



October 26, 2021

Submitted via <http://www.regulations.gov>.

Docket Management Facility, M-30
U.S. Department of Transportation
West Building, Ground Floor, Rm. W12-140
1200 New Jersey Avenue SE
Washington, DC 20590,

Re: Comment for NHTSA's Notice of Proposed Rulemaking for Corporate Average Fuel Economy Standards for Model Years 2024–2026 Passenger Cars and Light Trucks

Acting Administrator Steven Cliff,

On behalf of America's youth, Our Children's Trust respectfully provides these comments on the National Highway Traffic Safety Administration's ("NHTSA") Proposed Rulemaking for Corporate Average Fuel Economy Standards for Model Years 2024–2026 Passenger Cars and Light Trucks (Docket No. NHTSA–2021–0053). As the Nation's only law firm dedicated to representing youth whose constitutional rights are being infringed by their government's conduct that causes climate change, we write to advise NHTSA that it must promulgate much stricter CAFE standards aimed at electrifying the transportation sector to align with the best available science on conserving energy and achieving emission reductions needed to correct Earth's Energy Imbalance, stabilizing the climate system and to abide by the constitutional, public trust, and legal obligations that constrain NHTSA's actions. By this rule, NHTSA will authorize levels of greenhouse gas emissions from vehicles that exceed levels safe for children and their fundamental rights, including their rights of equal protection of the law.

Specific comments on your proposed CAFE standards and analysis.

1. According to the notice and the direction from the President, this proposal must "promote and protect our public health and the environment, among other things." 86 Fed. Reg. 49603. However, the standards do not do that because they would sanction by rulemaking and federal approval an overconsumption of energy and ongoing unsafe levels of climate pollution from the transportation sector. Much like our comments on EPA's related proposed rule (please see our comments to EPA, most of which apply here as well), increasing stringency on efficiency by 8 percent per year is not consistent with your obligations to protect life and liberty. 86 Fed. Reg. 49603.
2. Given that the Secretary will give the auto industry 18 months to meet more stringent standards, and given this delay in being able to get science-based standards in place, NHTSA should set standards that are truly protective of our nation's children as those standards are entirely

feasible. Put the industry on notice today that it needs to move to a 100% electric or clean fleet by 2030.

3. NHTSA is statutorily required to prioritize the maximum feasibility of conserving energy and increasing efficiency. 49 U.S.C. § 32902. The maximum feasible standard for efficiency and eliminating climate pollution is transitioning swiftly to 100% electric. Many studies have shown that the U.S. vehicle fleet to be regulated by this CAFE standard can and should be 100% electric by 2030. This rule should be on track to require the industry to do so. An 8% per year increase in stringency and efficiency starting in 2023 will not achieve that necessary standard. 86 Fed. Reg. 49606.
4. The cost/benefit analysis is unconstitutional in that it favors adults and industry today over the lives of children and whether they have a livable planet as they become adults and live out their lives. NHTSA uses two sets of discounting: (1) SCC at 2.5%, other benefits and costs at 3% and (2) SCC at 3%, other benefits and costs at 7%. These should be 0. The costs and benefit to society would drastically change and support a much more stringent and efficient standard than the one proposed. That cost benefit sensitivity analysis should be performed in the RIA and disclosed to the public so the public and decisionmakers can see the true benefit of more swiftly transitioning the industry to electric and non-ICE vehicles, especially given the feasibility of doing so today. 86 Fed. Reg. 49620 – See also Table II-9, 86 Fed. Reg. 49607-08.
5. The CAFE Model used to simulate VMTs and other activity levels used to calculate emission impacts should also not use a discount rate. What discount rates are used as assumptions in that model? Please disclose all assumptions used in the model. If you used discount rates above 1%, that has also led to a biased analysis of impacts of the standards and again, discriminates against children. For instance, your CAFE Model Documentation from 2016 defines r as “the discount rate the consumer is assumed to take into account when considering fuel savings.” https://www.nhtsa.gov/sites/nhtsa.gov/files/812305_cafe_modeldocumentation.pdf at p.26. That is an unjustified and unlawful use of the discount rate when a central purpose of electrifying transportation is to save the nation for its children and drastically promote efficiency and energy conservation because intergenerational harm is at stake. Are the car manufacturers allowed to provide their own discount rates, as your documentation suggests? This should be disclosed fully and the entire model reworked to eliminate any discounting and bias toward the present generation of consumers or manufacturers.
6. On discount rates, NHTSA should not be making decisions about appropriate standards based on the preferences of consumers. That is not its legal obligation. Yet, your technical support document suggests that while you are “observing record sales of battery electric vehicles” because there is sustained demand for pickup trucks, you will use an average value to “represent these preferences across the market.”
7. The IWG discount rates you reference in Tables 6-13 to 6-15 of 2.5% to 5% are too high and unconstitutional. The constitutional rights of children must be protected and the vehicle preferences of consumers should not lead your agency to discount the lives of children and treat them as less valuable or not equal under the eyes of the law when it comes to life, liberty,

personal security and a climate system that sustains human life, among other unalienable rights. Please do a wholly new analysis to eliminate all of the insidious discounting of children's lives and use 0 as the discount rate throughout your models, CBA, and all other analyses. As you concede, "choosing a discount rate can have an enormous effect on calculated SCGHG values." Technical Support Document at 539.

8. To apply a discount rate to monetized health impacts is also completely inappropriate and unlawful and discriminates against children. Technical Support Document, Tables 6-22, 6-23.
9. The end result of these unlawful discount rates is exemplified in Table III-37 Incremental Benefits and Costs Over the Lifetimes of Total Fleet Produced Through 2029 (2018\$ Billions), 3% Percent Discount Rate, by Alternative – 86 Fed. Reg. 49720. Alternative 3 ends up with a net incremental social benefit of -3.4 billion, whereas Alternatives 1 and 2 have a positive net benefit. That entire analysis would have shifted to a positive net benefit if discount rates were not applied throughout every step of the analysis. Please perform a sensitivity analysis for all alternatives with a 0 discount rate.
10. NHTSA should evaluate the consequences on fossil fuel longevity and cumulative emissions of creating CAFE standards that continue reliance on fossil fuel ICEs, rather than requiring a quicker transition to EVs.
11. At 86 Fed. Reg. 49733 (a) explains that: "Special ethical considerations arise when comparing benefits and costs across generations. Although most people demonstrate time preference in their own consumption behavior, it may not be appropriate for society to demonstrate a similar preference when deciding between the well-being of current and future 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." These are not just ethical considerations, but constitutional obligations to "Our Posterity" and the duty to provide equal protection of the law to children and future generations as to vehicle consumers and car manufacturing industry today.
12. At 86 Fed. Reg. 49801 NHTSA discloses the trajectory of CO₂ concentrations with the given alternatives: "Estimated CO₂ concentrations in the atmosphere for 2100 would range from 788.33 pollutant per million parts (ppm) under Alternative 3 to approximately 789.11 ppm under the No-Action Alternative, indicating a maximum atmospheric CO₂ decrease of approximately 0.77 ppm compared to the No-Action Alternative." The maximum safe level of atmospheric CO₂ is below 350 ppm, a level surpassed in the late 1980s. Today's dangerous levels of over 410 ppm are causing catastrophic consequences for humanity and our children. The levels that these standards align with are beyond unlivable for humans and most other species on the planet. Those findings alone make these rules unconstitutional.
13. This finding violates NHTSA's statutory and constitutional obligation: "Based on all of the above, NHTSA tentatively concludes that while all of the action alternatives are technologically feasible, Alternative 3 may be too costly to be economically practicable in the rulemaking timeframe, even if choosing it could result in greater fuel savings." 86 Fed. Reg. 49810.

14. Please propose at least one alternative tiered to a fully electric vehicle fleet by 2030.
15. Please propose at least one alternative that is aligned with putting the United States transportation system vehicle fleet on an emission reductions pathway consistent with < 350 ppm CO₂ by 2100.
16. We attach to our comments and incorporate herein our comments to EPA on its proposed GHG emissions standards for vehicles, our comments on the Technical Support Document for the social cost of carbon. Please consider those comments as part of our comments on your proposed rule.

Please also address each of the issues identified below in your rulemaking.

17. The federal government has long known that burning fossil fuels causes dangerous climate change, which imperils the health and wellbeing of American children and contributes to the catastrophic heat, drought, and wildfires terrorizing the West coast and hurricanes, flooding, and tornadoes horrifying the East coast. We are well beyond the time for incremental measures. Total U.S. emissions must be reduced by close to 100% by 2050 in order to protect the fundamental constitutional rights of children, particularly children within environmental justice communities, including communities of color, low-income communities, and indigenous communities.
18. Experts have opined that it is economically and technically feasible to achieve the science-based greenhouse gas (“GHG”) emission reduction target of close to 100% by 2050, while simultaneously enhancing sequestration capacity of sinks to drawdown historical cumulative CO₂ emissions, placing the U.S. on an emissions trajectory consistent with returning atmospheric CO₂ to below 350 ppm by 2100 and we urge you to heed their advice.¹
19. Experts are also clear on three key points that should be considered, analyzed and disclosed in your rulemaking.

¹ See Our Children’s Trust, *Government Climate and Energy Policies Must Target <350 ppm Atmospheric CO₂ by 2100 to Protect Children and Future Generations* (Mar. 2021) [Attachment 2]; James Hansen et al., *Assessing “Dangerous Climate Change”: Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, 8 PLOS ONE e81648 (2013) [hereinafter *Assessing “Dangerous Climate Change”*]; Expert Report of James E. Hansen, Ph.D., *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. June 28, 2018); Expert Report of Mark Jacobson, Ph.D., *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. June 28, 2018); Mark Z. Jacobson et al., *100% Clean and Renewable Wind, Water, and Sunlight (WWS) All-Sector Energy Roadmaps for the 50 United States*, 8 Energy & Env’t Sci. 2093 (2015); Ben Haley et al., *350 ppm Pathways for the United States* (2019), <https://www.ourchildrenstrust.org/s/350-PPM-Pathways-for-the-United-States-gk6k.pdf>; James H. Williams et al., *Carbon-Neutral Pathways for the United States*, 2 AGU Advances e2020AV000284 (2021); Ben Haley et al., *350 ppm Pathways for Florida* (2020), <https://www.ourchildrenstrust.org/s/350-PPM-Pathways-Florida-Report-pa2t.pdf>; Mark Z. Jacobson, *Zero Air Pollution and Zero Carbon From All Energy Without Blackouts at Low Cost in the Whole United States* (2021), <http://web.stanford.edu/group/efmh/jacobson/Articles/I/21-USStates-PDFs/21-WWS-USA>Total.pdf>.

- a) Children are uniquely vulnerable to human-caused climate change because of their developing bodies, higher exposure to air, food, and water per unit body weight, unique behavior patterns, dependence on caregivers, and longevity on the planet.² Climate change is causing a public health emergency that is adversely impacting the physical and mental health of American children through, among other impacts, extreme weather events, rising temperatures and increased heat exposure, decreased air quality, altered infectious disease patterns, and food and water insecurity.³ How does this program protect children’s unalienable rights?
- b) “Climate change is a response to energy imbalances in the climate system. For example, rising greenhouse gases directly cause an initial imbalance, the radiative forcing, in the planetary radiation budget, and surface temperatures increase in response as the climate attempts to restore balance.”⁴ Because of a buildup of CO₂ in Earth’s atmosphere (due to human activities, primarily the burning of fossil fuels and deforestation), more solar energy is retained in the atmosphere and less energy is released back into space. This excess accumulation of GHGs in our atmosphere results in an Earth energy imbalance (“EEI”) and thus an accumulation of heat in our climate system.⁵ Because of continuing GHG emissions, EEI is increasing and amounts to 0.87 ± 0.12 watts per square meter (W/m²) during 2010–2018.⁶ Between 2005–2019, the EEI doubled, representing an unprecedented and rapid warming of our planet.⁷ Restoring Earth’s energy balance is key to solving the climate crisis and scientists say that to do this, we must swiftly reduce GHG emissions by eliminating fossil fuel combustion and protecting and enhancing carbon sinks to sequester more carbon. Earth’s energy balance can only be restored by returning the atmospheric CO₂ concentration to below 350 ppm by 2100.⁸ As such, the target of <350 ppm by 2100 is the best scientific standard for “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. . . within a time-frame” sufficient to protect life and liberties.⁹ Because the Earth’s energy imbalance is already in the danger zone¹⁰ and scientists state the “Earth energy imbalance (EEI) is the most critical number defining the

² Samantha Ahdoot, Susan E. Pacheco & Council on Environmental Health, *Global Climate Change and Children’s Health*, 136 *Pediatrics* e1468 (2015); Rebecca Pass Philipsborn & Kevin Chan, *Climate Change and Global Child Health*, 141 *Pediatrics* e20173774 (2018).

³ *Id.*

⁴ Ryan J. Kramer et al., *Observational Evidence of Increasing Global Radiative Forcing*, 48 *Geophysical Research Letters* e2020GL091585 (2021), <https://doi.org/10.1029/2020GL091585>.

⁵ Karina von Schuckmann et al., *Heat Stored in the Earth System: Where Does the Energy Go?*, 12 *Earth Syst. Sci. Data*, 2013, 2014–15 (2020), <https://doi.org/10.5194/essd-12-2013-2020>.

⁶ *Id.*

⁷ Norman G. Loeb et al., *Satellite and Ocean Data Reveal Marked Increase in Earth’s Heating Rate*, 48 *Geophysical Research Letters* e2021GL093047 (2021), <https://doi.org/10.1029/2021GL093047>.

⁸ *Assessing “Dangerous Climate Change”*, *supra* note 1; von Schuckmann et al., *supra* note 5.

⁹ UNFCCC, Art. 2.

¹⁰ *See Assessing “Dangerous Climate Change”*, *supra* note 1.

prospects for continued global warming and climate change,”¹¹ “stabilization of climate . . . requires that EEI be reduced to approximately zero to achieve Earth’s system quasi-equilibrium.”¹² How does this program align with that mandate?

- c) Current increased average temperatures of 1°C and greater (now 1.2°C) are already dangerous. The IPCC special report on *Global Warming of 1.5°C* (2018) stated that allowing a temperature rise of 1.5°C “is not considered ‘safe’ for most nations, communities, ecosystems and sectors and poses significant risks to natural and human systems as compared to the current warming of 1°C (*high confidence*).”¹³ Medical experts have recently recognized that “[t]he science is unequivocal; a global increase of 1.5°C above the pre-industrial average and the continued loss of biodiversity risk *catastrophic harm* to health that will be impossible to reverse.”¹⁴ The science is clear—every ton of emissions matters and causes more danger and more temperature rise.¹⁵ It is well past time to take all steps to ensure all federal actions are aligned with reducing total U.S. emissions by close to 100% by 2050 while protecting and enhancing carbon sinks and a trajectory of returning CO₂ levels to below 350 ppm by 2100, or otherwise explain why those reductions cannot be met. How does this program align?

20. Our Children’s Trust represents twenty-one youth plaintiffs, including eleven Black, Brown, and Indigenous youth, in the constitutional climate lawsuit, *Juliana v. United States*, in which the Secretary, in his official capacity, and DOT are defendants. This case asserts that, through the government’s past and ongoing affirmative actions that cause climate change, it has violated the youngest generation’s constitutional rights to life, liberty, property, and equal protection of the law, as well as failed to protect essential public trust resources. In this litigation, federal courts have affirmed “that the federal government has long promoted fossil fuel use despite knowing that it can cause catastrophic climate change”¹⁶ and “has long understood the risks of fossil fuel use and increasing carbon dioxide emissions. As early as 1965, the Johnson Administration cautioned that fossil fuel emissions threatened significant changes to climate, global temperatures, sea levels, and other stratospheric properties.”¹⁷ The Ninth Circuit Court of Appeals found that there was evidence showing that the federal government was a substantial factor in causing the youth’s constitutional injuries because “[a] significant portion of [GHG] emissions occur in this country; the United States accounted for

¹¹ von Schuckmann et al., *supra* note 5.

¹² *Id.*

¹³ M.R. Allen et al., *Technical Summary*, in *Global Warming of 1.5°C*, at 44 (2018); *see also Assessing “Dangerous Climate Change”*, *supra* note 1.

¹⁴ Lukoye Atwoli et al., *Call for Emergency Action to Limit Global Temperature Increases, Restore Biodiversity, and Protect Health*, *The Lancet* (2021) (emphasis added), [https://doi.org/10.1016/S0140-6736\(21\)01915-2](https://doi.org/10.1016/S0140-6736(21)01915-2).

¹⁵ IPCC, *Summary for Policymakers*, in *Climate Change 2021: The Physical Science Basis*, SPM-37 (In Press) (“Every tonne of CO₂ emissions adds to global warming.”).

¹⁶ *Juliana v. United States*, 947 F.3d 1159, 1164 (9th Cir. 2020).

¹⁷ *Juliana v. United States*, 947 F.3d 1159, 1166 (9th Cir. 2020).

over 25% of worldwide emissions from 1850 to 2012, and currently accounts for about 15%.¹⁸ Federal courts have also confirmed that the government’s conduct in contributing to climate change is causing constitutional injuries to American youth.¹⁹ The transportation sector accounts for approximately 29% of GHG emissions in the U.S as of 2019.²⁰ According to the EPA, “[t]he transportation sector generates the largest share of greenhouse gas emissions. Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes.”²¹ This proposed rule must be crafted so that the GHG emissions that result from it are in line with the U.S. government’s public trust and constitutional obligation to reduce U.S. emissions in line with a <350 ppm CO₂ target by 2100. The proposed rule is not aligned with that standard, nor does it analyze how the CAFE standards and thus the emissions they allow from vehicles achieve the overall national emissions reductions necessitated by science and law.

21. Under the 5th Amendment to the U.S. Constitution, the government is restrained from engaging in conduct that infringes upon fundamental rights to life, liberty, and property, which includes a climate system that sustains human life and liberty. Under the Public Trust Doctrine, embedded in our Constitution and other founding documents, and in the very sovereignty of our Nation, U.S. residents (both present and future, i.e. Posterity) have a right to access and use crucial natural resources, like air and water. The U.S. government, and its executive agencies, have fiduciary duties as trustees to manage, protect, and prevent substantial impairment to our country’s vital natural resources which the government holds in trust for present and future generations.²² As the honorable Judge Ann Aiken stated in her decision to deny the government’s motion to dismiss *Juliana*, “the right to a climate system capable of sustaining human life is fundamental to a free and ordered society,”²³ and DOT and its agencies should align its policies to ensure this right is not violated.
22. Without immediate effective action, our children and future generations will continue to suffer injury with long-lasting and potentially irreversible consequences.²⁴ Moreover, all young people seeking environmental and climate justice, especially youth from frontline and environmental justice communities that have contributed the least to emissions and have long suffered from systemic environmental racism and social and economic injustices, must have their voices heard on this proposed oil and gas program that will affect their lives long after the Secretary and the other decision-makers at DOT are gone.

Thank you for your consideration. Please include all cited evidence in the administrative record. We are happy to provide any of the cited evidence on request. All of the *Juliana v. United*

¹⁸ *Juliana v. United States*, 947 F.3d 1159, 1169 (9th Cir. 2020).

¹⁹ *Juliana v. United States*, 947 F.3d 1159, 1168 (9th Cir. 2020).

²⁰ U.S. EPA, *Sources of Greenhouse Gas Emissions*, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions> (last visited Sept. 17, 2021).

²¹ *Id.*

²² *Juliana v. United States*, 217 F. Supp. 3d 1224, 1254 (D. Or. 2016).

²³ *Juliana v. United States*, 217 F. Supp. 3d 1224, 1250 (D. Or. 2016)

²⁴ See *Assessing “Dangerous Climate Change”*, *supra* note 1; James Hansen et al., *Ice Melt, Sea Level Rise and Superstorms: Evidence from Paleoclimate Data, Climate Modeling, and Modern Observations that 2°C Global Warming Could be Dangerous*, 16 *Atmos. Chem. & Phys.* 3761 (2016); U.S. Global Change Research Program, *Fourth National Climate Assessment, Vol. II* (2018).

States expert reports and related evidence cited herein are in the files of the Department of Justice, which represents DOT and the Secretary in the case, as its clients. Thus, you have access to all of those documents and evidence, along with the legal bases for the comments made herein. However, if you have not been provided with those documents, we are happy to provide them. We would be pleased to meet with you and or you and your counsel to discuss this vital matter and the constitutional use of NHTSA's statutory authority to redress the climate crisis and protect the nation's children. Please send us a response to our comments, notification of further comment opportunities and all analyses and decision documents to the address and email listed below.

Sincerely,

/s/

Julia Olson
Executive Director and Chief Legal Counsel
julia@ourchildrenstrust.org

Our Children's Trust
P.O. Box 5181
Eugene, OR 97405

Attachment 1: Our Children's Trust, Comment for Environmental Protection Agency's Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards - Proposed Rule (Docket No. EPA-HQ-OAR-2021-0208) (Sept. 27, 2021).

Attachment 2: Our Children's Trust, *Government Climate and Energy Policies Must Target <350 ppm Atmospheric CO₂ by 2100 to Protect Children and Future Generations* (Mar. 2021).

Attachment 1



September 27, 2021

Submitted via <https://www.regulations.gov/>

U.S. Environmental Protection Agency
EPA Docket Center
Washington, DC

Re: Comment for Environmental Protection Agency's Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards - Proposed Rule (Docket No. EPA-HQ-OAR-2021-0208)

Administrator Michael Regan,

On behalf of America's youth, Our Children's Trust provides these comments for the Environmental Protection Agency's ("EPA") "Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards" proposed rule (EPA-HQ-OAR-2021-0208), pursuant to Executive Order 13990. As the Nation's only law firm dedicated to representing youth whose constitutional rights are being infringed by their government's conduct that causes climate change, we write to advise EPA to strengthen the federal greenhouse gas ("GHG") emission standards for passenger cars and light trucks for Model Years ("MY") 2023-2026 beyond the proposed alternative and Alternative 2 so that they meet the urgency of the crisis and align with the kind of deep emission reductions scientists say are needed to protect the climate system and the constitutional rights of youth. We also ask that the EPA revise its Regulatory Impacts Analysis ("RIA")¹ so that it reflects the true costs of climate change, the true benefits of more swiftly electrifying the transportation sector and utilizes no discount rate or a discount rate that does not discriminate against children and future generations.

The federal government has long known that burning fossil fuels causes dangerous climate change that imperils the health and wellbeing of American children. The environmental consequences of vehicle emissions are well documented and are contributing to the catastrophic heat, drought, and wildfires terrorizing the West coast and hurricanes, flooding and tornadoes horrifying the East coast. The costs of these climate change-induced disasters are staggering and many of the victims will be unable to recover. A new study just out shows that children will experience many more of these extreme, life-threatening adults than their elders living today, including the ones making these policy decisions.² We are well beyond the time for incremental measures. These rules need to go further, faster and across a longer time horizon so that the entire transportation sector, and supporting industrial sectors, can plan and respond as quickly as feasible. The technology is there to expedite the transition away from the internal combustion engine and eliminate their sales by 2030 for passenger cars and light duty trucks and 2035 for heavy duty vehicles. This is not only economically feasible, it is enormously beneficial. According to your

¹ U. S. EPA, [Revised 2023 and Later Model Year Light- Duty Vehicle GHG Emissions Standards: Regulatory Impact Analysis](#) (Aug. 2021) [hereinafter *RIA*].

² Wim Thiery et al., *Intergenerational Inequities in Exposure to Climate Extremes*, Science (2021).

own RIA:

[T]here has been a proliferation of recent announcements from automakers signaling a rapidly growing shift in investment away from internal-combustion technologies and toward high levels of electrification. EPA has also heard from a wide range of stakeholders over the past several months, including but not limited to the automotive manufacturers and the automotive suppliers, that the significant investments being made now to develop and launch new EV product offerings and in the expansion of EV charging infrastructure could enable higher levels of EV penetration to occur in the market place by the MY 2026 time frame than we have projected in this proposal for both the proposed MY2026 standards and the Alternative 2 MY2026 standards. RIA at xx.

The RIA demonstrates that Alternative 2's more stringent standards would result in greater net benefits and fuel savings for American drivers than the preferred alternative.³ The actual benefits of the necessary science-based standards would outpace those analyzed in the RIA. There is every reason to move more quickly and propose a more stringent alternative than those considered: 1) the U.S. Constitution and your statutory public trust mandate require it; 2) it is technically feasible to decarbonize and electrify transportation more quickly; 3) the auto industry has signaled it can move more quickly than even your most stringent proposal, Alternative 2; and 4) the economic analysis of present value net benefits would be even more favorable for the nation and for consumers if you eliminated the unreasonable and unlawful discount rates from your CBA to more accurately reflect the clear benefit of requiring more stringent GHG emissions and EV standards for passenger cars and light duty trucks, and beyond.

Strengthening the GHG emission standards for passenger cars and light trucks is needed in order to protect the fundamental constitutional rights of children and future generations, particularly children within environmental justice communities, including communities of color, low-income communities, and indigenous communities. Executive Order 13990's policy directive clearly states "to listen to the science; to improve public health and protect our environment; to ensure access to clean air and water; . . . to reduce greenhouse gas emissions[.]" The science is clear. The world must stop fossil fuel emissions as soon as possible, every ton matters and causes more danger⁴, and the transportation sector must be an early target for decarbonization. A key tool for EPA to facilitate emission reductions is through strong GHG emission standards for passenger cars and light trucks.

EPA, OMB, and other agencies of the federal government have systematically undermined the rights of young people by conducting cost benefit analyses that strongly favor present generations of adults at the expense of future generations and children. Through the RIA's use of discount rates, EPA is undervaluing the costs of its policies to be borne by children living today

³ Alternative 2 total net benefits discounted would be \$110-180 billion, with fuel savings for consumers totaling \$150-290 through 2050, also discounted. In contrast, Alternative 1 total net benefits are only \$76-130 billion, with fuel savings of \$98-200 billion, illustrating that EPA is selecting an alternative that is less stringent, will allow more GHG emissions from the transportation sector, and will have less economic benefits to society and consumers. RIA at xxii, xxiv.

⁴ IPCC, *Summary for Policymakers*, in *Climate Change 2021: The Physical Science Basis*, SPM-37 (In Press) ("Every tonne of CO₂ emissions adds to global warming.").

and millions of American children of tomorrow. That analysis of costs and benefits affects this proposal on GHG emissions standards and how quickly EPA requires electrification of new vehicles on the roads. In addition to perpetuating the infringement of fundamental rights of youth, EPA violates its mandate to prepare an economic assessment that “shall be as extensive as practicable” by accurately accounting for intergenerational equity.⁵ As Frank Ramsey wrote a century ago, discounting the wellbeing of future generations is not defensible. The higher the discount rate used, the more that the rights and interests of young people and future generations are devalued in those calculations. The draft RIA currently uses discount rates of 2.5%, 3%, and 5% in evaluating Social Cost of Greenhouse Gases (“SC-GHG”) and 3% and 7% in evaluating other costs and benefits. In the context of evaluating costs and benefits of actions around the climate crisis and intergenerational rights, these discount rates are far too high, leading to SC-GHG estimates that are artificially low. Even the EPA acknowledges that these rates are insufficient with respect to the rights of future generations: “a consideration of climate benefits calculated using discount rates below 3 percent, including 2 percent and lower, are also warranted when discounting intergenerational impacts.”⁶

As a result, the draft RIA’s economic analysis unjustifiably undervalues the benefits of climate action and the costs of GHG emissions for children living today and coming generations, thereby treating them under law unequally. Given the devastating climate change impacts on human output, welfare, and life that are being documented today with present levels of global heating and that are expected to worsen in coming years and decades, the science supports the application of zero or much lower discount rates for long-term policy analysis. Many economists agree that intergenerational equity considerations as well as the likely decreases in standards of living and global productivity due to the high risk of harms from climate change necessitate a discount rate of 0% or even negative discount rates.

In light of these considerations, Our Children’s Trust respectfully requests that the EPA revise its RIA with a sensitivity analysis that fully accounts for the rights of children and future generations and then revise its proposed rule in light of that analysis in order to comply with the government’s duty to prevent infringement of the constitutional rights of young people and future generations to life, liberty, and property and, importantly, equal protection under law, including the Clean Air Act. The EPA must make the following changes:

1. Strengthen the GHG emission standards so that they are as stringent as possible and in line with the deep GHG emission reductions called for by science and eliminate the credits and offsets that allow some auto manufacturers to avoid transitioning away from the internal combustion engine. EPA should achieve zero emissions from all new passenger vehicles and light-duty trucks by 2030 and for heavy-duty trucks by 2035.
2. Remove from the draft RIA all SC-GHG estimations derived from the use of constitutionally, ethically, and economically indefensible 2.5%, 3% and 5% discount rates as well as the 3% and 7% analyses to the extent those to perpetuate discrimination against children and future generations and overestimate the economic wealth of future generations.
3. Incorporate into the RIA estimations derived using a discount rate methodology that

⁵ 42 U.S.C. § 7617(d).

⁶ RIA at xvii.

properly accounts for intergenerational equity (i.e., either a sensitivity analysis using negative, 0%, and near-zero discount rates or a declining discount rate schedule starting from a discount rate no higher than 1.5%).

4. Incorporate into the draft RIA an assessment of the totality of health and environmental impacts associated with GHG pollutants, and non-GHG pollutants, as these impacts are well-documented and relevant to the burdens imposed by the Rule on youth and future generations. The health costs of all GHG emissions should be fully evaluated in the RIA.

The remainder of this comment provides the justification for these proposed changes based on the best available economic and scientific academic literature. The attachments submitted with this comment provide further details.

EPA Must “Listen to the Science”

As part of its review of national emissions standards for passenger cars and light trucks under section 202(a) of the Clean Air Act, EPA should recognize the scientifically-defensible, economically viable, and technically feasible target of reducing total U.S. emissions by close to 100% by 2050, while simultaneously enhancing sequestration capacity of sinks to drawdown historical cumulative CO₂ emissions, placing the U.S. on an emissions trajectory consistent with returning atmospheric CO₂ to below 350 ppm by 2100.⁷ Experts have opined that it is economically and technically feasible to achieve this science-based greenhouse gas emission reduction target and we urge you to heed their advice.⁸

Experts are also clear on three key points relevant to EPA’s task at hand.

1. Children are uniquely vulnerable to human-caused climate change because of their developing bodies, higher exposure to air, food, and water per unit body weight, unique behavior patterns, dependence on caregivers, and longevity on the planet.⁹ Climate change is causing a public health emergency that is adversely impacting the physical and mental health of American children through, among other impacts, extreme weather events, rising temperatures and increased heat exposure, decreased air quality, altered infectious disease patterns, and food and water insecurity.¹⁰ The RIA confirms some of these disproportionate harms to children.

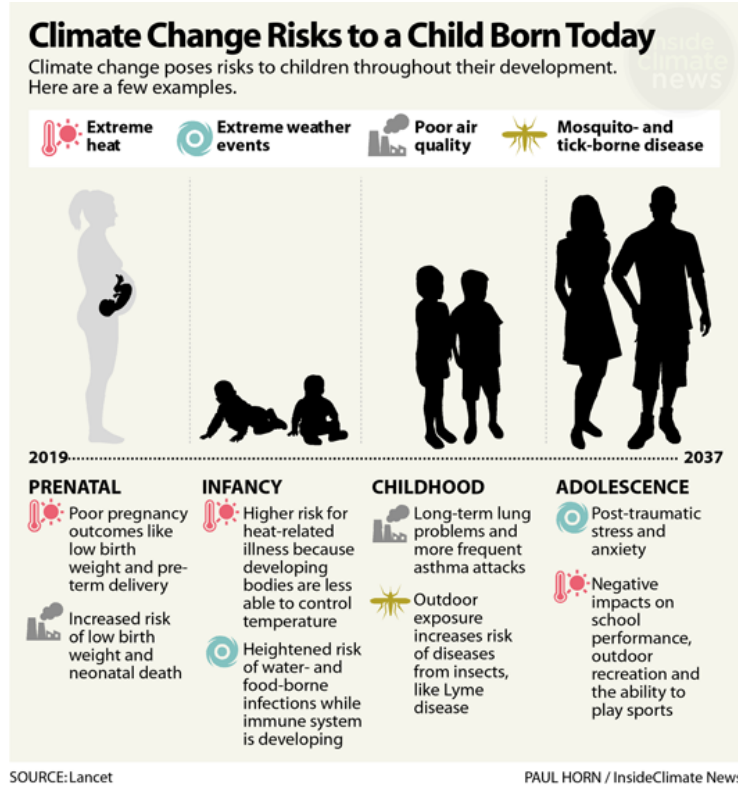
⁷ See Our Children’s Trust, Government Climate and Energy Policies Must Target <350 ppm Atmospheric CO₂ by 2100 to Protect Children and Future Generations (Mar. 2021) [Attachment 1]; James Hansen et al., *Assessing “Dangerous Climate Change”: Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, 8 PLOS ONE e81648 (2013) [hereinafter *Assessing “Dangerous Climate Change”*]; Expert Report of James E. Hansen, Ph.D., *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. June 28, 2018); Expert Report of Mark Jacobson, Ph.D., *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. June 28, 2018).

⁸ See Mark Z. Jacobson et al., *100% Clean and Renewable Wind, Water, and Sunlight (WWS) All-Sector Energy Roadmaps for the 50 United States*, 8 Energy & Env’t Sci. 2093 (2015); Ben Haley et al., *350 ppm Pathways for the United States* (2019) [Attachment 2]; James H. Williams et al., *Carbon-Neutral Pathways for the United States*, 2 AGU Advances e2020AV000284 (2021); Ben Haley et al., *350 ppm Pathways for Florida* (2020) [Attachment 3]; Mark Z. Jacobson, *Zero Air Pollution and Zero Carbon From All Energy Without Blackouts at Low Cost in the Whole United States* (2021) [Attachment 4].

⁹ Samantha Ahdoot, Susan E. Pacheco & Council on Environmental Health, *Global Climate Change and Children’s Health*, 136 Pediatrics e1468 (2015); Rebecca Pass Philipsborn & Kevin Chan, *Climate Change and Global Child Health*, 141 Pediatrics e20173774 (2018).

¹⁰ *Id.*

RIA at 7-5 to 7-15.



2. “Climate change is a response to energy imbalances in the climate system. For example, rising greenhouse gases directly cause an initial imbalance, the radiative forcing, in the planetary radiation budget, and surface temperatures increase in response as the climate attempts to restore balance.”¹¹ Because of a buildup of CO₂ in Earth’s atmosphere (due to human activities, primarily the burning of fossil fuels and deforestation), more solar energy is retained in the atmosphere and less energy is released back into space. CO₂ is the primary driver (or forcer) of climate change. This excess accumulation of GHGs in our atmosphere results in an Earth energy imbalance (“EEI”) and thus an accumulation of heat in our climate system.¹² Because of continuing GHG emissions, EEI is increasing and amounts to 0.87 ± 0.12 watts per square meter (W/m²) during 2010–2018.¹³ This energy increase is equivalent to the calories consumed if *each* person in the United States ate 1.7 billion Twinkies—enough to fill 110 Olympic swimming pools. Between 2005–2019, the EEI doubled, representing an unprecedented and rapid warming of our planet.¹⁴ Restoring Earth’s energy balance is key to solving the climate crisis and

¹¹ Ryan J. Kramer et al., *Observational Evidence of Increasing Global Radiative Forcing*, 48 *Geophysical Research Letters* e2020GL091585 (2021), <https://doi.org/10.1029/2020GL091585>.

¹² Karina von Schuckmann et al., *Heat Stored in the Earth System: Where Does the Energy Go?*, 12 *Earth System Science Data*, 2013, 2014–15 (2020).

¹³ *Id.*

¹⁴ Norman G. Loeb et al., *Satellite and Ocean Data Reveal Marked Increase in Earth’s Heating Rate*, 48 *Geophysical Research Letters* e2021GL093047 (2021), <https://doi.org/10.1029/2021GL093047>.

scientists say that to do this, we must swiftly reduce GHG emissions by eliminating fossil fuel combustion and protecting and enhancing carbon sinks to sequester more carbon. Earth’s energy balance can only be restored by returning the atmospheric CO₂ concentration to below 350 ppm by 2100.¹⁵ Scientists have concluded that “warming will continue even if atmospheric greenhouse gas (GHG) amounts are stabilized at today’s level, and the EEI defines additional global warming that will occur without further change in forcing.”¹⁶ As such, the target of <350 ppm by 2100 is the best scientific standard for “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. . . . within a time-frame” sufficient to protect life and liberties.¹⁷

3. Current increased average temperatures of 1°C and greater (now 1.2°C) are already dangerous. Basing decisions that align with temperature targets of 1.5°C is exponentially more catastrophic for our children and posterity. The IPCC special report on *Global Warming of 1.5°C* (2018) stated that allowing a temperature rise of 1.5°C “is not considered ‘safe’ for most nations, communities, ecosystems and sectors and poses significant risks to natural and human systems as compared to the current warming of 1°C (*high confidence*).”¹⁸ Medical experts have recently recognized that “[t]he science is unequivocal; a global increase of 1.5°C above the pre-industrial average and the continued loss of biodiversity risk *catastrophic harm* to health that will be impossible to reverse.”¹⁹ As such, 1.5°C should not be used to guide U.S. transportation policy that is required to be based on best available science.

EPA Must Cease Infringing the Constitutional Rights of Youth

Our Children’s Trust represents twenty-one youth plaintiffs, including eleven Black, Brown, and Indigenous youth, in the constitutional climate lawsuit, *Juliana v. United States*. This case asserts that, through the government’s affirmative actions that cause climate change, it has violated the youngest generation’s constitutional rights to life, liberty, property, and equal protection of the law, as well as failed to protect essential public trust resources. In this litigation, federal courts have affirmed “that the federal government has long promoted fossil fuel use despite knowing that it can cause catastrophic climate change”²⁰ and “has long understood the risks of fossil fuel use and increasing carbon dioxide emissions. As early as 1965, the Johnson Administration cautioned that fossil fuel emissions threatened significant changes to climate, global temperatures, sea levels, and other stratospheric properties.”²¹

¹⁵ Assessing “*Dangerous Climate Change*”, *supra* note; von Schuckmann et al., *supra* note.

¹⁶ von Schuckmann et al., *supra* note.

¹⁷ UNFCCC, Art. 2.

¹⁸ M.R. Allen et al., *Technical Summary*, in *Global Warming of 1.5°C*, at 44 (2018); *see also* Assessing “*Dangerous Climate Change*”, *supra* note.

¹⁹ Lukoye Atwoli et al., *Call for Emergency Action to Limit Global Temperature Increases, Restore Biodiversity, and Protect Health*, *The Lancet* (2021) (emphasis added), [https://doi.org/10.1016/S0140-6736\(21\)01915-2](https://doi.org/10.1016/S0140-6736(21)01915-2).

²⁰ *Juliana v. United States*, 947 F.3d 1159, 1164 (9th Cir. 2020).

²¹ *Juliana v. United States*, 947 F.3d 1159, 1166 (9th Cir. 2020).

The Ninth Circuit Court of Appeals found that there was evidence showing that the federal government was a substantial factor in causing the youths' constitutional injuries because "[a] significant portion of [GHG] emissions occur in this country; the United States accounted for over 25% of worldwide emissions from 1850 to 2012, and currently accounts for about 15%."²² As the EPA has acknowledged, "[t]ransportation is the single largest source of GHG emissions in the United States, making up 29 percent of all emissions," with "[p]assenger cars and trucks contribut[ing] 58 percent of all transportation sources and 17 percent of total U.S. GHG emissions."²³

Federal courts have also confirmed that the government's conduct in contributing to climate change is causing constitutional injuries to American youth:

Jaime B., for example, claims that she was forced to leave her home because of water scarcity, separating her from relatives on the Navajo Reservation. . . . Levi D. had to evacuate his coastal home multiple times because of flooding. . . . These injuries are not simply "'conjectural' or 'hypothetical;'" at least some of the plaintiffs have presented evidence that climate change is affecting them now in concrete ways and will continue to do so unless checked.²⁴

EPA's control over GHG emissions from the transportation sector must be exercised in a manner that avoids further constitutional infringement by not setting standards that exacerbate American youth's existing climate change injuries.

EPA has Public Trust and Constitutional Obligations to use its Authority to Protect the Atmosphere.

Under the 5th Amendment to the U.S. Constitution, the government is restrained from engaging in conduct that infringes upon fundamental rights to life, liberty, and property, which includes a climate system that sustains human life and liberty. Under the Public Trust Doctrine, embedded in our Constitution and other founding documents, and in the very sovereignty of our Nation, U.S. residents (both present and future, i.e. Posterity) have a right to access and use crucial natural resources, like air and water. The U.S. government, and its executive agencies, have fiduciary duties as trustees to manage, protect, and prevent substantial impairment to our country's vital natural resources which the government holds in trust for present and future generations.²⁵ As an executive agency of the U.S. government, EPA has an obligation to refrain from activities that substantially impair the atmosphere and other public trust resources (including land, water, and wildlife) and that harm young people's constitutional rights to life, liberty, property, and equal protection of the law.

As part of its proposed rule, EPA must define and recognize the nature of its public trust obligation to ensure it is implementing its statutory authority to set GHG emission standards for passenger vehicles and light trucks in a way that does not substantially impair essential trust

²² *Juliana v. United States*, 947 F.3d 1159, 1169 (9th Cir. 2020).

²³ U.S. EPA, [Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards: Proposed Rule: By the Numbers](#), EPA (Aug. 2021).

²⁴ *Juliana v. United States*, 947 F.3d 1159, 1168 (9th Cir. 2020).

²⁵ *Juliana v. United States*, 217 F. Supp. 3d 1224, 1254 (D. Or. 2016).

resources or limit the ability of youth and future generations from accessing and enjoying trust resources in the short- and long-term. As the honorable Judge Ann Aiken stated in her decision to deny the government’s motion to dismiss *Juliana*, “the right to a climate system capable of sustaining human life is fundamental to a free and ordered society,”²⁶ and EPA should align its policies to ensure this right is not violated.

EPA’s Actions Must Be Aligned with Restoring Earth’s Energy Imbalance.

The Earth’s energy imbalance is already in the danger zone according to scientists, including those within the federal government.²⁷ Scientists state the “Earth energy imbalance (EEI) is the most critical number defining the prospects for continued global warming and climate change.”²⁸ “Stabilization of climate . . . requires that EEI be reduced to approximately zero to achieve Earth’s system quasi-equilibrium.”²⁹ As such, EPA must determine how its standards will result in GHG emissions reductions required in order to align with a trajectory of returning CO₂ levels to below 350 ppm by 2100, which would restore the energy balance of Earth.³⁰

The transportation sector accounts for approximately 29% of GHG emissions in the U.S as of 2019.³¹ According to the EPA, “[t]he transportation sector generates the largest share of greenhouse gas emissions. Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes.”³² EPA’s proposed rule must be crafted so that the GHG emissions that result from the program are in line with the U.S. government’s public trust and constitutional obligation to reduce U.S. emissions in line with a <350 ppm CO₂ target by 2100. The proposed rule is not aligned with that standard, nor does it analyze how the emissions it allows from the passenger cars and light duty truck fleets of the transportation sector achieves the overall national emissions reductions necessitated by science and law.

EPA must also disclose how its proposed GHG emission standards would be consistent with achieving the U.S. Nationally Determined Contribution of reducing its net greenhouse gas emissions by 50-52% below 2005 levels by 2030.³³ How is it possible to continue authorizing cars and trucks with internal combustion engines at the levels permitted by the proposed rule given the current climate catastrophe and the U.S. government’s commitment to reduce its net GHG emissions by 50-52% below 2005 levels? Experts have opined that it is technically and economically feasible to transition the U.S. off of fossil fuels by 2050.³⁴ Key actions for this transformation include “begin[ning] large-scale electrification in transportation” in

²⁶ *Juliana v. United States*, 217 F. Supp. 3d 1224, 1250 (D. Or. 2016)

²⁷ See *Assessing “Dangerous Climate Change”*, *supra* note.

²⁸ von Schuckmann et al., *supra* note .

²⁹ *Id.*

³⁰ *Id.*, James Hansen et al., *Target Atmospheric CO₂: Where Should Humanity Aim?* 2 *Open Atmospheric Sci. J.* 217 (2008).

³¹ U.S. EPA, *Sources of Greenhouse Gas Emissions*, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions> (last visited Sept. 17, 2021).

³² *Id.*

³³ The United States of America Nationally Determined Contribution, *Reducing Greenhouse Gases in the United States: A 2030 Emissions Target* (April 2021).

³⁴ See *supra* note 5 .

the 2020s.³⁵ It is now 2021 and EPA has no plan in place for how it intends to ensure electrification of transportation and elimination of GHG emissions from the transportations activities that are within its regulatory control. Experts say that the entire new vehicle fleet can and should be electric by 2030 and 2035 for heavy duty trucks at the latest. EPA must utilize this regulatory process to ensure that its proposed GHG emission standards follows the advice of what experts say are needed to decarbonize and electrify the national transportation system. Under the current proposal, several car manufacturers are able to sell zero BEVs through 2026 and buy offsets from companies like Tesla. This system of allowing for an GHG emissions average by fleet, the purchasing of offsets from other companies, and no minimum requirements for the percentage of sales that are zero emissions by certain years does not demonstrate that the 2030 or 2035 targets would be met.

EPA’s GHG Emission Standards Must Facilitate Decarbonization of the Nation’s Transportation System.

Decarbonization of the transportation sector is critical to achieving GHG emission reductions goals and thus EPA’s emissions standards must ensure they facilitate, rather than inhibit, decarbonization goals. In fact, experts have opined that “[t]ransportation electrification is the most critical sector to achieve these electrification goals in due to the volume of liquid fuels it currently consumes.”³⁶ Energy experts have performed numerous pathway analyses which lay out the roadmap for what needs to be done to decarbonize all sectors of the U.S. economy, including transportation. EPA must begin large-scale electrification of the U.S. transportation system this decade [2020s], with near 100% sales of key electrified technologies by 2030—far more than EPA’s projection “that during the four-year ramping up of the stringency of the CO₂ standards, the proposed standards could be met with gradually increasing sales of plug-in electric vehicles in the U.S., up to about 8 percent market share (including both electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs) by MY 2026.”³⁷ For instance, a minimum of 80-100% of new vehicles sold by 2030 should be electric or hydrogen fueled.

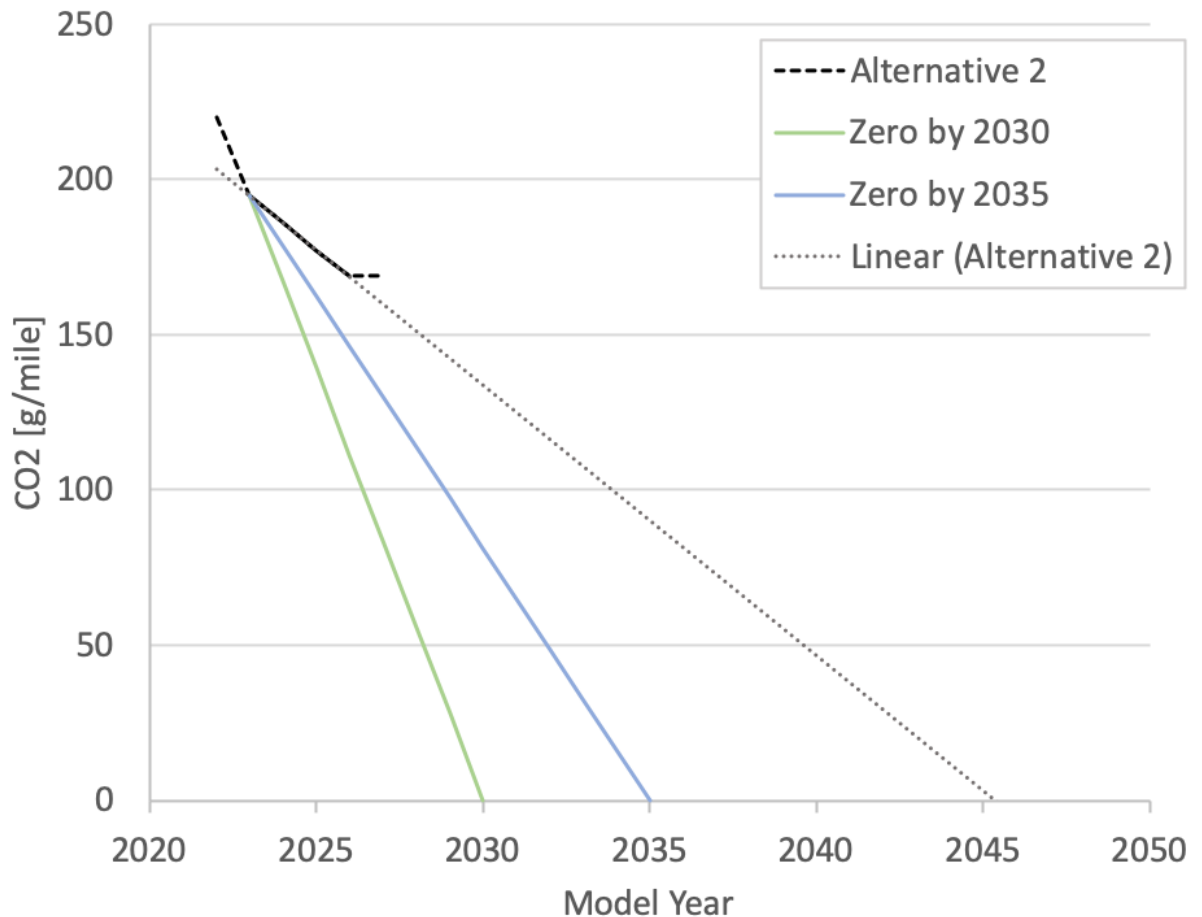
To enable and facilitate this transformation, EPA’s regulatory action must demonstrate that its standards will result in a zero emission standard no later than 2030 for at least passenger vehicles and 2035 for heavy duty trucks. The RIA does not demonstrate that. Instead, it suggests that even for Alternative 2 (the most stringent standard), a zero emission result would not be achieved until approximately 2045 if the current emissions standards are carried out in a linear fashion. In order to reach zero fleet emissions in 2030 and 2035, assuming a linear decrease in CO₂ [g/mile] from the projected Alternative 2 target of 195 g/mile in 2023, the projected fleet average target levels for 2026 would need to be ~111 and ~146 CO₂ [g/mile], respectively. The graph below carries the Alternative 2 line of Table 8 (RIA at xxi) toward a zero emissions standard and adds standards that are consistent with the minimum EPA should be doing to achieve the necessary emission reductions from the transportation sector. The RIA suggests that the emissions standards after MY2026 could result in steeper reductions, but it does not explain why, how or when those decisions will be made, and why they are not being made now given the technical and economic feasibility, the climate emergency, and the auto manufacturer’s capacity to move more quickly.³⁸

³⁵ Ben Haley et al., *350 ppm Pathways for the United States* 15 (2019).

³⁶ *Id.* at 38.

³⁷ 86 Fed. Reg. 43,731.

³⁸ The RIA only states: “As in many prior EPA mobile source rulemakings, the decision on what standard to set is largely based on the availability, capability, and cost of the emissions control technology along with the need for



EPA should also be working with the Department of Transportation and other agencies to encourage building markets to electrify vehicles of all types and ensure that the transportation system has the infrastructure needed to accommodate electrified transportation. Electrification will require integrated planning to ensure that new resources are developed to meet the growing demand, to plan distribution system upgrades and charging infrastructure, and to leverage the ability of new electric loads to operate flexibly. In addition, EPA must ensure that its policies promote mobility and alternative and equitable forms of transportation, reduce vehicle miles traveled, and that its investments do not needlessly invest in a transportation system that puts more cars on the road.

More stringent GHG emission standards will provide greater economic benefits

EPA’s own analysis demonstrates that Alternative 2 provides the most economic benefits and savings for consumers. However, Alternative 2 is based on 2012 rule standards carried out

reductions of GHG and the benefits of doing so. This proposal would also establish a path toward more significant reductions in the years following 2026.” RIA at 2-1. What is that path?

linearly to 2026, which is now nearly a decade old and does not account for the latest science and improvements in EV technology as well as decreased costs for EVs. RIA at xx. The availability, capability, and cost of technology reducing emissions in this part of the transportation sector all favor more stringent standards tied to a 2030 zero emissions target. EPA does not explain why it is not pursuing more significant reductions *now* rather than in the years following 2026. RIA at 2-1.

EPA needs to evaluate an alternative that is in line with the best climate science for returning to <350 ppm CO₂ by 2100, which requires nearly complete decarbonization of all energy sectors by 2050 and a zero emission standard for most new vehicles by 2030. The Biden administration has committed to a zero emission new vehicle fleet by 2035, but the proposed rule does not demonstrate how the rule will achieve that. EPA admits in the RIA, that none of the alternatives it considered are as rigorous enough to match what is possible from the auto industry in terms of EV penetration. It is EPA's job to do as much as it can to push the transition to zero emissions to protect the air and climate for children and future generations. It should not be waiting for the market to decide when to transition, but leading the way.

The Issue with Credits and Offsets

The RIA demonstrates that the new rule provides credits for natural gas vehicles that incentivize those vehicles when all vehicles need to move completely away from fossil fuels. RIA at 1-14.

EPA also incentivizes BEVs with credits and multipliers, but allows other manufacturers to continue producing entire fleets of ICEs. For instance Mitsubishi and Subaru will produce zero BEVs by MY2026, but Tesla will be able to sell its credits for having a 100% BEV fleet to those manufacturers. This system of standards needs to change to transition the fleet at a faster pace toward the 2030 standard as described above.

Manufacturers are allowed to take credits to offset their emissions standards by improving their air conditioning systems. Both need to occur. One should not lessen the need to do the other. Those credits should be eliminated and both should be required because “The technological achievements already developed and already increasing in application to vehicles within the current new vehicle fleet (Chapter 2.3) will enable the industry to achieve the proposed standards even without the development and implementation of additional technologies.”. RIA at 2-5, 2-6.

The Economic Analysis is Old

The RIA concedes that it is relying on data from 2016 and other outdated analysis and IAM that does not account for actual costs and benefits and the feasibility of BEVs. That should be addressed in the new rule, which should be more stringent than what is proposed here.

EPA Should Not Place the Burdens of Climate Change on Youth and Future Generations

The EPA's RIA violates the constitutional rights of youth and future generations by placing the physical and financial burden of climate change on them. Most notably, the RIA (1) fails to include a complete health and environmental assessment of GHG emissions that are explicitly authorized under the proposed rule; (2) fails to account for the true cost of authorizing GHG emissions from passenger vehicles and light trucks placing greater economic and other burdens on children and future generations; and (3) uses discount rates that undervalue the interests and rights of today's youth and future generations.

Youth and Future Generations are Already Facing a Health Crisis as a Result of Climate Change

Climate change is causing a public health emergency that is adversely impacting the physical and mental health of children through, among other impacts, extreme weather events, increased heat exposure, decreased air quality, altered infectious disease patterns, and food and water insecurity.³⁹ These exact types of impacts are *already* occurring at present levels of heating with regular frequency.

Increased heat exposure is particularly devastating for children at multiple stages of development. Infant mortality increases 25% on extremely hot days with the first seven days of life representing a period of critical vulnerability.⁴⁰ Extreme heat places young children at higher risk of kidney and respiratory disease as well as fever and electrolyte imbalance.⁴¹ Heat illness is also a leading cause of death and illness in high school athletes with nearly 10,000 episodes occurring annually.⁴²

Children's growing bodies are more susceptible to environmental irritants, and these irritants are increasing due to climate change. Over eight percent of children suffer from allergic rhinitis, and the ragweed pollen season in North America has grown 13-27 days longer since 1995 due to higher temperatures and greater CO₂ levels.⁴³ As wildfire seasons grow in length and

³⁹ Lancet Countdown on Health and Climate Change, [Policy Brief for the United States of America](#), Am. P. Health Ass'n. 6 (2019); S. Ahdoot & S.E. Pacheco, [Global Climate Change and Children's Health](#), 136 Pediatrics e1468, e1468 (2015) ("The effects of climate change on child health include physical and psychological sequelae of weather disasters, increased heat stress, decreased air quality, altered disease patterns of some climate-sensitive infections, and food, water, and nutrient insecurity in vulnerable regions.").

⁴⁰ Xavier Basagaña et al., [Heat Waves and Cause-specific Mortality at all Ages](#), 22 Epidemiology 765, 769 (2011) ("In infants, the effect of heat was particularly strong, with mortality increases of 25% when considering only the first hot day."); see also, Linda Giudice, [A Clarion Warning About Pregnancy Outcomes and the Climate Crisis](#), 3 JAMA Network Open e208811, e208811 (2020) (noting that "exposures mainly in the third trimester (or averaged across gestation) to PM_{2.5}, O₃, and heat, alone or together, are associated with [preterm birth, low birth weight, and stillbirth] in the vast majority of studies analyzed").

⁴¹ Nick Watts et al., [The 2019 Report of The Lancet Countdown on Health and Climate Change: Ensuring That the Health of a Child Born Today Is Not Defined by a Changing Climate](#), 394 The Lancet 1836, 1841 (2019).

⁴² J. Gilchrist et al., [Heat Illness Among High School Athletes—United States, 2005–2009](#), 59 CDC Morbidity & Mortality Weekly Report 1009, 1009 (2010) ("Heat illness during practice or competition is a leading cause of death and disability among U.S. high school athletes[. . .]. The average [time-loss heat illness] corresponds to a weighted average annual estimate of 9,237 illnesses nationwide."); see also, Perry Sheffield et al., [Climate Change and Schools: Environmental Hazards and Resiliency](#), 14 Int'l J. Env't Res. & Pub. Health 1397, 1399 (Nov. 16, 2017) (noting that climate change-induced extreme heat "is of particular concern for student athletes").

⁴³ [Allergy Facts](#), American College of Allergy, Asthma, & Immunology (Jan. 9, 2018) ("In data published from the 2014 National Health Interview Survey (NHIS), 8.4% of US children under age 18 suffered from hay fever[.]"); Lewis Ziska et al., [Recent Warming by Latitude Associated with Increased Length of Ragweed Pollen Season in Central](#)

severity across the western U.S., exposed children suffer substantial eye symptoms, as well as upper and lower respiratory symptoms, which lead to increased rates of asthma-related hospitalizations and emergency room visits.⁴⁴ Extreme weather events have negative impacts on children’s mental health as well as their physical health due to family loss or separation; school interruption; scarcity of food, water, and shelter; and public service outages during crucial stages of their growth and development.⁴⁵ Expert reports written by Dr. Susan Pacheco, Dr. Jerome Paulson, and Dr. Howard Frumkin are attached to this Comment, providing more detail on these extreme, particularized impacts of climate change on children’s health. In addition to scientific experts, judicial systems around the world are recognizing the increased, foreseeable risk of severe health issues that children and future generations face from climate change impacts.⁴⁶

The draft RIA is not as “extensive as practicable” as it contains no thorough assessment of the aforementioned health and environmental impacts on children from GHG emissions accumulating from passenger cars and trucks, intentionally ignoring the well-known and scientifically proven impacts on youth.⁴⁷ Instead, the RIA focuses on the negative health and environmental impacts from exposure to non-GHG pollutants including particulate matter, ozone, nitrogen oxides, sulfur oxides, carbon monoxide, air toxics, and other impacts from exposure to traffic, all of which are important to assess, but not to the exclusion of health specific impacts from GHG emissions.⁴⁸ Given the severity of the climate crisis, the U.S. government’s long-standing practice of emitting massive amounts of GHGs, and the resulting increase in Earth’s energy imbalance, every ton of GHGs emitted matters immensely.⁴⁹ While exposure to non-GHG pollutants is an important part of the analysis, EPA has no basis for its statement that “[t]hese [GHG] pollutants will not be directly regulated by the[se] standards.”⁵⁰ Passenger cars and trucks are not allowed on the roads unless they meet EPA’s regulatory standards and thus EPA is directly responsible for the GHG emissions that result from these sources.

[North America](#), 108 Proc. Nat’l Acad. Sci. 4248, 4248 (2011) (“Overall, these data indicate a significant increase in the length of the ragweed pollen season by as much as 13–27 [days] at latitudes above ~44°N since 1995.”).

⁴⁴ Nino Künzli et al., [Health Effects of the 2003 Southern California Wildfires on Children](#), 174 Am. J. Respiratory & Critical Care Med. 1221, 1224 (2006) (“Having fire smoke smell indoors for more than 6 [days] was associated with more than fourfold higher rates of eye symptoms, approximately threefold increased rates of dry cough and sneezing, and more than twofold higher rates of cold, sore throat, wet cough, medication use, physician visits, and missed school due to symptoms. . . . Asthma attacks increased 63%.”); *see also*, Watts et al., *supra* note , at 1837 (“Through adolescence and beyond, air pollution – principally driven by fossil fuels, and exacerbated by climate change – damages the heart, lungs, and every other vital organ. These effects accumulate over time[.]”).

⁴⁵ Daniel Martinez Garcia & Mary C. Sheehan, [Extreme Weather-Driven Disasters and Children’s Health](#), 46 Int’l J. Health Services 79, 88 (2016) (“Abrupt disruptions in a child’s life such as family loss or separation; school interruption; changes in food and water supply and shelter conditions; and public service outages may cause direct acute shock and other emotional trauma, as well as longer-term indirect effects.”).

⁴⁶ *See, e.g.*, Sharma et al. v Minister for the Environment, [2021] FCA 560, ¶¶225, 235, 246 (Austl.); *Klimaatzaak v Belgium et al.*, Tribunal de Première Instance [Civ.] [Tribunal of First Instance] Brussels, 4 ch. Jun. 17, 2021, 63 (Belg.).

⁴⁷ RIA at 7-1 to 7-15.

⁴⁸ *Id.*

⁴⁹ IPCC, *Summary for Policymakers*, in *Climate Change 2021: The Physical Science Basis SPM-37* (In Press) (“Every tonne of CO₂ emissions adds to global warming”).

⁵⁰ RIA at 7-1.

The RIA Fails to Account for the True Costs of Climate Change

The extraordinary costs of climate change are well documented and can be measured in both economic terms and loss of life. A segment of climate-related damages comes from extreme weather events, which are increasing in severity due to climate change. The NOAA National Centers for Environmental Information states that “[t]he U.S. has sustained 298 weather and climate disasters since 1980 where overall damages/costs reached or exceeded \$1 billion (including CPI adjustment to 2021). **The total cost of these 298 events exceeds \$1.975 trillion.**”⁵¹ In the 2010s, there were 123 climate disaster events, resulting in 5,224 deaths, with a price tag of \$844.7 billion.⁵² Just this year, as of July 9, 2021, “there have been 8 weather/climate disaster events with losses exceeding \$1 billion each to affect the United States. These events included 1 drought event, 2 flooding events, 4 severe storm events, and 1 winter storm event. Overall, these events resulted in the deaths of 331 people and had significant economic effects on the areas impacted.”⁵³ These kinds of extraordinary (and deadly) costs from what the U.S. government calls “climate disasters” dwarf the “costs of compliance” with the proposed rule must be considered when conducting an economic impact analysis that is “as extensive as practicable.”⁵⁴

The RIA Uses Discount Rates that Infringe the Constitutional Rights of Youth and Future Generations

The RIA purposely devalues the long-term effects of these climate-induced harms that today’s young people and future generations will endure throughout their lives.⁵⁵ By incorporating higher than scientifically supported discount rates into its analysis, the EPA makes a value judgment that these intense negative health and economic burdens on youth and future generations matter very little, if at all. The problems with this approach have been summarized by the late economist Frank Ackerman in his expert report in the *Juliana* litigation:

The treatment of discounting by [the U.S. Government] frames their economic analysis of long-term problems such as climate change and has resulted in a policy or practice by [the government] that deliberately devalues the climate harms [the government] knew these Youth Plaintiffs will experience over the long term. Discount rates have immense influence on the results of economic analyses, particularly in an intergenerational context. How much less are future costs and benefits worth today, solely because they will occur in the future? If a high discount rate is used, the costs and benefits that will be experienced 100 years from now are worth almost nothing today, suggesting that climate mitigation (or other policies that benefit future generations) are not worth spending much on today. At a low discount rate, such as the 1.4% annual rate adopted by the Stern Review (Stern

⁵¹ NOAA, Nat’l Centers for Environmental Information, *Billion-Dollar Weather and Climate Disasters: Overview*, <https://www.ncdc.noaa.gov/billions/> (emphasis in original) (last visited Sept. 21, 2021).

⁵² *Id.*

⁵³ *Id.*

⁵⁴ 42 U.S.C. § 7617(c)(1), (d).

⁵⁵ See Expert Report of Susan E. Pacheco, MD and Jerome A. Paulson, MD, FAAP, at 26-29, *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. Jun. 28, 2018) (documenting the severe, long-term impacts climate change will have on children’s lifelong success and development) [Attachment 5]; see also, Expert Report of Howard Frumkin, MD, MPH, DrPH, *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. Jun. 28, 2018) [Attachment 6].

2007), the present value of future impacts is much more substantial, endorsing policy-making as if the future mattered. Within the economic debates over discount rates, there are many strong rationales for very low, and even zero, discount rates. This is important because a very low discount rate is required in order to recognize the importance of climate impacts on future generations and their wellbeing in [the government's] climate and energy policy.⁵⁶

Nobel Laureate economist, Dr. Joseph Stiglitz, has been also been advising the U.S. government for years (including in 2021) to lower the discount rate in order to account for the high risk of climate harms and for the need to protect children and future generations. Dr. Stiglitz believes the U.S. government's policies that discount children's future "at inappropriately high rates continue to steer America on the path of incalculable losses and away from that more demanding and sane course."⁵⁷

Government agencies have also long recommended the use of lower discount rates when considering rules and policies that will have far-reaching intergenerational effects. The U.S. General Accounting Office (renamed the Government Accountability Office in 2004) indicated in 1991 that "sensitivity analysis should be used to address issues such as . . . intergenerational effects of policies on human life[.]"⁵⁸ noting that "[t]his approach can yield an effective real discount rate very close to zero[.]"⁵⁹ In 2003, Office of Management and Budget ("OMB") similarly suggested that, "[i]f your rule will have important intergenerational benefits or costs[,]" you might consider a further sensitivity analysis using a lower but positive discount rate[.]"⁶⁰ EPA is incorrect that it is somehow legally constrained from using lower discount rates. As the EPA puts it in its 2010 guidelines for Preparing Economic Analyses,

OMB's *Circular A-4* (2003) *requires* the use of constant 3 percent and 7 percent for both intra- and intergenerational discounting for benefit-cost estimation of economically significant rules *but allows for* lower, positive consumption discount rates, perhaps in the 1 percent to 3 percent range, if there are important intergenerational values.⁶¹ (emphasis added)

OMB *Circular A-4*, promulgated pursuant to an Executive Order, cannot be used as a means for EPA to deviate from its statutory obligation to promote public health and welfare and to conduct an economic impact assessment that is "as extensive as practicable." OMB has no statutory authority to mandate the discount rates being implemented by EPA. If the science supports use of discount rates lower than 2.5%, 3%, 5% and 7%, which it clearly does as EPA itself acknowledges, then that is what EPA must use.

⁵⁶ Expert Report of Frank Ackerman, at 2, *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. Jun. 28, 2018) [Attachment 7].

⁵⁷ Expert Report of Joseph E. Stiglitz, Ph.D., at ¶79, *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. Jun. 28, 2018) [Attachment 8].

⁵⁸ U.S. General Accounting Office, *Discount Rate Policy* 9 (May 1991).

⁵⁹ *Id.* at 11.

⁶⁰ Office of Management and Budget, *Circular A-4*, at 36 (2003).

⁶¹ U.S. EPA, *Ch. 6 Discounting Future Benefits and Costs*, in Guidelines for Preparing Economic Analyses 6-15 (2010).

By using outdated and scientifically unsupported discount rates, rather than committing to and implementing the use of a specific, lower discount rate for policies that implicate future generations, the EPA is perpetuating the tremendous burdens being placed on young people and future generations. These young people and future generations cannot afford for the EPA to make the same mistake with its newest GHG standards. The bottom line is that in order to treat a life in the future equally to a life today, we must take into account all the services that a stable climate system has provided for past and present generations, services that are at severe risk of widespread diminishment for future generations. When taking these considerations into account, economic and scientific analyses strongly indicate that future generations will be even worse off than us (suggesting a negative discount rate) and at best would be about as well off as those of us living today (suggesting a discount rate of zero).

“If our impacts on future generations matter, then the appropriate discount rate for climate costs and benefits needs to be very low, probably near zero, an argument made effectively in the Stern Review (Stern 2007) and other sources.”⁶² As part of its RIA, EPA should conduct a sensitivity analysis with a discount rate of zero with much more stringent alternatives to the proposed rule that will lead to a zero emissions standard for all new vehicles by 2030 and 2035 at the latest. Then EPA can determine the true impacts of its proposed rule and much better alternatives for children and future generations.

Conclusion

Given the fact that U.S. government conduct has resulted in a quarter of all global GHG emissions that are causing the current climate catastrophe, it is well past time for the EPA to take all steps within its power to ensure its GHG emission standards for cars and trucks are aligned with the best available science and are eliminating tailpipe GHG emissions from all new vehicles by 2030 or 2035 at the latest for heavy duty vehicles, in line with eliminating total U.S. emissions by close to 100% by 2050, placing the U.S. on an emissions trajectory consistent with returning atmospheric CO₂ to below 350 ppm by 2100, or otherwise explain why those reductions cannot be met. Without immediate effective action, our children and future generations will continue to suffer injury with long-lasting and potentially irreversible consequences.⁶³ Moreover, all young people seeking environmental and climate justice, especially youth from frontline and environmental justice communities that have contributed the least to emissions and have long suffered from systemic environmental racism and social and economic injustices, must have their voices heard in developing climate change policies.

Thank you for your consideration. Please include all cited evidence in the administrative record. We are happy to provide any of the cited evidence on request. Please send us a response to our comments and decision documents to the address and email listed below.

⁶² Expert Report of Frank Ackerman, *supra* note , at 7.

⁶³ See *Assessing “Dangerous Climate Change”*, *supra* note ; James Hansen et al., *Ice Melt, Sea Level Rise and Superstorms: Evidence from Paleoclimate Data, Climate Modeling, and Modern Observations that 2°C Global Warming Could be Dangerous*, 16 *Atmos. Chem. & Phys.* 3761 (2016); U.S. Global Change Research Program, *Fourth National Climate Assessment, Vol. II* (2018).

Sincerely,
/s/

Julia Olson
Executive Director and Chief Legal Counsel
julia@ourchildrenstrust.org

Our Children's Trust
P.O. Box 5181
Eugene, OR 97405

Attachment 1: Our Children's Trust, *Government Climate and Energy Policies Must Target <350 ppm Atmospheric CO₂ by 2100 to Protect Children and Future Generations* (Mar. 2021).

Attachment 2: Ben Haley et al., *350 ppm Pathways for the United States, Executive Summary* (2019). Full report available at <https://www.ourchildrenstrust.org/s/350-PPM-Pathways-for-the-United-States-gk6k.pdf>.

Attachment 3: Ben Haley et al., *350 ppm Pathways for Florida, Executive Summary and U.S. data from the Technical Supplement* (2020). Full report available at <https://www.ourchildrenstrust.org/s/350-PPM-Pathways-Florida-Report-pa2t.pdf>.

Attachment 4: Mark Z. Jacobson, *Zero Air Pollution and Zero Carbon From All Energy Without Blackouts at Low Cost in the Whole United States* (2021).

Attachment 5: Expert Report of Susan E. Pacheco, MD and Jerome A. Paulson, MD, *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. Jun. 28, 2018).

Attachment 6: Expert Report of Howard Frumkin, MD, MPH, DrPH, *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. Jun. 28, 2018).

Attachment 7: Expert Report of Frank Ackerman, *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. Jun. 28, 2018).

Attachment 8: Expert Report of Joseph E. Stiglitz, Ph.D., *Juliana v. United States*, No. 6:15-cv-01517 (D. Or. Jun. 28, 2018).

Attachment 2

Government Climate and Energy Policies Must Target <350 ppm Atmospheric CO₂ by 2100 to Protect Children and Future Generations (March 2021)

INTRODUCTION

Human laws can adapt to nature's laws, but the laws of nature will not bend for human laws. Government climate and energy policies **must** be based on the best available science to protect our climate system and vital natural resources on which human survival and welfare depend, and to ensure the fundamental rights of young people and future generations are protected.

Because carbon dioxide (CO₂) is the primary driver of Earth energy imbalance (EEI), climate destabilization, and ocean warming and acidification, all government policies regarding CO₂ emissions and CO₂ sequestration should be aimed at reducing global CO₂ concentrations **below 350 parts per million (ppm) by 2100**. Global mean atmospheric CO₂ levels, as of 2020, are approximately 412 ppm and rising.¹ With timely action, an emission reductions and sequestration pathway back to <350 ppm could limit peak warming to approximately 1.3°C this century and stabilize long-term heating this century at ~1°C above pre-industrial temperatures with further reductions next century. The temperature of the Earth, much like sea level rise, is a measurable indicator of the CO₂ problem, but it is not a good metric for solving it. EEI and CO₂ levels provide measurable standards, with CO₂ emission reductions and sequestration the measurable means to meet those standards.

As explained in more detail below, there are numerous scientific bases and lines of evidence supporting setting <350 ppm by 2100 as the uppermost safe limit for atmospheric CO₂ concentrations and global warming. Beyond 2100, atmospheric CO₂ may need to return to well below 350 ppm and closer to the preindustrial level of ~280 ppm to prevent the complete melting of Earth's ice sheets and protect coastal cities from sea level rise. Fortunately, it is still not only technically and economically feasible to return to <350 ppm by 2100, but transitioning to clean energy sources will provide significant economic and public health benefits and improve quality-of-life.

WHY GOVERNMENTS MUST AIM FOR <350 PPM AND RESTORING EARTH ENERGY BALANCE

Three lines of robust and conclusive scientific evidence, based on the paleo-climate record and real-world observations, show that above an atmospheric CO₂ concentration of 350 ppm there is: 1) significant Earth energy imbalance; 2) massive ice sheet destabilization and sea level rise; and 3) ocean warming and acidification resulting in the bleaching death of coral reefs and other marine life.

¹ Ed Dlugokencky & Pieter Tans, NOAA/GML, www.esrl.noaa.gov/gmd/ccgg/trends/.

1) Earth Energy Imbalance

Scientists say the “Earth energy imbalance (EEI) is the most critical number defining the prospects for continued global warming and climate change.”² “Stabilization of climate, the goal of the universally agreed United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and the Paris Agreement in 2015, requires that EEI be reduced to approximately zero to achieve Earth’s system quasi-equilibrium.”³ Earth’s energy flow is significantly out of balance. Because of a buildup of CO₂ (and to a lesser extent other greenhouse gases) in our atmosphere, due to human activities, primarily the burning of fossil fuels and deforestation,⁴ more solar energy is retained in our atmosphere and less energy is released back into space.⁵ (Figure 1.)⁶ The measured imbalance from 2010-2018 ($0.87 \pm 0.12 \text{ W m}^{-2}$) was approximately double the imbalance from 1971-2018.⁷

Returning CO₂ concentrations to below 350 ppm would restore the energy balance of Earth by allowing as much heat to escape into space as Earth retains, an important historic balance that has kept our planet in the sweet spot for the past 10,000 years, supporting stable sea levels and coastlines, enabling productive agriculture, and allowing humans and other species to thrive.⁸ The paleo-climate record shows that CO₂ levels, temperature, and sea level all move together (see Figure 2). Humans have caused CO₂ levels to shoot off the chart (circled in red), rising to levels unprecedented over the past 3 million years, and causing the Earth energy imbalance.⁹

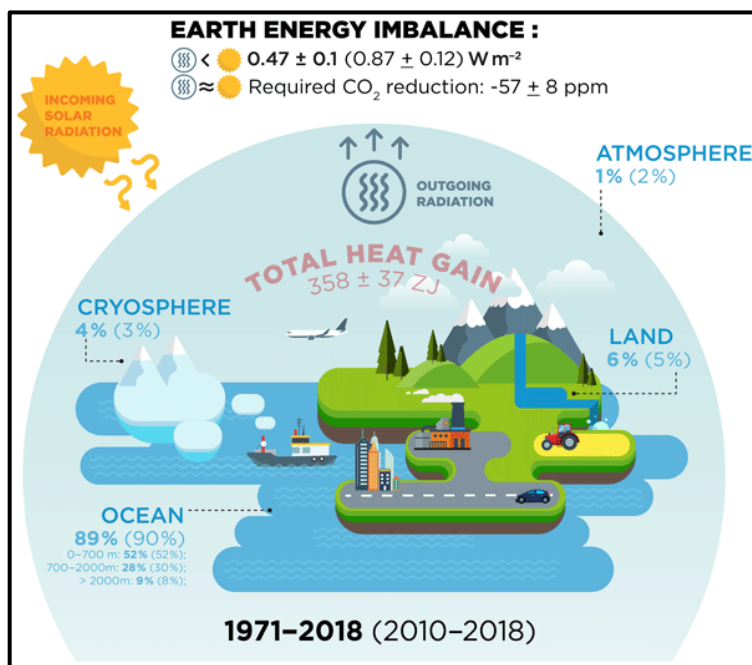


Figure 1: Earth heat inventory for Earth energy imbalance at the top of the atmosphere.

² Karina von Schuckmann et al., *Heat Stored in the Earth System: Where Does the Energy Go?*, 12 Earth Syst. Sci. Data. 2013 (2020) [hereinafter *Heat Stored in the Earth System*] (written by 38 international experts, including lead IPCC authors).

³ *Id.*

⁴ IPCC, *Summary for Policymakers*, in *Climate Change 2014: Synthesis Report* (2014).

⁵ James Hansen et al., *Assessing “Dangerous Climate Change”: Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, 8 PLOS ONE e81648 (2013) [hereinafter *Assessing “Dangerous Climate Change”*].

⁶ von Schuckmann, *Heat Stored in the Earth System*.

⁷ *Id.*

⁸ James Hansen, *Storms of My Grandchildren* 166 (2009).

⁹ M. Willeit et al., *Mid-Pleistocene Transition in Glacial Cycles Explained by Declining CO₂ and Regolith Removal*, 5 Science Advances eaav7337 (2019).

2) Ice Sheets and Sea Level Rise

The last time the ice sheets appeared stable in the modern era was in the 1980s when the atmospheric CO₂ concentration was below 350 ppm. The consequences of >350 ppm and >1°C of warming are already visible, significant, and dangerous for humanity. With just over a global average 1°C of warming, glaciers in all regions of the world are shrinking, and the rate at which they are melting is accelerating.¹⁰ Large parts

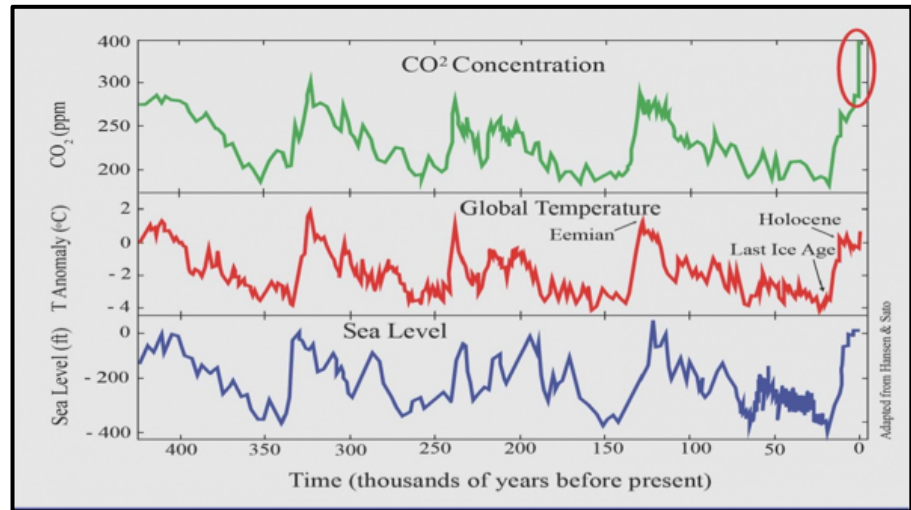


Figure 2: Evidence from the paleo-climate record showing the relationship between CO₂ concentration, global temperature, and sea level.

of the Greenland and Antarctic ice sheets, which required millennia to grow, are teetering on the edge of irreversible disintegration, a point that, if reached, would lock-in major ice sheet mass loss, sea level rise of many meters, and worldwide loss of coastal cities – a consequence that would be irreversible on any timescale relevant to humanity (see Figure 3).¹¹ Greenland’s ice sheet melt is currently occurring faster than anytime during the last three and a half centuries, with a 33% increase alone since the 20th century.¹² From 1994 to 2017, the Earth lost 28 trillion tonnes of ice, with the rate of ice loss increasing by 57% compared to the 1990s.¹³ The paleo-climate record shows the last time atmospheric CO₂ levels were over 400 ppm, the seas were **70 feet higher** than they are today and heating consistent with CO₂ concentrations as low as 450 ppm may have been enough to melt almost all of Antarctica.¹⁴ While many experts are predicting multi-meter sea level rise this century, even NOAA’s modest estimate of 5-8.2 feet (1.5-2.5 m) global mean rise by 2100¹⁵ would impact millions of Americans (see Figure 4).¹⁶

¹⁰ M. Zemp et al., *Global Glacier Mass Changes and their Contributions to Sea-Level Rise from 1961-2016*, 568 *Nature* 382 (2019); B. Menounos et al., *Heterogeneous Changes in Western North American Glaciers Linked to Decadal Variability in Zonal Wind Strength*, 46 *Geophysical Research Letters* 200 (2019).

¹¹ Hansen, *Assessing “Dangerous Climate Change,”* at 13; see also James Hansen et al., *Ice Melt, Sea Level Rise and Superstorms; Evidence from Paleoclimate Data, Climate Modeling, and Modern Observations that 2 °C Global Warming Could be Dangerous*, 16 *Atmos. Chem. & Phys.* 3761 (2016) [hereinafter *Ice Melt, Sea Level Rise and Superstorms*].

¹² L.D. Trusel et al., *Nonlinear Rise in Greenland Runoff in Response to Post-industrial Arctic Warming*, 562 *Nature* 105 (2018).

¹³ T. Slater et al., *Earth’s Ice Imbalance*, 15 *The Cryosphere* 233 (2021).

¹⁴ James E. Hansen, *Declaration in Support of Plaintiffs, Juliana v. United States*, No. 6:15-cv-01517-TC, 14 (D. Or. Aug. 12, 2015); IPCC, *Chapter 6.3.2, What Does the Record of the Mid-Pliocene Show?*, in *Climate Change 2007: The Physical Science Basis* (2007); Dowsett & Cronin, *High Eustatic Sea Level During the Middle Pliocene: Evidence from the Southeastern U.S. Atlantic Coastal Plain*, 18 *Geology* 435 (1990); N.J. Shackleton et al., *Pliocene Stable Isotope Stratigraphy of Site 846*, 138 *Proceedings of the Ocean Drilling Program, Scientific Results* 337 (1995).

¹⁵ NOAA, *Global and Regional Sea Level Rise Scenarios for the United States* (2017) (intermediate-high to extreme global mean sea level rise scenarios).

¹⁶ NOAA, *Examining Sea Level Rise Exposure for Future Populations*, <https://coast.noaa.gov/digitalcoast/stories/population-risk.html>.



Figure 3: Antarctic melt water from the Nansen ice shelf.

Many climate models represent sea level rise as a gradual linear response to melting ice sheets, but the historic climate record shows something very different. In reality, seas do not rise slowly and predictably but rather in pulses as ice sheets destabilize.¹⁷ Scientists believe we still have a chance to preserve the large ice sheets of Greenland and Antarctica and most of our shorelines and ecosystems if we restore Earth's energy balance and return to below 350 ppm,

thereby limiting longer-term warming by the end of the century to no more than 1°C above pre-industrial levels (short-term warming will inevitably exceed 1°C but must not exceed 1°C for more than a short span of years rather than multiple decades or centuries).

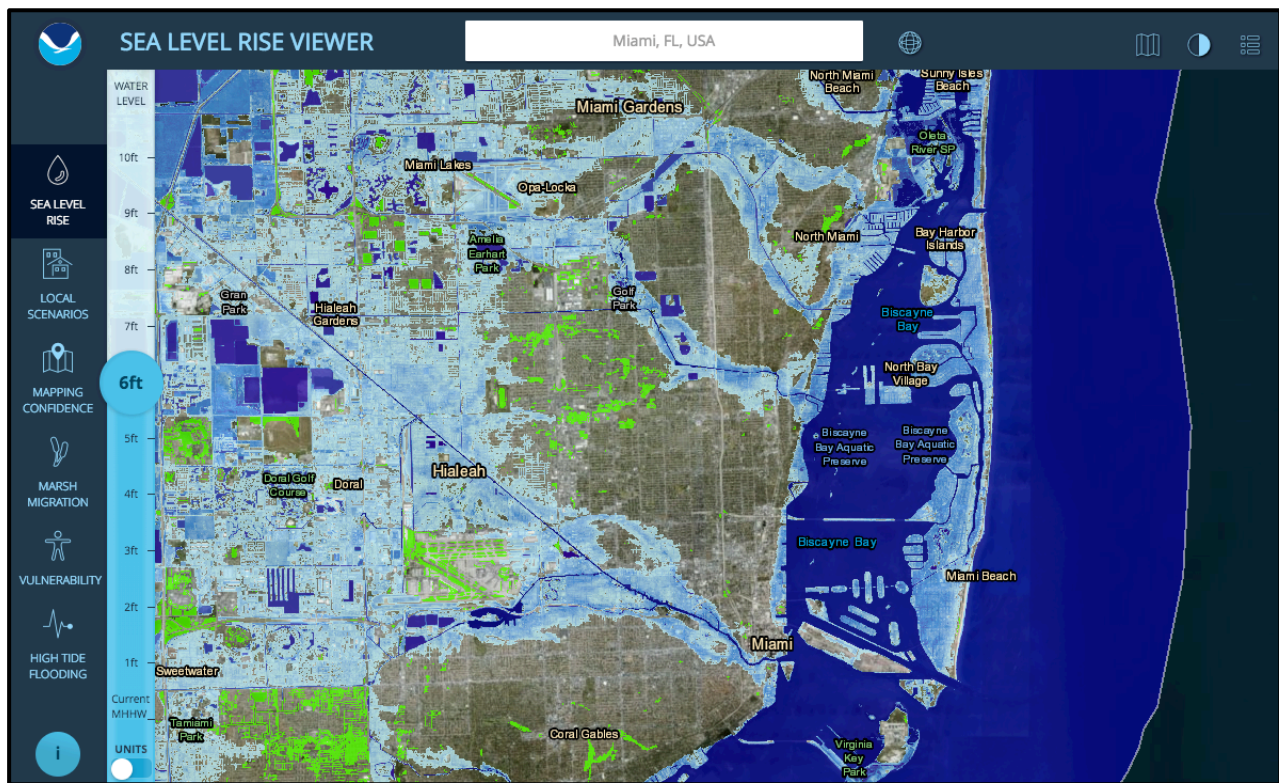


Figure 4: South Florida, including Miami, will face significant inundation with 6 feet of sea level rise.

¹⁷ H.R. Wanless, et al., *Dynamics and Historical Evolution of the Mangrove/Marsh Fringe Belt of Southwest Florida, in Response to Sea-level History, Biogenic Processes, Storm Influences and Climatic Fluctuations*. Semi-annual Research Report (June 1993 to February 1994); Hansen, *Ice Melt, Sea Level Rise and Superstorms*, at 3761; Hansen, *Assessing "Dangerous Climate Change,"* at 20.

3) Ocean Warming and Acidification

Less than 350 ppm is the best scientific standard to protect oceans and marine life. Our oceans have absorbed about 90% of the excess heat in the atmosphere trapped by greenhouse gases (see Figure 5) as well as approximately 30% of CO₂ emitted into the atmosphere, causing ocean temperatures to surge and the ocean to become more acidic.¹⁸ Indeed, our oceans are warming much more rapidly than previously-thought.¹⁹ In 2020, the oceans absorbed 20 sextillion joules of heat due to climate change and warmed to record levels. The quantity of warming, 20,000,000,000,000,000,000,000 joules, is equivalent to the amount of energy from 10 Hiroshima atomic bombs being released every second of the year or to heat 1.3 billion kettles of water.²⁰ Many marine ecosystems, and particularly coral reef ecosystems, cannot tolerate the increased warming and acidity of ocean waters that result from increased CO₂ levels.²¹ At today's global mean CO₂ concentration, around 412 ppm, critically important ocean ecosystems, such as coral reefs, are rapidly declining and will be irreversibly damaged from high ocean temperatures and repeated mass bleaching events if we do not quickly curtail emissions (see Figures 6 and 7).²² According to the Intergovernmental Panel on Climate Change (IPCC), bleaching events are occurring more frequently than the IPCC previously projected and 70-90% of the world's coral reefs could disappear as soon as 2030 (the IPCC also predicts >99% of coral reefs will die with 2°C warming).²³ The 2018 National Climate Assessment acknowledged that coral reefs in Florida, Hawaii, Puerto Rico, and the

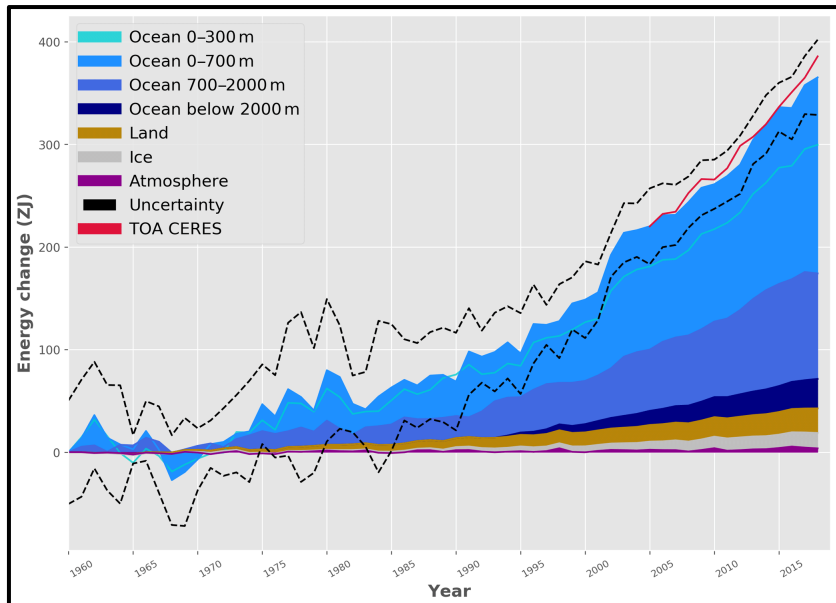


Figure 5. Earth energy accumulation relative to 1960.

the Intergovernmental Panel on Climate Change (IPCC), bleaching events are occurring more frequently than the IPCC previously projected and 70-90% of the world's coral reefs could disappear as soon as 2030 (the IPCC also predicts >99% of coral reefs will die with 2°C warming).²³ The 2018 National Climate Assessment acknowledged that coral reefs in Florida, Hawaii, Puerto Rico, and the

¹⁸ von Schuckmann, *Heat Stored in the Earth System*; Hansen, *Assessing "Dangerous Climate Change,"* at 1; IPCC, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2013); L. Cheng et al., *How Fast are the Oceans Warming?* 363 *Science* 128 (2019) (as of 2019, about 93% of the energy balance accumulates in the ocean); NOAA, *What is Ocean Acidification?*, <https://oceanservice.noaa.gov/facts/acidification.html>.

¹⁹ L. Cheng et al., *How Fast are the Oceans Warming?*, 363 *Science* 128 (2019).

²⁰ <https://www.abc.net.au/news/2021-01-18/ocean-temperatures-reached-record-high-in-2020-study-finds/13062628>; <https://www.cambridgenetwork.co.uk/news/world-continued-warm-2020>.

²¹ T. P. Hughes et al., *Global Warming Impairs Stock-Recruitment Dynamics of Corals*, 568 *Nature* 387 (2019).

²² K. Frieler et al., *Limiting Global Warming to 2 °C is Unlikely to Save Most Coral Reefs*, 3 *Nature Climate Change* 165 (2013); J. Veron et al., *The Coral Reef Crisis: The Critical Importance of <350ppm CO₂*, 58 *Marine Pollution Bulletin* 1428 (2009); T. P. Hughes et al., *Spatial and Temporal Patterns of Mass Bleaching of Corals in the Anthropocene*, 359 *Science* 80 (2018); T. P. Hughes et al., *Global Warming Impairs Stock-Recruitment Dynamics of Corals*, 568 *Nature* 387 (2019).

²³ Ove Hoegh-Guldberg et al., *Impacts of 1.5°C Global Warming on Natural and Human Systems*, in *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, at 225-226 (2018); IPCC, *Summary for Policymakers*, in *Global Warming of 1.5°C* (2018).

U.S. Virgin Islands have been harmed by mass bleaching and coral diseases and could disappear by mid-century as a result of warming waters.²⁴ Scientists believe we can protect marine life and prevent massive bleaching and die-off of coral reefs only by rapidly returning CO₂ levels to below 350 ppm.²⁵

No scientific institution, including the IPCC, has ever concluded that the Earth energy imbalance, which exists with >350 ppm, and 1.5-2°C warming would be safe for ocean life. According to Dr. Ove Hoegh-Guldberg, one of the world's leading experts on ocean warming and acidification, and a Coordinating Lead Author on the "The Ocean" chapter of the IPCC's Fifth Assessment Report and on the "Impacts of 1.5°C Global Warming on Natural and Human Systems" of the IPCC's Special Report on Global Warming of 1.5°C:

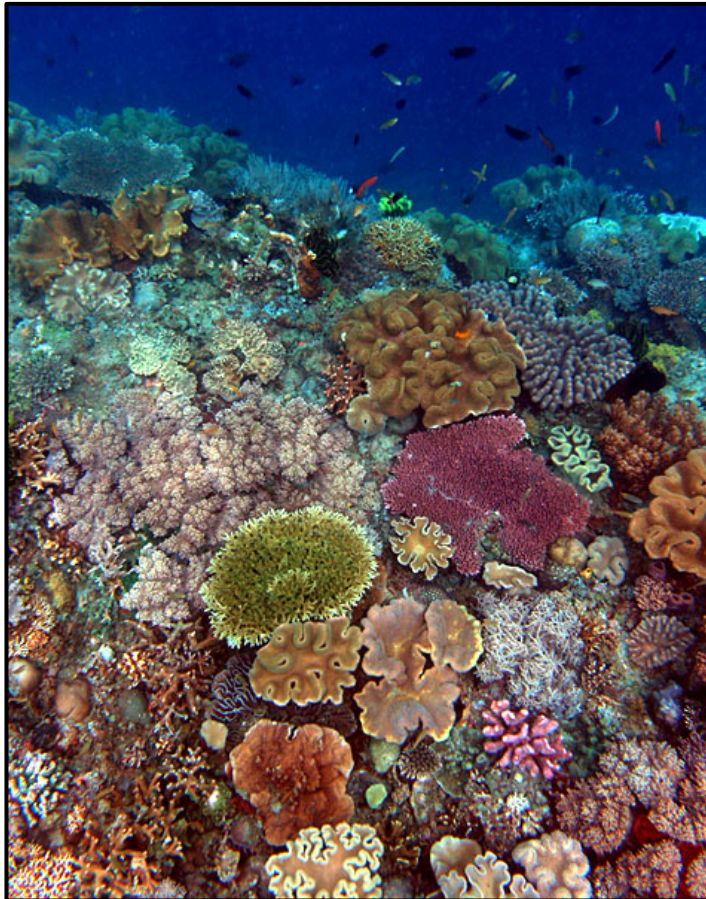


Figure 6: Healthy coral like this are already gravely threatened and will likely die with warming of 1.5°C.

“Allowing a temperature rise of up to 2°C would seriously jeopardize ocean life, and the income and livelihoods of those who depend on healthy marine ecosystems. Indeed, the best science available suggests that coral dominated reefs will completely disappear if carbon dioxide concentrations exceed much more than today’s concentrations. Failing to restrict further increases in atmospheric carbon dioxide will eliminate coral reefs as we know them and will deny future generations of children from enjoying these wonderful ecosystems.”²⁶



Figure 7: Bleached coral from warmer ocean temperatures.

IPCC's Special Report on Global Warming of 1.5° states that “[w]arming of 1.5°C is not considered ‘safe’ for most nations, communities, ecosystems, and sectors and poses significant risks to natural and human systems as compared to current warming of 1°C (*high confidence*).”²⁷

²⁴ A.J. Pershing et al., *Oceans and Marine Resources*, in *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*, Vol. II (USGCRP, 2018).

²⁵ J. Veron et al., *The Coral Reef Crisis: The Critical Importance of <350 ppm CO₂*, 58 *Marine Pollution Bulletin* 1428 (2009).

²⁶ Ove Hoegh-Guldberg, *Declaration in Support of Petitioners, Foster v. Wash. Dep’t of Ecology*, No. 14-2-25295-1 SEA (Wash. Super. Ct. Aug. 24, 2015).

²⁷ J. Roy et al., *Sustainable Development, Poverty Eradication and Reducing Inequalities*, in *Global Warming of 1.5°C*,

ADDITIONAL OBSERVATIONS ILLUSTRATE THE DANGERS OF INCREASED WARMING

In addition to the evidence discussed above which illustrates the necessity of ensuring that the atmospheric CO₂ concentration returns to no more than 350 ppm, based on present day observations about climate impacts occurring **now**, it is clear that the present level of 412 ppm and resulting heating of 1.1°C (as of 2020) is already causing significant climate impacts and additional warming will exacerbate these already dangerous impacts. Climate impacts that are already being experienced today include:

- Declining snowpack and rising temperatures are increasing the length and severity of drought conditions, especially in the western United States and Southwest, causing problems for agriculture users, forcing some people to relocate, and leading to water restrictions.²⁸
- In the western United States, the wildfire season is now almost three months longer (87 days) than it was in the 1980s.²⁹ 10.3 million acres burned in 2020, well above the 2011-2020 average of 7.5 million acres.³⁰
- Extreme weather events, such as intense rainfall events that cause flooding, are increasing in frequency and severity because a warmer atmosphere holds more moisture.³¹ What are supposedly 1-in-1000-year rainfall events are now occurring with alarming frequency – in 2018 there were at least five such events.³²
- Tropical storms and hurricanes are increasing in frequency and intensity, both in terms of rainfall and windspeed, as warmer oceans provide more energy for the storms (as seen with Hurricanes Harvey, Irma, and Maria in 2017)³³ (Figure 8).
- Terrestrial ecosystems are experiencing compositional and structural changes, with major adverse consequences for ecosystem services.³⁴



Figure 8: Flooding in Port Arthur, Texas on August 13, 2018 after Hurricane Harvey.

at 447 (2018).

²⁸ Steven W. Running, [Declaration in Support of Plaintiffs, Juliana v. United States](#), No. 18-36082, Doc. 21-12 (9th Cir. Feb. 7, 2019).

²⁹ *Id.*; A. L. Westerling, *Increasing Western US Forest Wildfire Activity: Sensitivity to Changes in the Timing of Spring*, 371 *Phil. Trans. R. Soc. B* 20150178 (2016).

³⁰ Congressional Research Service, *Wildfire Statistics* (updated Jan. 4, 2021).

³¹ Kevin E. Trenberth, [Declaration in Support of Plaintiffs, Juliana v. United States](#), No. 18-36082, Doc. 21-3 (9th Cir. Feb. 7, 2019).

³² F. Belles, *America's 'One-in-1,000-Year' Rainfall Events in 2018*, The Weather Channel (Sept. 27, 2018).

³³ Kevin E. Trenberth, [Declaration in Support of Plaintiffs, Juliana v. United States](#), No. 18-36082, Doc. 21-3 (9th Cir. Feb. 7, 2019).

³⁴ C. Nolan et al., *Past and Future Global Transformation of Terrestrial Ecosystems Under Climate Change*, 361 *Science*

- Terrestrial, freshwater, and marine species are experiencing a significant decrease in population size and geographic range, with some going extinct and others are facing the very real prospect of extinction – the rapid rate of extinctions has been called the sixth mass extinction.³⁵
- Human health and well-being are already being affected by heat waves, floods, droughts, and extreme events; infectious diseases; and quality of air, food, and water.³⁶ Doctors and leading medical institutions are calling climate change a “health emergency.”³⁷ Children are uniquely vulnerable to climate change health effects due to their higher respiratory rate, lung growth and development, immature immune system, higher metabolic demands, and immature central nervous system.³⁸
- In addition to physical harm, climate change is causing mental health impacts, ranging from stress to clinical disorders such as anxiety, depression, and suicidality, due to exposure to climate events, displacement, loss of income, chronic stress, and other impacts of climate change.³⁹



Figure 9: Offutt Air Force Base was impacted by flood waters during flooding in Nebraska during spring 2019.

• As Congress has recognized, “climate change is a direct threat to the national security of the United States and is impacting stability in areas of the world both where the United States Armed Forces are operating today, and where strategic implications for future conflict exist.”⁴⁰ Senior military leaders have called climate change “the most serious national security threat facing our Nation

920 (2018).

³⁵ G. Ceballos et al., *Accelerated Modern Human-Induced Species Losses: Entering the Sixth Mass Extinction*, 1 *Science Advances* e1400253 (2015); Steven W. Running, *Expert Report, Juliana v. United States*, No. 6:15-cv-01517-TC, Doc. 264-1 (D. Or. June 28, 2018).

³⁶ K.L. Ebi et al., *Human Health*, in *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*, Vol. II (USGCRP, 2018).

³⁷ C.G. Solomon & R.C. LaRocque, *Climate Change – A Health Emergency*, 380 *N. Engl. J. Med.* 209 (2019).

³⁸ S. Pacheco, *Catastrophic Effects of Climate Change on Children’s Health Start before Birth*, 130 *Journal of Clinical Investigation* 562 (2020); C. May et al., *Northwest*, in *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*, Vol. II (USGCRP, 2018); N. Watts et al., *The 2019 Report of The Lancet Countdown on Health and Climate Change: Ensuring that the Health of a Child Born Today is not Defined by a Changing Climate*, 394 *The Lancet* 1836 (2019); *Brief of Amici Curiae Public Health Experts, Public Health Organizations, and Doctors in Support of Plaintiffs*, No. 18-36082, Doc. 47 (9th Cir. Mar. 1, 2019).

³⁹ Lise Van Susteren, *Expert Report, Juliana v. United States*, No. 6:15-cv-01517-TC, Doc. 271-1 (D. Or. June 28, 2018). K.L. Ebi et al., *Human Health*, in *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*, Vol. II (USGCRP, 2018).

⁴⁰ *National Defense Authorization Act for Fiscal Year 2018*, Pub. L. No. 115-91, 131 Stat. 1358.

today,”⁴¹ a conclusion similarly recognized by our Nation’s intelligence community.⁴² Climate change is increasing food and water shortages, pandemic disease, conflicts over refugees and resources, and destruction to homes, land, infrastructure, and military assets, directly threatening our military personnel and the “Department of Defense’s ability to defend the Nation” (see Figure 9).⁴³

- Climate change is already causing vast economic harm in the United States. Since 1980 the United States has experienced 285 climate and weather disasters that each caused damages in excess of \$1 billion, for a total cost of \$1.875 trillion.⁴⁴ In 2018 alone, Congress appropriated more than \$130 billion for weather and climate related disasters.⁴⁵

These already serious impacts will grow in severity and will impact increasingly large numbers of people and parts of the world if CO₂ concentrations continue to rise. If we want our children and grandchildren to have a safe planet to live on, full of health and biodiversity rather than chaos and conflict, we must follow the best scientific prescription to restore Earth’s energy balance and avoid the destruction of our planet’s atmosphere, climate, and oceans.

INTERNATIONAL POLITICAL TARGETS OF 1.5°C OR 2°C ARE NOT SCIENCE-BASED AND ARE NOT SAFE

International treaties require the stabilization of the climate system to avoid dangerous anthropogenic climate change. As described above, EEI and CO₂ concentrations should be the measurable scientific metrics, adopted as legal standards, for setting emission reduction and sequestration targets to stabilize our climate, avoid danger, and protect children and future generations. Temperature targets, set higher than today’s already-too-hot planet, which would mean an even greater and more dangerous EEI and greater instability, are incompatible with fundamental human rights. International, politically-established temperature targets like 1.5°C or “well below” 2°C – which are commonly associated with long-term atmospheric CO₂ concentrations of 425 and 450 ppm, respectively – have not been and are not presently considered safe or scientifically-sound targets for present or future generations.

Legalizing heating of 1.5°C-2°C legalizes greater dangers than we have already witnessed. It is a death sentence for young people. In fact, Sir David King, former Special Envoy for Climate Change and Chief Scientific Advisor for the United Kingdom, elaborated on the importance of 350 ppm and limiting global heating to 1°C:

As a key negotiator for the United Kingdom government during discussions leading up to the Paris Agreement, I advocated that 1.5°C was an acceptable level of global warming. However, I was wrong. In 2020, our planet experienced an average of 1.1°C

⁴¹ Vice Admiral Lee Gunn, USN (Ret.), [Declaration in Support of Plaintiffs, Juliana v. United States](#), No. 18-36082, Doc. 21-17 (9th Cir. Feb. 7, 2019) (emphasis in original); see also CNA Military Advisory Board, *National Security and the Accelerating Risks of Climate Change* (2014).

⁴² National Intelligence Council, *Implications for US National Security of Anticipated Climate Change* (Sept. 2016).

⁴³ U.S. Dep’t of Defense, *2014 Climate Change Adaptation Roadmap* (2014).

⁴⁴ NOAA, *Billion Dollar U.S. Weather/Climate Disasters 1980-2020* (2020), <https://www.ncdc.noaa.gov/billions/events.pdf>.

⁴⁵ U.S. House of Representatives Committee on the Budget, *The Budgetary Impact of Climate Change 2* (Nov. 27, 2018).

of warming — much higher in some places like the Arctic -- and we experienced catastrophic weather events and climate-related disasters. These will only become more frequent, and more severe, as our emissions continue to rise. We cannot afford to negotiate what we now know is the safest level for stabilizing our climate systems: We must limit warming to less than 1.0°C as fast as possible. The 350 ppm pathways findings in studies by Jim Williams and Evolved Energy Research successfully demonstrate that the United States has clear pathways available to significantly reduce emissions, protecting the health and livelihood of their citizens while also boosting their national economies. This will crucially enable the USA to join leading nations in managing this severe challenge to humanity.⁴⁶

Importantly, the IPCC has never established nor endorsed a target of 1.5°C or 2°C warming as a limit below which the climate system will be stable and the energy balance restored. It is beyond the IPCC’s declared mandate to endorse a particular threshold of warming as “safe” or “dangerous.” As the IPCC makes clear, “each major IPCC assessment has examined the impacts of [a] multiplicity of temperature changes but has left [it to the] political processes to make decisions on which thresholds may be appropriate.”⁴⁷

Neither 1.5°C nor 2°C warming above pre-industrial levels has ever been considered “safe” from either a political or scientific point of view. The 2°C figure was originally adopted in the political arena “from a set of heuristics,” and it has retained predominantly political character ever since.⁴⁸ The 2°C figure has recently been all-but-abandoned as a credible policy goal, in light of the findings in IPCC’s 1.5°C Special Report, and the mounting evidence leading up to its publication, that 2°C would be catastrophic relative to lower, still-achievable levels of warming.⁴⁹

On the other hand, the idea of a 1.5°C target was first raised by the Alliance of Small Island States (AOSIS) in the negotiations leading up to the ill-fated 2009 UNFCCC Conference of Parties in Copenhagen.⁵⁰ AOSIS, however, was explicitly advocating a *well below* 1.5°C and *well below* 350 ppm target, on the basis of the research of Dr. James Hansen and his colleagues.⁵¹ Political compromise, including pressure from the fossil fuel industry, on this target then led to the adoption of a goal of “pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels” in Article 2 of the Paris Agreement. Yet the 2018 IPCC Special Report on 1.5°C has made clear that allowing a temperature rise of 1.5°C:

⁴⁶ Correspondence from Sir David King to Julia Olson (Jan. 2021) (notes on file with Julia Olson); The Do One Better! Podcast, Interview with Sir David King, <https://www.lidji.org/sir-david-king>.

⁴⁷ IPCC, *Climate Change 2014: Mitigation of Climate Change, Contribution of Working Group III to the Fifth Assessment Report* 125 (Cambridge University Press, 2014).

⁴⁸ S. Randalls, *History of the 2°C Temperature Target*, 1 WIREs Climate Change 598, 603 (2010); C. Jaeger & J. Jaeger, *Three Views of Two Degrees*, 11 (Suppl 1) Reg. Environ. Change S15 (2011).

⁴⁹ IPCC, *Summary for Policymakers*, in *Climate Change 2014: Impacts, Adaptation, and Vulnerability*, 13-14 (2014); UNFCCC, *Report on the Structured Expert Dialogue on the 2013–2015 Review*, 18 (2015), <http://unfccc.int/resource/docs/2015/sb/eng/inf01.pdf>; Petra Tschakert, *1.5°C or 2°C: A Conduit’s View from the Science-Policy Interface at COP20 in Lima, Peru*, 2 Climate Change Responses 8 (2015); IPCC, *Global Warming of 1.5°C* (2018).

⁵⁰ See R. Webster, *A Brief History of the 1.5C Target*. Climate Change News (Dec. 10, 2015), <http://www.climatechangenews.com/2015/12/10/a-brief-history-of-the-1-5c-target/>.

⁵¹ *Submission from Grenada on behalf of AOSIS to the Ad Hoc Working Group on Further Commitments for Annex I Parties Under the Kyoto Protocol*, U.N. Doc. FCCC/KP/AWG/2009/MISC.1/Add.1 (25 March 2009), <https://unfccc.int/sites/default/files/resource/docs/2009/awg7/eng/misc01a01.pdf>, citing James Hansen et al. *Target Atmospheric CO₂: Where Should Humanity Aim?* 2 The Open Atmospheric Science Journal 217 (2008).

is **not considered ‘safe’** for most nations, communities, ecosystems, and sectors and poses significant risks to natural and human systems as compared to current warming of 1°C (*high confidence*).⁵²

Dr. James Hansen warns that “distinctions between pathways aimed at ~1°C and 2°C warming are much greater and more fundamental than the numbers 1°C and 2°C themselves might suggest. These fundamental distinctions make scenarios with 2°C or more global warming far more dangerous; so dangerous, we [James Hansen et al.] suggest, that aiming for the 2°C pathway would be foolhardy.”⁵³ This target is at best the equivalent of “flip[ping] a coin in the hopes that future generations are not left with few choices beyond mere survival. This is not risk management, it is recklessness and we must do better.”⁵⁴

Tellingly, more than 80 eminent scientists from over 50 different institutions have been co-authors on publications in peer-reviewed journals finding that the maximum level of atmospheric CO₂ consistent with restoring the EEI, protecting humanity and other species is 350 ppm, and no one, including the IPCC, has published any scientific evidence to counter that 350 ppm is the maximum safe concentration of CO₂.⁵⁵

A 1.5° OR 2°C TARGET RISKS **LOCKING-IN DANGEROUS FEEDBACKS**

The longer the length of time atmospheric CO₂ concentrations remain at dangerous levels (i.e., above 350 ppm) and there is an Earth energy imbalance, the risk of triggering, and locking-in, dangerous warming-driven feedback loops increases. The 1.5°C or 2°C target (linked to 425-450 ppm) reduces the likelihood that the biosphere will be able to sequester CO₂ due to carbon cycle feedbacks and shifting climate zones.⁵⁶ As Earth surface temperatures increase, forests burn and soils warm, releasing their carbon. These natural carbon “sinks” become carbon “sources” and a portion of the natural carbon sequestration necessary to drawdown excess CO₂ simply disappear. Another dangerous feedback includes the release of methane, a potent greenhouse gas, as the global tundra thaws.⁵⁷ These feedbacks might show little change in the short-term, but can hit a point of no return, even at a 1.5°C or 2°C temperature increase, which will trigger accelerated heating and sudden *and irreversible* catastrophic impacts. Moreover, an emission reduction target aimed at 2°C would “yield

⁵² J. Roy et al., *Sustainable Development, Poverty Eradication and Reducing Inequalities*, in *Global Warming of 1.5°C*, at 447 (2018) (emphasis added).

⁵³ Hansen, *Assessing “Dangerous Climate Change,”* at 15.

⁵⁴ Matt Vespa, *Why 350? Climate Policy Must Aim to Stabilize Greenhouse Gases at the Level Necessary to Minimize the Risk of Catastrophic Outcomes*, 36 *Ecology Law Currents* 185, 186 (2009).

⁵⁵ James Hansen, et al., *Target Atmospheric CO₂: Where Should Humanity Aim?* 2 *The Open Atmospheric Science Journal* 217 (2008); Hansen, *Assessing “Dangerous Climate Change”*; Hansen, *Ice Melt, Sea Level Rise and Superstorms*; James Hansen, et al., *Young People’s Burden: Requirement of Negative CO₂ Emissions*, 8 *Earth Syst. Dynamics* 577 (2017); J. Veron, et al., *The Coral Reef Crisis: The Critical Importance of <350 ppm CO₂* 58 *Marine Pollution Bulletin* 1428 (2009); K. Frieler, et al., *Limiting Global Warming to 2 °C is Unlikely to Save Most Coral Reefs* 3 *Nature Climate Change* 165 (2013); von Schuckmann, *Heat Stored in the Earth System*; Communication from James Hansen, Karina von Shuckmann to Julia Olson (2021) (notes on file with Julia Olson).

⁵⁶ Hansen, *Assessing “Dangerous Climate Change,”* at 15, 20.

⁵⁷ *Id.*

a larger eventual warming because of slow feedbacks, probably at least 3°C.”⁵⁸ Once a temperature increase of 2°C is reached, there will already be “additional climate change ‘in the pipeline’ even without further change of atmospheric composition.”⁵⁹

THE BEST AVAILABLE SCIENCE REQUIRES US TO REDUCE CO₂ LEVELS TO <350 PPM BY 2100

There are two steps to reducing CO₂ levels to <350 ppm by the end of the century: 1) reducing CO₂ emissions; and separately 2) sequestering excess CO₂ already in the atmosphere (carbon drawdown). Carbon dioxide emission reductions of approximately 80% by 2030 and close to 100% by 2050 (in addition to the requisite CO₂ sequestration) are necessary to be on track to an atmospheric CO₂ concentration to 350 ppm, restoring energy balance, and keeping long-term warming to below 1°C above preindustrial temperatures. Politically-motivated emission reduction targets that seek to reduce CO₂ emissions by only 80% by 2050 are consistent with an atmospheric CO₂ concentration of 450 ppm and long-term warming of 2°C, which, as described above, would result in catastrophic and irreversible impacts for the climate system and oceans.

IT IS TECHNOLOGICALLY AND ECONOMICALLY FEASIBLE TO REDUCE EMISSIONS IN LINE WITH 350 PPM BY 2100

Importantly, it is economically and technologically feasible to transition the entire U.S. energy system to a zero-CO₂ energy system by 2050 and to drawdown the excess CO₂ in the atmosphere through reforestation and carbon sequestration in soils.⁶⁰

Deep Decarbonization Pathways Project and Evolved Energy Research recently completed research and very sophisticated modeling describing a nearly complete phase out of fossil fuels in the U.S. by 2050.⁶¹ They describe six different technologically feasible pathways to drastically, and quickly, cut our reliance on fossil fuels and achieve the requisite level of emissions reductions in the U.S. while meeting our nation’s forecasted energy needs. All of the 350 ppm pathways rely on four pillars of action: a) investment in energy efficiency; b) electrification of everything that can be electrified; c) shifting to very low-carbon and primarily renewable electricity generation; and d) carbon dioxide capture as fossil fuels are phased out. The six scenarios are used to evaluate the ability to meet the targets even absent one key technology. For example, one scenario describes a route to 350 ppm absent construction of new nuclear facilities; another illustrates getting to 350 ppm with extremely limited biomass technology; still another describes a way to 350 ppm without any carbon capture and storage. Even absent a key technology, each of these six routes are viable and cost effective.

⁵⁸ *Id.* at 15.

⁵⁹ *Id.* at 19.

⁶⁰ See Mark Z. Jacobson et al., *100% Clean and Renewable Wind, Water, and Sunlight (WWS) All-Sector Energy Roadmaps for the 50 United States*, 8 Energy & Envtl. Sci. 2093 (2015) (for plans on how the United States and over 100 other countries can transition to a 100% renewable energy economy see www.thesolutionsproject.org); see also Arjun Makhijani, *Carbon-Free, Nuclear-Free: A Roadmap for U.S. Energy Policy* (2007); B. Haley et al., *350 ppm Pathways for the United States* (2019); James Williams et al., *Carbon-Neutral Pathways for the United States*, 2 AGU Advances e2020AV000284 (2021).

⁶¹ B. Haley et al., *350 ppm Pathways for the United States* (2019).

A related 2021 study concludes that emissions reductions consistent with a 350 ppm trajectory by 2100 can be done at low net cost, substantially lower than estimates for less ambitious 80% by 2050 scenarios a few years ago due to recent declines in solar, wind, and vehicle battery prices.⁶² The cost would be well below the 9.5% of GDP spent on the energy system in 2009 (not to mention well below the harm to the economy caused by climate change). (Figure 10)⁶³ Once the transition is complete, the cost of energy will remain low and stable because we will no longer be dependent on volatile global fossil fuel markets for our energy supplies. As Nobel Laureate Economist Dr. Joseph Stiglitz has stated: “[t]he benefits of making choices today that limit the economic costs of climate change far outweigh any economic costs associated with limiting our use of fossil fuels.”⁶⁴

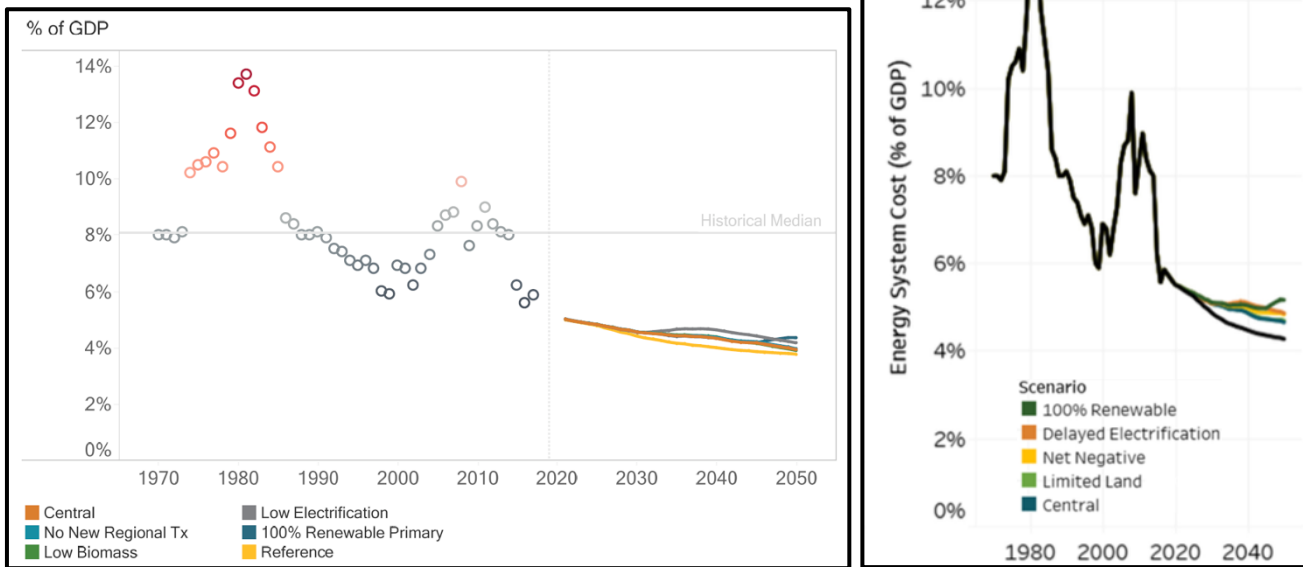


Figure 10: Historic and projected costs of energy in the U.S. as percentage of GDP.

Other experts have already prepared plans for all 50 U.S. states as well as for over 139 countries that demonstrate the technological and economic feasibility of transitioning off of fossil fuels toward 100% of energy, for all energy sectors, from clean and renewable energy sources: wind, water, and sunlight by 2050 (with 80% reductions in fossil fuels by 2030).⁶⁵

Products already exist that enable new construction or retrofits that result in zero greenhouse gas buildings. We have the technology to meet all electricity needs with zero-emission electric generation. We know how to achieve zero-emission transportation, including aviation. These actions result in other benefits, such as improved health, job creation, and savings on energy costs.

The amount of natural carbon sequestration required is also proven to be feasible. Researchers have evaluated the potential to drawdown excess carbon dioxide in the atmosphere by increasing the carbon

⁶² James Williams et al., *Carbon-Neutral Pathways for the United States*, 2 AGU Advances e2020AV000284 (2021).

⁶³ *Id.*, Ben Haley et al., *350 ppm Pathways for Florida, Technical Supplement* (2020).

⁶⁴ Joseph E. Stiglitz, Ph.D., *Declaration in Support of Plaintiffs, Juliana v. United States*, No. 18-36082, Doc. 21-14 (9th Cir. Feb. 7, 2019).

⁶⁵ Mark Z. Jacobson et al., *100% Clean and Renewable Wind, Water, and Sunlight (WWS) All-Sector Energy Roadmaps for the 50 United States*, 8 Energy & Env'tl. Sci. 2093 (2015). For a graphic depicting the overview of the plan for the United States see: <https://thesolutionsproject.org/why-clean-energy/#/map/countries/location/USA>.

stored in forests, soils, and wetlands, and have found significant potential for these natural systems to support a return to 350 ppm by the end of the century.⁶⁶ We know the agricultural, rangeland, wetland, and forest management practices that decrease greenhouse gas emissions and increase sequestration.

There is no scientific, technological, or economic reason to *not* adopt a <350 ppm and 1°C by 2100 target. There are abundant reasons for doing so, not the least of which is to do our best through human laws to respect the laws of nature and create a safe and healthy world for children and future generations.

A NOTE ON “NET ZERO”

The politically popular concept of “net zero” allows governments to zero out a percentage of ongoing fossil fuel emissions by counting them as “sequestered” through removal processes, such as biogenic or natural sequestration in carbon sinks, leaving a smaller amount of source “net emissions” to be reduced. However, in order to align emissions and sequestration with a <350 ppm standard, carbon removed through natural sequestration in sinks must be used to draw down the excess CO₂ already in the atmosphere from cumulative historic emissions, not to provide a negative credit or offset for ongoing emissions. Emissions and sequestration must be accounted and inventoried separately with separate standards for each category.⁶⁷ A “net zero” emissions target is a shell game with little accountability, detached from a precise standard for protection of fundamental rights and restoration of Earth’s energy balance.

⁶⁶ Benson W. Griscom et al., *Natural Climate Solutions*, 114 Proceedings of the National Academies of Sciences 11645 (2017); Joseph E. Fargione et al., *Natural Climate Solutions for the United States*, 4 Science Advances eaat1869 (2018).

⁶⁷ D. McLaren et al., *Beyond “Net-Zero”: A Case for Separate Targets for Emissions Reduction and Negative Emissions*, Front. Clim. (2019).