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U.S. Environmental Protection Agency
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1200 New Jersey Avenue, SE
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Docket ID No. EPA-HQ-OAR-2018-0283

Re: COMMENTS ON PROPOSED RULE, THE SAFER AFFORDABLE FUEL-EFFICIENT VEHICLES RULE FOR MODEL YEARS 2021-2026 PASSENGER CARS AND LIGHT TRUCKS, 83 FED. REG. 42,986 (AUG. 24, 2018)

On behalf of itself, Dr. Michael Oppenheimer, and Dr. Philip B. Duffy, the Emmett Environmental Law & Policy Clinic at Harvard Law School[1] respectfully submits these comments on the Safer Affordable Fuel-Efficient Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, 83 Fed. Reg. 42,986 (Aug. 24, 2018) (the "Proposal"). Dr. Michael Oppenheimer is the Albert G. Milbank Professor of Geosciences and International Affairs at Princeton University and Director of Princeton University's Center for Policy Research on Energy and the Environment. He has also served as an author of several reports of the Intergovernmental Panel on Climate Change ("IPCC"), the U.N. international body that assesses the science related to climate change, including, currently, the Special Report on Oceans, Cryosphere, and Climate Change. Dr. Philip B. Duffy is President and Executive Director of the Woods Hole Research Center, a leading climate change think tank founded in 1985. Dr. Duffy has served as a Senior Advisor in the White House National Science and Technology Council and Senior Policy Analyst in the White House Office of Science and Technology Policy under the Obama Administration.

The signatories oppose the Proposal because the Agencies' own data and analyses demonstrate the critical need to maintain or strengthen—not abandon—the current Greenhouse Gas ("GHG") emission and fuel economy standards for passenger cars and light trucks. Weakening the current

[1] The Emmett Environmental Law & Policy Clinic works on a variety of local, national, and international projects covering the spectrum of environmental law and policy issues under the direction of Professor Wendy B. Jacobs.

standards, as clearly demonstrated by the Draft Environmental Impact Statement ("DEIS") on which the Proposal is founded, will exacerbate the severe economic, environmental, and public health harms to the United States attributable to climate change. For the reasons discussed herein, we urge the Environmental Protection Agency ("EPA") and the National Highway Traffic Safety Administration ("NHTSA") (together, the "Agencies") to withdraw the Proposal.

Although there are many grounds upon which the Proposal can be criticized—including its assumptions and conclusions about its impact on air quality, public health, and motor vehicle safety—our comments focus on the following issues:

- The U.S. transportation sector is a major source of GHG emissions.

- Scientific consensus points to the immediate and ongoing need for continuing, incremental reductions in GHG emissions across all sectors of the U.S. economy. The DEIS, by detailing the devastating consequences that will result from inaction, is largely consistent with that consensus. The Proposal is not.

- Even if the Proposal's impacts were properly characterized as "small," even small increases in GHG emissions can have major impacts.

- The climate impacts projected in the Proposal's emissions scenarios portend significant, adverse harms to public health, the economy, and the natural world, both in the United States and worldwide.

- The DEIS adopts a misleading baseline scenario by assuming the United States and the rest of the world will take no additional steps to address climate change. It also sets an impossible goal for the Proposal, by asserting that reductions in passenger car and light truck emissions cannot alone keep global emissions within a 2°C carbon budget, and establishes an arbitrary endpoint of the year 2100 for its analysis.

- The do-nothing approach represented by the Proposal is inconsistent with the precautionary and technology-forcing nature of the Clean Air Act.

In short, there is a staggering mismatch between the harms identified in the DEIS and the course of action contemplated in the Proposal. The DEIS observes that the world is on track for extremely dangerous levels of global warming by the end of the century and candidly admits that the Proposal will make this problem worse. The DEIS's spin on these factual findings—that it will cause only *slightly* warmer temperatures, *slightly* higher seas, and *slightly* more acidic oceans, *see* DEIS at 5-31—is nonsensical and irrelevant. The science is clear, and the DEIS admits as much: addressing climate change requires "drastic reductions in emissions . . . in all U.S. sectors" and the rest of the global economy. *Id.* at 5-30. The Proposal's flatlining of GHG emission and fuel economy standards would do exactly the opposite. The Proposal is worse than an arbitrary and irrational abdication of responsibility under the Clean Air Act. It is an invitation for disaster.

I. The Proposal is Inconsistent with the DEIS, which Recognizes that "Drastic Reductions" of Emissions from the U.S. Transportation Sector Are Necessary

A. The U.S. Transportation Sector, and Passenger Car and Light Truck Emissions in Particular, Are a Major Source of Greenhouse Gas Emissions

The Proposal is founded on a fallacy: that because the difference between projected passenger car and light truck GHG emissions under existing regulations and under the Proposal is "small," those incremental emissions reductions are not worth pursuing. The first problem with this characterization is that the U.S. transportation sector is not a small source of GHG emissions. The DEIS recognizes as much, stating that "transportation is the single leading source of U.S. emissions from fossil fuels, causing over one-third of total CO_2 emissions from fossil fuels."[2] According to EPA analysis, the U.S. transportation sector produced 28% of U.S. GHG emissions in 2016, tied with the power sector as the largest source of emissions in the country.[3] Passenger cars and light trucks, the vehicles regulated by the Proposal, account for more than half of U.S. transportation sector GHG emissions, releasing 1,109 million metric tons of CO_2 equivalent ("MMT CO_{2e}") in 2016.[4] This scale rivals the total national emissions of other countries. If emissions from U.S. passenger cars and light trucks were considered their own country, they would rank 7th-largest worldwide: bigger than Germany and Indonesia and slightly smaller than Brazil.[5]

Because the U.S. transportation sector is very large, increases or reductions in its emissions are correspondingly significant. The DEIS predicts that the Proposal will release an additional 95 MMT CO_{2e} into the atmosphere in 2040, per year, compared with keeping the current standards in place. DEIS at 5-25. This increase in emissions would be greater than recent emissions totals of entire countries such as Austria, New Zealand, or Sweden.[6] Even just one part of the Proposal—elimination of non-CO_2 GHG emissions standards for passenger cars and light trucks, *see* 83 Fed. Reg. at 42,990, Tbl. I-4—would deregulate GHG emissions controls for more than

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[2] DEIS at 5-8 (citing EPA, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2016 (2018); *see also Massachusetts v. EPA*, 549 U.S. 497, 525 (2007) ("Judged by any standard, U.S. motor-vehicle emissions make a meaningful contribution to greenhouse gas concentrations.").

[3] EPA, FAST FACTS: U.S. TRANSPORTATION SECTOR GREENHOUSE GAS EMISSIONS 1990-2016, at 1 (2018), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100USI5.pdf [hereinafter "EPA, FAST FACTS"].

[4] *Id.* at 2–3.

[5] *See* European Commission, Emission Database for Global Atmospheric Research ("EDGAR"), *Fossil CO_2 & GHG Emissions of all World Countries, 2017* (2017), http://edgar.jrc.ec.europa.eu/overview.php?v=CO2andGHG1970-2016&dst=GHGemi&sort=des9 (totaling 916, 823, and 1,121 MMT CO_{2e}, respectively, for Germany, Indonesia, and Brazil in 2012, the last year for which data is available) [hereinafter "EDGAR, *GHG Emissions*"].

[6] *Id.* (totaling 89.3, 80.2 and 88.4 MMT CO_{2e}, respectively, in 2012). Recognizing that these emissions are harmful, Austria, New Zealand, and Sweden have all committed to "undertake rapid reductions" in their greenhouse gas emissions "as soon as possible." Paris Agreement, Art. 4, Cl. 1 (Nov. 2016); *see also Paris Agreement*, U.N. TREATY COLLECTION, https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=_en (listing all countries that have ratified the Paris Agreement).

50 MMT CO_{2e} per year.[7] That is roughly the same amount as New York City's annual GHG emissions[8] and more than 7 times that of Boston's.[9]

Yet the DEIS describes the Proposal's impacts as "small" when compared to the overall global "emissions trajectories" projected. DEIS at 5-30. This is an unreasonable comparison to make. Any source of GHG emissions, even that of entire countries with advanced economies, could be made to seem small when compared to global GHG totals. If the DEIS's approach were applied by other governments worldwide, virtually all emissions sources could be exempted from regulatory intervention due to the "small[ness]" of their corresponding harms. *See id.* This approach irrationally commits the U.S. to the "reasonably foreseeable" high-emissions scenario that the DEIS has projected, *see id.* at 8-20, which will worsen climate change impacts on the United States. The undersigned ask the Agencies: If U.S. passenger car and light truck GHG emissions are too small to be worth targeting for immediate, incremental reductions, which sources of emissions—if any—would the Agencies consider worth regulating?

B. Because GHG Pollution is a Cumulative Problem, Immediate, Incremental Reductions in Emissions Are Needed Now to Avoid Worse Harms Later

The DEIS states that "drastic reductions" of emissions from the U.S. transportation sector (and other sources) are necessary to avoid dire impacts of climate change to the U.S. economy and public health. DEIS at 5-30. The Proposal, however, would do the opposite: it would *increase* cumulative GHG emissions from passenger cars and light trucks by nearly 10% over the coming century. *See id*.

Climate change results from the total buildup of CO_2 and other GHGs in the atmosphere from many human sources over a long period of time. *See* DEIS at 5-4. This is because GHGs remain in the atmosphere for many years after being emitted (as long as millennia in the case of much of the emitted carbon dioxide), causing them to accumulate over time and amplifying their harms. In other words, climate change is a "stock" problem (based on the total quantity of GHGs in the atmosphere) rather than a "flow" problem (based on the quantity of GHGs emitted at a given time). Increases in emissions rates are harmful because they quicken the rate at which the "stock" of atmospheric GHG pollution rises, thereby pushing the world faster toward even more dangerous levels of warming. Conversely, reductions in emissions must occur incrementally and continuously to ensure that the stock of GHGs in the atmosphere does not get too large.

Another way of expressing the cumulative nature of the problem is through the concept of a "carbon budget." A carbon budget is a way of expressing the total amount of human-made

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[7] Tailpipe emissions of nitrous oxide and methane and air-conditioning system leakage of hydrofluorocarbons represent 5% of GHG emissions for passenger cars and light trucks (with CO_2 representing the other 95%). DEIS at 5-21, n.18; *see also* EPA, FAST FACTS, *supra* note 3, at 2 (reporting non-CO_2 GHG emissions from U.S. passenger cars and light trucks in 2016 at 0.8 MMT CO_{2e} in methane, 12.4 MMT CO_{2e} in nitrous oxide, and 37.4 MMT CO_{2e} in hydrofluorocarbons).

[8] CITY OF NEW YORK, MAYOR'S OFFICE OF SUSTAINABILITY, INVENTORY OF NEW YORK CITY GREENHOUSE GAS EMISSIONS IN 2015, at 13 (2017), https://www.dec.ny.gov/docs/administration_pdf/nycghg.pdf (reporting 52 MMT CO_{2e} total emissions in 2015, the most recent year analyzed).

[9] City of Boston, *Boston's Carbon Emissions*, https://www.boston.gov/departments/environment/bostons-carbon-emissions (last updated Oct. 1, 2018) (reporting 6.4 MMT CO_{2e} in GHG emissions in 2016).

GHGs that can be emitted and accumulate in the atmosphere before global temperatures exceed a certain warming threshold. DEIS at 5-29. To avoid exceeding the carbon budget for less dangerous levels of warming, annual emissions must be reduced and, eventually, zeroed-out.[10]

The DEIS examines the Proposal's impacts on a total budget consistent with staying below 2°C of warming. DEIS at 5-29–30. This is the maximum level of warming set by the Paris Agreement, the international agreement on climate change mitigation to which the U.S. is still a party.[11] 2°C of warming would be much less harmful to the United States than the 4°C of warming projected in the DEIS, with less damaging wildfires, lower rates of heat-related human morbidity, and less costly river and coastal flooding.[12]

The DEIS's carbon budget analysis shows that the Proposal's contribution to climate change is not "small"—despite its repeated use of that adjective—while also demonstrating that current fuel economy and GHG emission standards are but an initial step that must be pursued and expanded via further reductions in emissions. According to the DEIS's analysis, even when maintaining the current fuel economy and GHG emission standards, the U.S. transportation sector would burn through about 5% of the entire global budget consistent with avoiding 2°C warming by 2100.[13] If the Proposal were implemented, the DEIS projects that the U.S. transportation sector's share would tick up to nearly 6%. *Id.* Limiting warming to 1.5°C (a level of warming still less harmful than 2°C[14]) requires an even tighter budget.[15] With the current standards, U.S. transportation sector emissions between 2016 and 2100 would account for nearly 20% of the total.[16] If the Proposal were implemented, that share rises to approximately 22%. In other words, the Proposal would exhaust nearly 2% of the remaining carbon budget for the *entire* planet.

Given these facts and for these reasons, the DEIS correctly recognizes that "drastic reductions" of emissions from the U.S. transportation sector, and all other sectors of the global economy, are necessary to stay within a 2°C budget. DEIS at 5-30. The Proposal, however, would do the

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[10] *See* IPCC, GLOBAL WARMING OF 1.5°C, SUMMARY FOR POLICY MAKERS, at SPM-15 (Oct. 2018), http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf ("Limiting global warming to below 2°C" requires "CO2 emissions . . . to decline by about 20% by 2030 . . . and reach net zero around 2075.").

[11] *Paris Agreement*, *supra* note 6 (listing the United States as a party), https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=_en.

[12] IPCC, CLIMATE CHANGE 2014: SYNTHESIS REPORT, SUMMARY FOR POLICYMAKERS 14, Fig. SPM.8 (2014), http://ar5-syr.ipcc.ch/ipcc/ipcc/resources/pdf/IPCC_SynthesisReport.pdf (comparing global harms at 2°C and 4°C by 2100).

[13] DEIS at 5-29–30 (citing IPCC, SUMMARY FOR POLICYMAKERS, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS, CONTRIBUTION OF WORKING GROUP 1 TO THE FIFTH ASSESSMENT REPORT (2013)).

[14] *See generally* IPCC, GLOBAL WARMING OF 1.5°C, SUMMARY FOR POLICY MAKERS, *supra* note 10.

[15] *Id.* at SPM-16 (About 420,000 MMT CO_{2e} remain for a 1.5°C budget.).

[16] With current standards in place, U.S. passenger cars and light trucks are projected to add 83,000 MMT CO_{2e} to the atmosphere between 2016 and 2100; if the Proposal were to take effect, that number would increase to 91,000 MMT CO_{2e}. DEIS at 5-30.

opposite. Compared to leaving the current fuel standards in place, it would *increase* total passenger car and light truck emissions over the 21st century by nearly 10%.[17]

Not only will the Proposal significantly *increase* emissions, but it will also significantly increase costs to the United States. Continuing to reduce emissions between 2021 and 2026 will be cheaper in the long run than stalling progress now, which will require much more sudden and extreme reductions later. The longer the United States (and other major economies) wait to meaningfully bring down their GHG emissions, the greater the atmospheric buildup of pollution and the more drastic—and expensive—the emissions reductions will need to be to avoid severe global warming.[18] Sudden, drastic reductions in emissions will be more expensive to implement than the gradual, incremental reductions represented by the existing regulations.[19] This fact not only demonstrates the irrationality of the Proposal, but also contradicts the Proposal's conclusion that it will save the public "a considerable amount of money." *See* 83 Fed. Reg. at 42,997.

C. Even Small Increases in GHG Emissions Can Have Significant, Harmful Impacts by Tripping Tipping Points in the Climate System

Even if it were correct to characterize the emissions associated with the Proposal as "small," [20] even small increases in global emissions can have harmful impacts. The DEIS acknowledges as much, stating more emissions means more warming and more sea level rise. *See* DEIS at 5-30. The impacts of the Proposal's additional emissions, further, will be "long-lasting" and "global [in] scale," *id.*, and will intensify as the climate continues to warm.[21]

"Tipping points" multiply the severity of these incremental increases in emissions many times over. Tipping points are "disproportionately large or singular" changes in climate-affected systems resulting from relatively "moderate additional change" in GHG emissions and other

[17] DEIS at 5-30 (reporting that the Proposal would release an additional 8,000 MMT CO_{2e} between 2016 and 2100). The increase would be more than a century's worth of emissions from Portugal, assuming Portugal itself breaches its Paris commitments and does not reduce its emissions. *See* EDGAR, *GHG Emissions*, *supra* note 5 (Portugal 2012 values).

[18] IPCC, GLOBAL WARMING OF 1.5°C, MITIGATION PATHWAYS COMPATIBLE WITH 1.5°C IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT 2-47 (2018), http://report.ipcc.ch/sr15/pdf/sr15_chapter2.pdf.

[19] WHITE HOUSE COUNCIL OF ECONOMIC ADVISERS, THE COST OF DELAYING ACTION TO STEM CLIMATE CHANGE 5 (2014) ("Taking meaningful steps now sends a signal to the market that reduces long-run costs of meeting the target. Part of this signal is that new carbon-intensive polluting facilities will be seen as bad investments; this reduces the amount of locked-in high-carbon infrastructure that is expensive to replace. Second, taking steps now to reduce CO_2 emissions signals the value of developing new low- and zero-emissions technologies, so additional steps towards a zero-carbon future can be taken as policy action incentivizes the development of new technologies."), https://obamawhitehouse.archives.gov/sites/default/files/docs/the_cost_of_delaying_action_to_stem_climate_change.pdf; NATIONAL RESEARCH COUNCIL, LIMITING THE MAGNITUDE OF FUTURE CLIMATE CHANGE 87 (2010) ("[A]n insufficient short-term effort significantly increases the costs of compliance in the long term. Delays in beginning to reduce the U.S. contribution to global GHG emissions would risk further loss of opportunities to control GHG concentrations over the long term.").

[20] This characterization is not correct, as established by the DEIS.

[21] Press Release, IPCC, Summary for Policy Makers of IPCC Special Report on Global Warming of 1.5°C Approved by Governments 1 (Oct. 8, 2018), http://ipcc.ch/pdf/session48/pr_181008_P48_spm_en.pdf ("Every bit of warming matters . . . since warming of 1.5 degrees Celsius or higher increases the risk associated with long-lasting and irreversible changes.").

variables. DEIS at 5-27. If emissions remain unchecked, some tipping points could unfold so "abrupt[ly][,]. . . quickly, and unexpectedly" that human systems would have difficulty adapting to them." *Id.*

The DEIS describes some of these potential tipping points as "catastrophic." DEIS at 8-72. Specifically, a certain amount of warming would cause "a catastrophic release of methane" from permafrost and the bottom of the ocean. *Id.* The amount of methane suddenly released would exceed the global warming potential of all human-caused GHG emissions since the beginning of the Industrial Age. *Id.* (noting that the Arctic methane reservoir is estimated to be about 82,000,000 MMT CO_{2e}.).[22] Other dangerous tipping points involve disintegration of the West Antarctic and Greenland ice sheets which would raise the level of the sea by about 35 feet.[23] The DEIS recognizes this threat, citing several studies showing that ice sheet melt is underway in parts of the West Antarctic ice sheet, that ice loss beyond a certain threshold of warming would become "self-sustaining," and that little in the region's geography could prevent its "irreversible collapse," given enough warming.[24] Collapse, however, is not inevitable. A sharp reduction in emissions over the next several decades, in line with international climate goals, would likely allow Antarctica's ice sheets to remain largely stable.[25]

The DEIS's discussion of these tipping point risks is extremely misleading. It explains that "the current state of science does not allow for quantifying how increased emissions from a specific policy or action might affect the probability and timing of abrupt climate change." DEIS at 5-28. Though it is true that the precise thresholds are unknown, there is scientific consensus around the range of warming within which some of these tipping points will occur. For example, the tipping point for the eventual complete melting of the Greenland ice sheet will occur somewhere between 1°C and 4°C of warming. DEIS at 8-68. This is squarely within the climate impacts projected by the DEIS, which predicts more than 4°C of warming by 2100.[26] Thus, even though

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[22] *See also* T.A. Boden et al., *Carbon Dioxide Information Analysis Center, Global, Regional, and National Fossil-Fuel CO_2 Emissions*, OAK RIDGE NATIONAL LABORATORY, U.S. DEPARTMENT OF ENERGY (2017), http://cdiac.ess-dive.lbl.gov/trends/emis/tre_glob_2014.html ("Since 1751 just over [400,000 MMT CO_2] have been released to the atmosphere from the consumption of fossil fuels and cement production.").

[23] *See* Jørn Thiede et al. *Millions of Years of Greenland Ice Sheet History Recorded in Ocean Sediments*, 80 POLARFORSCHUNG 141 (2011); Jonathan L. Bamber et al., *Reassessment of the Potential Sea-Level Rise from a Collapse of the West Antarctic Ice Sheet*, 324 SCIENCE 901 (2009); Matthew B. Lythe & David G. Vaughan, *BEDMAP: A New Ice Thickness and Subglacial Topographic Model of Antarctica*, 106(B6) J. GEOPHYSICAL RES. 11,335 (2001).

[24] DEIS at 8-68–8-69 (citing Ian Joughin et al., *Marine Ice Sheet Collapse Potentially Underway for the Thwaites Glacier Basin, West Antarctica*, 344 SCIENCE 735 (2014); E. Rignot et al., *Widespread, Rapid Grounding Line Retreat of Pine Island, Thwaites, Smith, and Kohler Glaciers, West Antarctica, from 1992 to 2011*, 41 GEOPHYSICAL RES. LETTERS 3502 (2014); and M. Mengel & A. Levermann, *Ice Plug Prevents Irreversible Discharge from East Antarctica*, 4 NATURE CLIMATE CHANGE 451 (2014)).

[25] Robert M. DeConto & David Pollard, *Contribution of Antarctica to Past and Future Sea-Level Rise*, 531 NATURE 591, 593 (2016) (observing that a low-emissions scenario "RCP2.6 produc[es] almost no net change [in future Antarctic contributions to sea level] by 2100, and only 20cm by 2500").

[26] DEIS at 5-31 (projecting about 3.5°C warming by 2100, relative to 1986-2005, *see id.* at 5-32 note "b"); *see also id.* at 5-11 (reporting 0.9°C of warming between 1880 and 2016). The DEIS's presentation of this information is confusing because it does not forecast the Proposal's impacts relative to pre-industrial CO_2 concentrations, global average temperature, sea levels, or ocean acidity.

the precise tipping-point threshold is uncertain, it is reasonably foreseeable based on the DEIS's own projections that it will be crossed sometime during the 21st century. This is of the utmost importance because the anticipated melting of the Greenland ice sheet will cause up to 23 feet of sea level rise over several centuries. *See* DEIS at 8-68.

Precise quantification of a risk of this magnitude is unnecessary to appreciate its significance and compel appropriate regulatory action. As the D.C. Circuit stated when interpreting a statutory standard identical to the one upon which EPA must base its GHG emissions standards for passenger cars and light trucks:

> A statute allowing for regulation in the face of danger is, necessarily, a precautionary statute. Regulatory action may be taken before the threatened harm occurs; indeed, the very existence of such precautionary legislation would seem to demand that regulatory action precede, and, optimally, prevent, the perceived threat . . . [The Clean Air Act] is such a precautionary statute.[27]

The Proposal, however, embodies the opposite of this precautionary approach. It will make it *more* likely that this tipping point, and others, will be crossed because every incremental increase in emissions makes it more likely that a tipping point will be reached.[28] Because the Proposal will increase emissions and global average temperatures, it will "contribute to the marginal increase or acceleration of reaching these tipping-point thresholds . . . [being] one of many global actions that, together, could contribute to abrupt and severe climate change." DEIS at 8-72. This risk analysis demonstrates the Proposal's impacts are not "small" and that it is not rationally founded on the analyses in the DEIS.

II. Given the Magnitude of Impacts at 4°C of Warming and Nearly 1 Meter of Sea Level Rise, the Proposal's Abandonment of the Current Standards Is Arbitrary and Irrational

There is a profound disconnect between the severe harms cataloged in the DEIS and the regulatory rollback contemplated in the Proposal. The DEIS assumes little abatement of GHG emissions through the 21st century.[29] It thus concludes that by 2100, the Earth will experience over 4°C of warming, nearly 1 meter of sea level rise, and atmospheric concentrations of CO_2 of approaching 800 parts per million ("ppm").[30] The last time the Earth's CO_2 levels exceeded 750 ppm may well have been 35 million years ago, during the Eocene Epoch, before the major ice sheets had formed.[31] Human civilization has never experienced changes of this magnitude in the

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[27] *Ethyl Corp. v. EPA*, 541 F.2d 1, 14 (D.C. Cir. 1976) (discussing EPA's ability to regulate under Section 211 of the Clean Air Act gasoline additives that "will endanger the public health or welfare").

[28] IPCC, FIFTH ASSESSMENT REPORT, CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, VULNERABILITY, SUMMARY FOR POLICYMAKERS 14 (2014), http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf ("[T]he risk associated with crossing multiple tipping points . . . increases with rising temperature.") [hereinafter "IPCC, FIFTH ASSESSMENT REPORT"].

[29] The DEIS does not explain why it has chosen such a pessimistic projection. *See* DEIS at 5-25, 8-20.

[30] *See id.* at 5-25 (discussing the emissions scenario selected); *id.* at 5-31, Tbl. 5.4.2-3 (listing impacts).

[31] Nicholas Stern, *The Structure of Economic Modeling of the Potential Impacts of Climate Change: Grafting Gross Underestimation of Risk onto Already Narrow Science Models*, 51 J. ECON. LITERATURE 838, 840 (2013).

climate system.[32] Stalling emissions reductions efforts, considering the harms predicted by the DEIS, is irrational and arbitrary.

A. Dramatic Changes to the Climate System Are Already Occurring

Significant changes in the climate system are well underway. The DEIS acknowledges "evidence of rapid climate change," DEIS at 5-10, and that the rate of this warming is accelerating, *id.* at 11. Temperatures are already about 1°C warmer than pre-industrial averages, with the last decade being "the warmest on record, and 2016 the hottest year on record in the continental United States." *Id.* at 5-10. The rate of increase in the Arctic is even higher, with "almost twice the global average rate over at least the past several decades."[33] Associated with this warming are "more frequent weather extremes such as droughts, floods, severe storms and heat waves,"[34] 19 centimeters of sea level rise,[35] and increasingly intense hurricanes and tropical storms in the North Atlantic.[36] More severe "storm surges and waves," in turn, have caused substantial coastal erosion in Mississippi, Texas, and Louisiana since the 1970s.[37]

Climate change-related impacts have been seen and felt throughout 2018. Hurricane Michael, the fourth strongest hurricane ever to hit the United States,[38] was powered in part by "warmer than usual" waters in the Gulf of Mexico.[39] Hurricane Florence, similarly, was fed by warmer-than-average oceans and moister air.[40] The country also saw historic storms in 2017. Hurricane Harvey dumped record amounts of rain on Houston in August 2017 and caused widespread flooding throughout Texas.[41] Hurricane Maria, a few weeks later, killed nearly 3,000 people in

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[32] *Id.*

[33] DEIS at 5-11–5-12 (citing U.S. GLOBAL CHANGE RESEARCH PROGRAM, CLIMATE SCIENCE SPECIAL REPORT, FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME 1 (2017) [hereinafter "GCRP 2017"]).

[34] *Id.* at 5-10 (citing GCRP 2017 and IPCC, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS, CONTRIBUTION OF WORKING GROUP I TO THE IPCC'S FIFTH ASSESSMENT REPORT (2013) [hereinafter "IPCC, CLIMATE CHANGE 2013").

[35] *Id.* at 5-13 (citing IPCC, CLIMATE CHANGE 2013, *supra* note 34).

[36] *Id.* at 5-16 (citing IPCC, CLIMATE CHANGE 2013, *supra* note 34).

[37] *Id.* at 5-14 (citing EPA, TECHNICAL SUPPORT DOCUMENT FOR ENDANGERMENT AND CAUSE OR CONTRIBUTE FINDINGS FOR GREENHOUSE GASES UNDER SECTION 202(A) OF THE CLEAN AIR ACT (Dec. 7, 2009); and R.J. NICHOLLS ET AL., CLIMATE CHANGE 2007: IMPACTS, ADAPTATION, AND VULNERABILITY, CONTRIBUTION OF WORKING GROUP II TO THE IPCC'S FOURTH ASSESSMENT REPORT ON CLIMATE CHANGE, COASTAL SYSTEMS AND LOW-LYING AREAS 325-356 (2017).

[38] Phil Klotzbach, *Michael Made History as One of the Top Four Strongest Hurricanes to Strike the United States*, WASH. POST. (Oct. 11, 2018), https://www.washingtonpost.com/weather/2018/10/11/michael-made-history-one-top-four-strongest-hurricanes-strike-united-states/.

[39] John Schwartz, *Why Hurricane Michael's Power Caught Forecasters Off Guard*, N.Y. TIMES (Oct. 11, 2018), https://www.nytimes.com/2018/10/11/climate/hurricane-michael-science.html.

[40] KEVIN A. REED ET AL., THE HUMAN INFLUENCE ON HURRICANE FLORENCE, STONY BROOK UNIVERSITY, SCHOOL OF MARINE AND ATMOSPHERIC SCIENCES 2 (Sep. 2018), https://cpb-us-e1.wpmucdn.com/you.stonybrook.edu/dist/4/945/files/2018/09/climate_change_Florence_0911201800Z_final-262u19i.pdf.

[41] NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION & NATIONAL WEATHER SERVICE, NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT: HURRICANE HARVEY 6 (2018),

Puerto Rico and left much of that U.S. territory without electricity or clean drinking water for months.[42] The magnitude of Hurricanes Harvey, Maria, and Irma and others from the 2017 season have all been linked to warmer-than-average ocean temperatures attributable to climate change.[43] Meanwhile, California's wildfires have become more widespread as conditions have become hotter and drier due to climate change.[44]

B. 4°C of Warming by 2100 Will Cause Serious Harms to Many Aspects of Human Society and the Natural World

The DEIS observes that the world is currently on a high-emissions trajectory and that only a minimal amount of mitigation is reasonably foreseeable through the 21st century. DEIS at 8-20. It thus projects the climate impacts corresponding to a high level of emissions: nearly 800 ppm of CO_2, more than 4°C of warming, and about 1 meter of sea level rise by the year 2100. DEIS at 5-31.[45] The harms to the United States and the world at this level of warming are difficult to overstate. Such warming would cause "substantial species extinction, large risks to global and regional food security, and . . . high temperature and humidity compromising normal human activities, including growing food or working outdoors in some areas for parts of the year."[46] These changes will last "well beyond 2100," because elevated CO_2 concentrations "will persist [in the atmosphere] for many centuries." DEIS at 5-10.

At 4°C of warming the U.S. economy is projected to suffer $698 billion in damage per year by 2100.[47] More frequent and more intense extreme weather events, like heat waves, heavy rains, droughts, and storms, will harm the productivity of U.S. agriculture and forestry activities, making those sectors more vulnerable to climate risks.[48] The harms to global agriculture

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https://www.nhc.noaa.gov/data/tcr/AL092017_Harvey.pdf (observing that between 36 to 48 inches of rainfall was reported in Houston, while other parts of Texas reported 60 inches of rain).

[42] GEORGE WASHINGTON UNIVERSITY, MILKEN INSTITUTE SCHOOL OF PUBLIC HEALTH, ASCERTAINMENT OF THE ESTIMATED EXCESS MORTALITY FROM HURRICANE MARÍA IN PUERTO RICO, EXECUTIVE SUMMARY iii (Aug. 2018), https://publichealth.gwu.edu/sites/default/files/downloads/projects/PRstudy/Acertainment%20of%20the%20Estimated%20Excess%20Mortality%20from%20Hurricane%20Maria%20in%20Puerto%20Rico.pdf.

[43] Kevin E. Trenberth et al., *Hurricane Harvey Links to Ocean Heat Content and Climate Change Adaption*, 6 EARTH'S FUTURE 730, https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2018EF000825.

[44] ANTHONY L. WESTERLING, STATE OF CALIFORNIA ENERGY COMMISSION, CALIFORNIA'S FOURTH CLIMATE CHANGE ASSESSMENT, WILDFIRE SIMULATIONS: PROJECTING CHANGES IN EXTREME WILDFIRE EVENTS WITH A WARMING CLIMATE 1 (Aug. 2018), http://www.climateassessment.ca.gov/techreports/docs/20180827-Projections_CCCA4-CEC-2018-014.pdf.

[45] Specifically, the DEIS projects 76.34 cm of sea level rise in 2100 under Alternative 1, from a 1986-2005 baseline. Because there has already been 19 cm of sea level rise between 1901 and 2010, DEIS at 5-13, the total projected sea level rise from pre-industrial levels is 95.34 cm.

[46] IPCC, FIFTH ASSESSMENT REPORT, *supra* note 28, at 14.

[47] Tom Kompas et al., *The Effects of Climate Change on GDP by Country and the Global and Economic Gains from Complying with the Paris Climate Accord*, 6 EARTH'S FUTURE 1153, 1169, Table A1 (2018) (projecting that the global economy will experience an annual GDP loss of $23 trillion USD per year by 2100 at 4°C warming).

[48] DEIS at 8-48 (citing C.L. WALTHALL ET AL., CLIMATE CHANGE AND AGRICULTURE IN THE UNITED STATES: EFFECTS AND ADAPTATION, USDA TECHNICAL BULLETIN (2013); GCRP, GLOBAL CLIMATE CHANGE IMPACTS IN THE UNITED STATES: THE THIRD NATIONAL CLIMATE CHANGE ASSESSMENT (2014); IPCC, CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY, PART A: GLOBAL AND SECTORAL ASPECTS, CONTRIBUTION OF

increase with each degree-Celsius increase in warming: wheat crop yields will decrease by 6%, corn by 7.4%, rice by 3.2%, and soybean by 3.1%.[49] U.S. agriculture may sustain disproportionate harms, with U.S. corn yields reduced by 10.3% per degree-Celsius warming due to corn's high sensitivity to rising temperatures.[50]

The DEIS, relying on projections reported by the IPCC, projects a range of "likely" additional sea level rise between 0.26 meter and 0.82 meter over the coming century.[51] The projected rise in sea level would have "serious implications" for low-lying coastal areas and small islands,[52] including parts of Florida, Louisiana, Texas, Mississippi, and the Carolinas. Notably, these projections may be low, as they do not fully account for sea level rise from the breakup and disintegration of major ice sheets, meaning "sea-level rise could be even greater." DEIS at 5-13. Specifically, GHG emissions growth over the coming decades could trigger "runaway" instability in Antarctica's ice sheets, causing "more than 15 meters [of sea level rise] by 2500."[53]

Climate impacts on food security, sea level, and the economy will threaten the national security of the United States. By the end of the 21st century, the U.S. intelligence community predicts the United States will face "wide-ranging national security challenges" driven by climate change, including geopolitical instability, increased sectional tensions, and negative impacts on the global financial and economic system.[54] This is because climate change is a "threat multiplier," meaning it "exacerbates existing or arising threats to stability and peace" and can "trigger armed conflict."[55] Long-term displacement of climate refugees in particular may lead to additional conflicts in their new home countries.[56] Such mass displacement—estimated on the order of

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WORKING GROUP II TO THE FIFTH ASSESSMENT REPORT OF THE IPCC ON CLIMATE CHANGE (2014); USDA, CLIMATE CHANGE, GLOBAL FOOD SECURITY, AND THE U.S. FOOD SYSTEM (2015); EPA, CLIMATE CHANGE INDICATORS IN THE UNITED STATES (4th ed. 2016); and U.S. FOREST SERVICE, EFFECTS OF DROUGHT ON FOREST AND RANGELANDS IN THE UNITED STATES: A COMPREHENSIVE SCIENCE SYNTHESIS (2016).

[49] Chuang Zhao et al., *Temperature Increase Reduces Global Yields of Major Crops in Four Independent Estimates*, 35 PNAS 9326 (2017).

[50] *Id.*

[51] DEIS at 5-13 (citing IPCC, CLIMATE CHANGE 2013, *supra* note 34).

[52] *Global Sea Level Rise Is Accelerating—Study*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE (Feb. 13, 2018) https://unfccc.int/news/global-sea-level-rise-is-accelerating-study (discussing impacts of 0.65 meter of sea level rise).

[53] DeConto & Pollard, *supra* note 25, at 591.

[54] NATIONAL INTELLIGENCE COUNCIL & U.S. INTELLIGENCE COMMUNITY, IMPLICATIONS FOR U.S. NATIONAL SECURITY OF ANTICIPATED CLIMATE CHANGE 3 (Aug. 17, 2016), https://fas.org/irp/nic/climate-change.pdf.

[55] DEIS at 8-61 (citing Halvard Buhaug et al., *Climate Variability, Food Production Shocks, and Violent Conflict in Sub-Saharan Africa*, 10 ENVTL. RES. LETTERS 1 (2015)).

[56] *Id.* at 8-60 (citing Michael Brzoska & Christiane Fröhlich, *Climate Change, Migration, and Violent Conflict: Vulnerabilities, Pathways, and Adaption Strategies*, 5 MIGRATION & DEV. 190 (2015)).

hundreds of millions of people by 2100, DEIS at 8-44—will in turn harm U.S. military humanitarian operations and "strain [the military's] ability to respond to conflict."[57]

These impacts raise questions the Agencies need to answer:

- The United States is both an Arctic nation (Alaska) and an island nation (Hawaii, Puerto Rico, Guam, and others). How have the Agencies considered the unique threats to these parts of the United States?

- The Proposal will do nothing to ensure continued emissions reductions in the U.S. transportation sector. How is this consistent with the mandates of the Clean Air Act and with the EPA's GHG Endangerment Finding?[58]

- The analysis in the DEIS was developed before the October 2018 release of IPCC's *Global Warming of 1.5°C* report. Do any of its findings or recommendations—such as the significantly worse harms at 2°C warming, compared to 1.5°C—impact those of the DEIS?

III. The DEIS Adopts a Misleading Baseline Scenario, Sets an Impossible Goal for the Proposal, and Establishes an Arbitrary Endpoint for its Analysis

Although the DEIS correctly observes that "drastic reductions" in GHG emissions are necessary, it also contains an analysis that is misleading at several points. First, it distorts the scale of the Proposal's impacts by comparing them against a global emissions scenario that assumes only unrealistic, partial, and grossly insufficient efforts to mitigate climate change. For example, in projecting atmospheric CO_2 levels and related impacts for the year 2100, the DEIS projects that neither the United States nor any other nation will have taken any additional steps to address climate change beyond those currently in effect. DEIS at 5-31.[59] This scenario does not realistically portray what is happening elsewhere in the world or even in the United States, where states and businesses continue to take a variety of actions to reduce GHG emissions.[60] If the United States and other nations take their Paris Agreement obligations seriously and continue to take incremental steps beyond those embodied in current law, then the world could see less than

[57] *Id.* at 8-61 (citing DEPARTMENT OF DEFENSE, NATIONAL SECURITY IMPLICATIONS OF CLIMATE-RELATED RISKS AND A CHANGING CLIMATE (May 2015); and NATIONAL RESEARCH COUNCIL, NATIONAL SECURITY IMPLICATIONS OF CLIMATE CHANGE FOR U.S. NAVAL FORCES (2011)).

[58] EPA's 2009 Endangerment Finding found that CO_2 and five other greenhouse gases "endanger the public health and the public welfare of current and future generations." 74 Fed. Reg. 66,496, 66,516 (Dec. 15, 2009). With this determination, nearly a decade ago, the EPA "triggered [its] obligation" to regulate greenhouse gases from passenger vehicles and light trucks under Section 202(a) of the Clean Air Act. *Delta Const. Co., Inc. v. EPA*, 783 F.3d 1291, 1294 (D.C. Cir. 2015) (per curiam).

[59] The DEIS's description of its baseline emissions projections as reflecting a "moderate level of global actions to address climate change" is incorrect. *See* DEIS at 8-20. Though it may approximate the "middle-ground" between lower and much higher-emissions scenarios, *see id.* at 5-25, it results in atmospheric concentrations of CO_2 much too dangerous for mitigation efforts to be called "moderate."

[60] It also contradicts the DEIS's reporting on emissions reductions efforts in other countries, with China, Norway, France, Britain, India, and the Netherlands requiring or considering significant shifts in their passenger vehicle fleets to zero- or low-emissions vehicles. DEIS at 8-5.

2°C of warming by the end of the century. Against this baseline, the relative impact of the Proposal, which instead charts a path of climate inaction, would be much greater than those analyzed in the DEIS.

Second, the DEIS sets an arbitrary and unreasonable standard as an excuse for justifying the rollback of U.S. emissions reductions. Specifically, in its discussion of a carbon budget, the DEIS states that "[t]he emission reductions necessary to keep global emissions within this carbon budget could not be achieved solely with drastic reductions in emissions from the U.S. passenger car and light truck vehicle fleet." DEIS at 5-30. This is not an appropriate standard or point of reference; no reasonable policymaker or scientist asserts that the necessary emissions reductions can be achieved through reductions in the U.S. transportation sector alone (or indeed any single sector). It is illogical to argue against taking a single step on the basis that a single step is insufficient to reach one's goal.

The DEIS's assertion, furthermore, that such reductions are not "technically feasible," *see id.*, is both factually wrong and ignores the technology-forcing nature of the Clean Air Act's mobile source provisions.[61] It also conflicts with the DEIS's separate finding that "government regulations [and economic factors] could cause manufacturers to revise product and investment plans over time." DEIS at 8-7. This market shift is already underway: Volvo, Volkswagen, Toyota, Renault-Nissan, BMW, Daimler, Ford, Tesla, and General Motors have all "announced investments to meet higher [electric vehicle] targets in 2019 and beyond." *Id.*

Finally, the DEIS analyzes the Proposal's impacts only through an arbitrarily selected endpoint (e.g., an additional 0.003°C in warming by 2100, *see* DEIS at 5-31; *see also id.* at 5-30–45). The DEIS's quantitative analysis arbitrarily and unreasonably ends at 2100 despite its observation that "the effects of the CO_2 emissions that have accumulated in the atmosphere prior to 2100 will persist well beyond 2100 . . . . [T]his elevation in atmospheric CO_2 concentrations will persist for many centuries, with the potential for temperature anomalies continuing much longer." DEIS at 5-10. Some impacts, like sea level rise, are assured to occur over the course of several centuries in the projected baseline high-emissions scenario.[62] Given that such impacts are not uncertain, but, to the contrary, are the inevitable consequences of the do-nothing approach to climate change embodied by the Proposal, there is no reason to exclude them from the NEPA analysis. [63]

[61] *See Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. New York State Dept. of Environmental Conservation* 17 F.3d 521, 538 (2nd Cir. 1994) ("No doubt as a result of the technology forcing nature of the Clean Air Act, today's automobile as we know it is passing away . . . . [It is wrong to argue that] anything that ever could be invented ha[s] already been invented.").

[62] *See* DeConto & Pollard, *supra* note 25, at 591.

[63] *See Scientists' Institute for Public Information, Inc. v. Atomic Energy Commission*, 481 F.2d 1079, 1098 (D.C. Cir.1973) (holding that NEPA required "the most search scrutiny" of "unique and unprecedented" hazards to human health over hundreds of years posed by long-term storage of radioactive waste).

These shortcomings within the DEIS result in a siloed analysis that provides cover for the false conclusion that the impacts are too insignificant to justify regulatory costs. Yet the scientific consensus cited throughout the DEIS says precisely the opposite.[64]

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For all these reasons, the Proposal is arbitrary and capricious and inconsistent with the Agencies' statutory authorities and EPA's GHG Endangerment Finding. The Proposal should therefore be withdrawn.

Thank you for your attention to these comments.

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[64] *See generally* IPCC, FIFTH ASSESSMENT REPORT, *supra* note 28.