circular A-4, which dictates that discount rates for intergenerational problems like climate change must be lower than values for current consumption reflected in current U.S. treasury markets.[76] As noted above, current U.S. Treasury markets would indicate a rate that should not be greater than 2 percent. Therefore the Agencies' use of the 2.5 percent for their intergenerational rate is arbitrary.

The Agencies provide no rationale for their 2.5 percent intergenerational rate other than that it falls within the 1 to 3 percent range suggested in Circular A-4.[77] But like the 3 percent consumer discount rate, these rates from Circular A-4 were based on market conditions at the time.[78] Consequently, the Agencies' 2.5 percent figure is too high and departs arbitrarily from the best available economics on intergenerational discounting.

---

[76] *See id.* at 36 (explaining why agencies should use a lower discount rate for intergenerational issues due to equity and uncertainty concerns).
[77] *See* SAFE Final Rules, 85 Fed. Reg. at 24,733.
[78] *See* Circular A-4, *supra* note 4, at 36 ("[T]he [intergenerational] discount rate appropriate in this case, from the 1990s, ranged from 1 to 3 percent.").

C. The Agencies ignored their own evidence and erroneously cited to superseded draft data to support their flawed intergenerational discount rate.

The Agencies erroneously relied on superseded draft data in assessing the implications of their 2.5 percent intergenerational discount rate. As a result, the Agencies misstated the SAFE Rules' impacts by billions of dollars.

In the SAFE Rules, the Agencies describe changing the intergenerational discount rate from 3 percent to 2.5 percent as reducing total net benefits by only 1 percent. They then cite this 1 percent reduction to dismiss the results of their intergenerational sensitivity analysis as showing "little or no effect on the estimated total benefits of the proposed rule."[79] To support this argument, the Agencies rely on Tables 13-8 and 13-9 from the 2018 Preliminary Regulatory Impact Analysis ("Preliminary Analysis").[80]

However, the Agencies changed dramatically the numbers pivotal for this calculation in the same tables of the Final Regulatory Impact Analysis. If the Agencies had used the final numbers instead of the superseded draft Preliminary Analysis numbers, they would have found that using a 2.5 percent discount rate

---

[79] *See* SAFE Final Rules, 85 Fed. Reg. at 24,735.

[80] *See* Nat'l Highway Traffic Safety Admin. & U.S. Envtl. Protection Agency, Preliminary Regulatory Impact Analysis: The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021–2026 Passenger Cars and Light Trucks 1547–50 tbls. 13-8, 13-9 (Oct. 2018).

actually decreases net benefits by 20% for the CAFE standards[81] and 11% for the CO_2 standards.[82] These changes are worth billions of dollars in social costs.

CONCLUSION

By considering only narrowly defined domestic costs and using inappropriately high discount rates when setting the Agencies' Social Cost, the Agencies departed from the well-established, scientifically validated and widely endorsed Social Cost Protocol, mainstream environmental economics, and their own 2012 Rules without sufficient justification. As a result, the Agencies overestimated the SAFE Rules' net benefits by billions of dollars. In fact, the Agencies' own analyses show that if the Agencies had calculated a more accurate Social Cost using a global scope and proper discount rate, their cost-benefit for the

---

[81] *See* SAFE Regulatory Impact Analysis, *supra* note 3, at 1803–04, tbl. VII-482 (–$13.1 billion to –$15.7 billion).

[82] *See id.* at 1807, tbl. VII-484 (from –$22 billion to –$24.5 billion). These overall net benefit numbers come from analyses using a 3 percent discount rate for other costs and benefits outside the Social Cost. Tables VII-483 and VII-485 of the SAFE Regulatory Impact Analysis perform analyses using a 7 percent overall discount rate and show similar reductions in net benefits. The Agencies confirm these are the correct net-benefit numbers in other sections of the final rules. *See* SAFE Final Rules, 85 Fed. Reg. at 24,176 ("For the CAFE program, overall (fleetwide) net benefits vary from $16.1 billion at a 7 percent discount rate to –$13.1 billion at a 3 percent discount rate. For the CO_2 program, overall (fleetwide) societal net benefits vary from $6.4 billion at a 7 percent discount rate to –$22.0 billion at a 3 percent discount rate.").

SAFE Rules would not be positive, as the Agencies misleadingly presented, but would always be negative by at least $19.3 billion.[83]

These numerous, compounding errors render the SAFE Rules arbitrary and capricious, requiring vacatur.

Respectfully submitted,

/s/ Mark Norman Templeton

Dated: January 21, 2021

Mark Norman Templeton
Robert Adam Weinstock
Andrew Maxfield (clinical law student)
Justin Taleisnik (clinical law student)
Abrams Environmental Law Clinic
6020 South University Avenue
Chicago, Illinois 60637
(773) 702-9611
templeton@uchicago.edu
rweinstock@uchicago.edu

[83] *See* SAFE Regulatory Impact Analysis, *supra* note 3, at 1803–10 tbls. VII-482, VII-483, VII-484, VII-485 (yielding net benefits between –$19.3 billion and –$55.4 billion in the global, 3 percent sensitivity analyses). Even these analyses use an inappropriately high 3 percent discount rate. If the Agencies had used a lower, intergenerational rate as required by Circular A-4, the net benefits of the SAFE Rules would be even lower.

CERTIFICATE OF COMPLIANCE

Pursuant to Fed. R. App. P. 32(g), I hereby certify that this brief complies with the type-volume limitation of Fed. R. App. P. 32(a)(7)(B) and the Court's Order of October 19, 2020 (Doc. 1867064). According to the count of Microsoft Word, this brief contains 6,169 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(f) and Circuit Rule 32(e)(1).

I further certify that this brief complies with the typeface and type-style requirements of Fed. R. App. P. 32(a)(5) and (6) because it has been prepared in 14-point Times New Roman, a proportionally spaced font.

Dated: January 21, 2021

/s/ Mark Norman Templeton

Mark Norman Templeton

CERTIFICATE OF SERVICE

I hereby certify that on this 21st day of January, 2021, the foregoing Brief of Professor Michael Greenstone as Amicus Curiae in Support of Petitioners has been served on all registered counsel through the Court's electronic filing system.

Dated: January 21, 2021

/s/ Mark Norman Templeton

Mark Norman Templeton