

September 2, 2025

Chris Wright, Secretary of Energy  
U.S. Department of Energy  
1000 Independence Avenue SW  
Washington, DC 20585

*Comments submitted electronically via <https://www.regulations.gov/commenton/DOE-HQ-2025-0207-0001>*

**RE: Comments of the California Air Resources Board Responding to the Proposed Department of Energy's report titled, *A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate*, Docket No. DOE-HQ-2025-0207**

Dear sir/madame:

The California Air Resources Board (CARB) submits the enclosed comments on the Proposed Department of Energy's (DOE) report titled, *A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate*. This report is based on deeply flawed assertions that rely on unfounded and cherry-picked claims originating from the oil industry and self-proclaimed climate skeptics while ignoring the overwhelming scientific consensus. Thousands of scientists from around the world are not wrong. The development of the report by the Climate Working Group shuns scientific process and findings made by previous federal administrations and fails to comply with the basic administrative requirements of the Federal Advisory Committee Act. This about-face only leaves one conclusion: This administration is captured by fossil fuel interests and is putting corporate profits above public health and environmental protection.

Americans will not be fooled again by the specter of uncertainty when it comes to industry profits over their health. This is a recycled playbook from when big tobacco put forth arguments of "uncertainty," putting profits over public health, that were later debunked. Here, too, any assertions of uncertainty, by a group of fringe voices, do not reflect the consensus of and have been debunked by thousands of scientific experts.

CARB urges DOE to maintain its credibility and not move forward with this deeply flawed, extreme report, which is inconsistent with well-established science and data.

Sincerely,



Steven S. Cliff, Ph.D.  
Executive Officer

Enclosures: *See next page*

Comments from the California Air Resources Board  
Docket No. DOE-HQ-2025-0207  
September 2, 2025

**Enclosures:**

Attachment A: California Air Resources Board Summary Comments on the Department of Energy's proposed report titled, "*A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate*," Docket No. DOE-HQ-2025-0207.

Attachment B: California Air Resources Board Full Comments on the Department of Energy's proposed report titled, "*A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate*," Docket No. DOE-HQ-2025-0207.

**Attachment A:**  
**California Air Resources Board Summary Comments**  
**“A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate”**  
**U.S. Department of Energy, July 23, 2025**  
**Docket No. DOE-HQ-2025-0207**

The California Air Resources Board (CARB)<sup>1</sup> submits the enclosed comments on the Department of Energy’s (DOE) proposed report titled, *A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate*<sup>2</sup> (DOE Report), which was released to coincide with the U.S. Environmental Protection Agency’s (U.S. EPA) proposal to undo the 2009 endangerment finding on greenhouse gases (GHGs).<sup>3</sup> The DOE Notice explains that the DOE Report “reviews scientific certainties and uncertainties in how anthropogenic carbon dioxide (CO<sub>2</sub>) and other greenhouse gas emissions have affected, or will affect, the Nation’s climate, extreme weather events, and selected metrics of societal well-being.” The authors of the report are known climate skeptics and contrarians with ties to the oil and gas industry.<sup>4</sup> This report is an affront to science and the scientific process with reliance upon misleading statements and cherry-picking of data, resulting in unsupported conclusions.

The DOE Report argues that carbon dioxide (CO<sub>2</sub>)-induced warming is less damaging than commonly believed, ignoring the strong body of peer-reviewed scientific evidence from studies conducted across the globe linking human activity, particularly fossil fuel use, to a warming planet with increased extreme weather events. Furthermore, the report cherry-picks data and misrepresents research findings, particularly regarding the role of greenhouse gas (GHG)

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<sup>1</sup> The mission of CARB is to promote and protect public health, welfare, and ecological resources through effective reduction of air pollutants while recognizing and considering effects on the economy. CARB is the lead agency for climate change programs and oversees all air pollution control efforts in California to attain and maintain health-based air quality standards. CARB’s major goals include safe and clean air for all Californians, reducing the State’s toxic air contaminants, and providing leadership and innovating approaches to implement air pollution controls. About | California Air Resources Board

<sup>2</sup> Notice of Availability: A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate, 90 Fed. Reg. 36150 (Aug. 1, 2025).

<sup>3</sup> Reconsideration of 2009 Endangerment Finding and Greenhouse Gas Vehicle Standards, 90 Fed. Reg. 36288 (Aug. 1, 2025).

<sup>4</sup> Scott Waldman, Benjamin Storrow, DOE Reframes Climate Consensus as a Debate, E&E News, Politico (July 31, 2025), [DOE reframes climate consensus as a debate - E&E News by POLITICO](#).

emissions in driving climate change. The report has already drawn severe criticism from the broad scientific community.<sup>5</sup>

### **1. The DOE Report disregards human health.**

The DOE Report (pages 110-114) downplays the serious health impacts of climate change affecting people in the U.S. and the entire population, particularly those in underserved communities. In reality, all Americans are feeling the impacts of climate change – with 27 domestic climate-driven disasters last year alone resulting in at least 568 direct or indirect fatalities and approximately \$182.7 billion in damages.<sup>6</sup> These health harms are occurring now and rising in number due to extreme heat, wildfire smoke events, hurricanes, droughts, and many other climate hazards, compounded by their interacting effects. In addition to excluding the vast majority of health impact evidence, it presents misinformation about the frequency and severity of heat events and resulting mortality incidents. The report argues that cold-related mortality exceeds heat-related mortality. It also suggests that adaptation measures like air conditioning have significantly reduced heat-related deaths, emphasizing the importance of affordable energy in mitigating mortality risks from temperature extremes, especially for low-income households. These statements are incorrect, and citations are taken out of context. This misinformation is mainly based on selective quoting and misrepresentation of the findings of commonly cited climate reports, together with some quoting from papers that do not reflect the scientific consensus and, in many cases, have not undergone rigorous peer review.

### **2. The DOE Report disregards the fundamental scientific processes and the requirements of the Federal Advisory Committee Act.**

The DOE Report attempts to cast doubts on well-established hallmarks of scientific findings, including fundamental principles such as the scientific method and peer review. However, it is the DOE Report that eschews these methods in the development of its own report, and the composition of the committee that wrote the report violates the basic requirements of the Federal Advisory Committee Act.<sup>7</sup>

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<sup>5</sup>Maxine Joselow and Brad Plumer, Energy Dept. Attacks Climate Science in Contentious Report, New York Times (Aug. 2, 2025), <https://www.nytimes.com/2025/07/31/climate/trump-climate-skeptics-science-report.html>.

<sup>6</sup>Adam Smith, 2024: An active year of U.S. billion-dollar weather and climate disasters (Jan. 10, 2025), <https://www.climate.gov/news-features/blogs/beyond-data/2024-active-year-us-billion-dollar-weather-and-climate-disasters>.

<sup>7</sup> 5 U.S.C. §1004(b)(2) (requiring advisory committees to "be fairly balanced in terms of the points of view represented").

The report specifically targets the Intergovernmental Panel on Climate Change (IPCC)<sup>8</sup> (e.g., pages 6, 11-16, 25-28, 31, 35-38, 69, 82-85, 88-90, 93-95, 113 of the DOE Report). The IPCC was established by the United Nations (UN) and the World Meteorological Organization in 1988 and is the leading international body for assessing climate change, consisting of 195 member countries with thousands of credible volunteer scientists that assess the scientific basis of climate change, its implications and potential future risks, as well as adaptation and mitigation options. The Sixth Assessment Report (AR6),<sup>9</sup> which is the most recent IPCC assessment report, underwent a rigorous peer review process involving 743 international experts<sup>10</sup> (during the peer-review process the authors of the IPCC report addressed more than 200,000 comments<sup>11</sup>) and is routinely cited as one of the most reputable and trustworthy sources of climate change information by leading climate scientists around the world.

By comparison, there was not a similar process for the DOE Report as it was compiled by only five scientists known to have skeptical and extremist views on climate science picked by the DOE secretary (himself a fossil fuel entrepreneur<sup>12,13</sup>) and written in less than two months. Additionally, the report comes after the Trump administration fired hundreds of scientists that are responsible for drafting the government's flagship climate report, the National Climate Assessment (NCA).<sup>14</sup> The DOE Report is in sharp contrast to the thorough work demanded to complete the NCA, where hundreds of scientists spend years gathering research and going through multiple rounds of peer-review.

### **3. The DOE Report disregards science and scientific consensus.**

In addition to disregarding fundamental scientific processes, the DOE Report relies on misleading and cherry-picked information and studies (e.g., pages 15, 88-89 of the DOE Report). The report's key claims are widely criticized.<sup>15</sup> Studies published in peer-reviewed scientific literature have investigated the extent of the scientific consensus on climate change. These studies have found high levels of consensus among climate scientists that climate change is occurring and is primarily

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<sup>8</sup> IPCC, About, <https://www.ipcc.ch/>.

<sup>9</sup> IPCC, Climate Change Synthesis Report (AR6) (2023), [https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC\\_AR6\\_SYR\\_LongerReport.pdf](https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf).

<sup>10</sup> IPCC, How does the IPCC Select its Authors, [https://www.ipcc.ch/site/assets/uploads/2024/04/IPCCFactSheet\\_SelectAuthors.pdf](https://www.ipcc.ch/site/assets/uploads/2024/04/IPCCFactSheet_SelectAuthors.pdf).

<sup>11</sup> IPCC, How does the IPCC review process work? [https://www.ipcc.ch/site/assets/uploads/2024/04/IPCCFactSheet\\_ReviewProcess.pdf](https://www.ipcc.ch/site/assets/uploads/2024/04/IPCCFactSheet_ReviewProcess.pdf).

<sup>12</sup> Secretary, U.S. Department of Energy, Chris Wright, <https://www.energy.gov/person/chris-wright> (last visited Aug. 29, 2025).

<sup>13</sup> Chris Wright, LinkedIn, <https://www.linkedin.com/in/chris-wright-b8370a17b/> (last visited Aug. 29, 2025).

<sup>14</sup> U.S. Global Change Climate Research Program, Fifth National Climate Assessment (2023), [https://toolkit.climate.gov/sites/default/files/2025-07/NCA5\\_2023\\_FullReport.pdf](https://toolkit.climate.gov/sites/default/files/2025-07/NCA5_2023_FullReport.pdf).

<sup>15</sup> Paul Voosen, Contrarian climate assessment from U.S. government draws swift pushback, *Science* (July 30, 2025), <https://www.science.org/content/article/contrarian-climate-assessment-u-s-government-draws-swift-pushback>.

caused by human activity. For example, a 2021 study found greater than 99% consensus on human-induced climate change in the peer-reviewed scientific literature.<sup>16</sup> Other studies<sup>17</sup> have found consensus levels ranging from 90% to 100%. The greater the climate expertise among those surveyed, the higher the consensus on human-caused global warming. It is telling that this fossil fuel industry aligned DOE inserted itself into climate science and ignores well-established climate science.

#### **4. The DOE Report disregards the science supporting U.S. EPA's 2009 endangerment finding and subsequent research.**

U.S. EPA issued its "Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act" in 2009, following a careful evaluation conducted primarily by the IPCC, the U.S. Climate Change Science Program and U.S. Global Change Research Program, and the National Research Council of the U.S. National Academy of Sciences.<sup>18</sup> This two-year effort drew on the most recent data available at the time and incorporated substantial synthesis reports on climate change science and potential impacts, such as 28 core reference documents, developed by hundreds of scientists and subjected to rigorous peer review. The rulemaking process also involved extensive public engagement, including testimony at hearings and written comments, with over 200,000 comments submitted on the Advance Notice of Proposed Rulemaking within 120 days, and more than 380,000 comments received on the Proposed Findings within 60 days.<sup>19</sup>

Since 2009, an extensive and growing body of evidence has reinforced the conclusion that climate change endangers the health and welfare of current and future generations. A review by Duffy et al.<sup>20</sup> found that new research documents a broader range of impacts, having a greater extent of effects, increased severity, and stronger interconnections among risks, based on both observed and projected data, which further justifies the case for endangerment. The study underscores that climate change poses a significant threat to the health and welfare of both current and future

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<sup>16</sup> Lynas et al (2021). Greater than 99% consensus on human-cause. climate change in the peer-reviewed scientific literature *Environ. Res. Lett.* 16 114005. DOI 10.1088/1748-9326/ac2966. <https://iopscience.iop.org/article/10.1088/1748-9326/ac2966/pdf>.

<sup>17</sup> Myers et al (2021). Consensus revisited: quantifying scientific agreement on climate change and climate expertise among Earth scientists 10 years later. *Environ. Res. Lett.* 16 104030. DOI 10.1088/1748-9326/ac2774. <https://iopscience.iop.org/article/10.1088/1748-9326/ac2774/pdf>.

<sup>18</sup> U.S. EPA. (2009). Technical Support Document for the Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act. Climate Change Division, Office of Atmospheric Programs U.S. Environmental Protection Agency. Washington, DC. [https://www.epa.gov/sites/default/files/2021-05/documents/endangerment\\_tsd.pdf](https://www.epa.gov/sites/default/files/2021-05/documents/endangerment_tsd.pdf).

<sup>19</sup> U.S. EPA. (2009). Greenhouse Gas Endangerment Finding Timeline. Climate Change Division, Office of Atmospheric Programs U.S. Environmental Protection Agency. Washington, DC. [https://www.epa.gov/sites/default/files/2021-05/documents/endangermentfinding\\_timeline.pdf](https://www.epa.gov/sites/default/files/2021-05/documents/endangermentfinding_timeline.pdf).

<sup>20</sup> Duffy, P. B., Field, C. B., Diffenbaugh, N. S., Doney, S. C., Dutton, Z., Goodman, S., ... & Williams, A. P. (2019). Strengthened scientific support for the Endangerment Finding for atmospheric greenhouse gases. *Science*, 363(6427), eaat5982. <https://www.science.org/doi/pdf/10.1126/science.aat5982>.

generations. The evidence not only confirms and deepens the understanding of climate-related risks such as extreme heat, air quality degradation, natural hazards, and infectious diseases and aeroallergens, but also identifies additional health and societal threats not addressed in the original finding, including reduced nutritional security, mental health effects, and population displacement and conflict. In particular, public health, air quality, food production and agriculture, and water resources show substantial and well-supported evidence that reinforces the connection to climate change, highlights the growing severity and breadth of its impacts, and underscores emerging risks, further supporting the conclusion that GHGs pose a danger to public health and welfare.

Given the current administration's fealty to fossil fuels, this DOE Report (e.g., page 129) is now being used by the U.S. EPA to support repealing the endangerment finding, a key legal basis for regulating GHG emissions under the Clean Air Act. U.S. EPA argues that Section 202(a) of the Clean Air Act, which authorizes vehicle emissions regulation, does not allow for regulations based on global climate change concerns. They assert that the statute only permits regulating pollutants that cause local or regional harm, not global impacts.

## **5. The DOE Report disregards the co-benefits of reducing GHG emissions.**

While climate change poses one of the greatest public health threats of the twenty-first century,<sup>21</sup> taking action to address it also presents one of the most significant opportunities to improve public health outcomes.<sup>22</sup> Many GHG reduction strategies deliver substantial health co-benefits. For example, CARB's 2022 Scoping Plan - Appendix G: Public Health identifies eight health co-benefit areas, where taking actions to reduce greenhouse gases will provide significant public health benefits. These actions provide benefits including reducing heat impacts, reducing air quality extremes,<sup>23</sup> improving children's health and development, improving economic security, improving food security, increasing mobility and physical activity, increasing urban greening, reducing wildfires and smoke impacts, and increasing housing affordability. These actions can enhance health and community resilience and refer to a body of evidence of the health benefits of action.<sup>24</sup> Globally, West et al.<sup>25</sup> projected annual avoided deaths from PM2.5 and ozone exposure

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<sup>21</sup> Romanello, M., McGushin, A., Di Napoli, C., Drummond, P., Hughes, N., Jamart, L., Kennard, H., Lampard, P., Rodriguez, B.S., Arnell, N. and Ayeb-Karlsson, S. (2021). The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future. *The Lancet*, 398(10311), pp.1619-1662.

<sup>22</sup> Watts, N., Adger, W.N., Agnolucci, P., Blackstock, J., Byass, P., Cai, W., Chaytor, S., Colbourn, T., Collins, M., Cooper, A. and Cox, P.M. (2015). Health and climate change: policy responses to protect public health. *The Lancet*, 386(10006), pp.1861-1914.

<sup>23</sup> Fiore, A.M., V. Naik, and E.M. Leibensperger, 2015: Air Quality and Climate Connections. *Journal of the Air & Waste Management Association*, 65(6), 645-685, doi:10.1080/10962247.2015.1040526.

<sup>24</sup> CARB. (2022). 2022 Scoping Plan: Appendix G Public Health. 2022. Accessed August 8, 2025. <https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-g-public-health.pdf>

<sup>25</sup> West, J.J., Smith, S.J., Silva, R.A., Naik, V., Zhang, Y., Adelman, Z., Fry, M.M., Anenberg, S., Horowitz, L.W. and Lamarque, J.F. (2013). Co-benefits of mitigating global greenhouse gas emissions or future air quality and human health. *Nature climate change*, 3(10), pp.885-889. <https://www.nature.com/articles/nclimate2009>.



combined at around half a million in 2030, over one million in 2050, and over 1.5 million in 2100. These mortality benefits translate into substantial avoided costs. The study concludes that, at both global and regional scales, the health co-benefits from reduced air pollution mortality alone are sufficient to justify greenhouse gas mitigation, even without considering the broader advantages of mitigating climate.

## **6. The DOE Report disregards the impacts of recently defunded federal policies.**

In March 2025, U.S. EPA announced that it would propose reversing dozens of environmental rules as part of the “biggest deregulatory action in U.S. history.”<sup>26</sup> The administration has announced plans to weaken limits on GHG emissions from power plants and from cars and trucks. Moreover, the administration has canceled a requirement for oil and gas companies to report methane emissions – a GHG that is more than 80 times more potent than CO<sub>2</sub> on a 20-year horizon – and is in the process of attempting to eliminate methane emission standards for oil and gas facilities. The DOE Report (pages 129-130) is silent on the benefits that GHG regulations have provided, including the Corporate Average Fuel Economy (CAFE) standard, which cumulatively reduced fuel consumption by well over one and a half trillion gallons, avoided 14 billion tons GHG emissions from vehicles, and saved consumers trillions of dollars.<sup>27</sup> The planned reversal of environmental and climate policies goes against the clear consensus of curbing GHG emissions to avoid the worst impacts of climate change. The world is accelerating toward cleaner vehicle technologies and will watch the United States fade in the rearview mirror as these successful programs are being repealed.

Direct impacts of climate change on society include increased frequency and magnitude of extreme weather events. The administration is defunding several state-of-the-science research initiatives to improve weather forecasting, including weather balloon launches.<sup>28</sup> These cuts raise serious concerns for public safety, including outdated weather warning alerts and emergency preparedness that could result in significant loss of life. Extreme weather events spare no one, regardless of politics. Cutting funds for emergency services translates directly into avoidable deaths.

In Texas, the state government repeatedly rejected Kern County’s request for a flood warning system—an investment of under \$1 million. Federal government funding cuts left crucial positions vacant, making coordination with local emergency managers difficult. In addition, changes in policy requiring Secretary level approvals meant that FEMA could not pre-position Urban Search

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<sup>26</sup> U.S. EPA, EPA Launches Biggest Deregulatory Action in U.S. History (Mar. 12, 2025), <https://www.epa.gov/newsreleases/epa-launches-biggest-deregulatory-action-us-history>.

<sup>27</sup> Greene, David L., Judith M. Greenwald, and Rebecca E. Ciez. “US fuel economy and greenhouse gas standards: What have they achieved and what have we learned?.” *Energy Policy* 146 (2020): 111783.

<sup>28</sup> Oliver Milman, ‘Chaos’: Trump cuts to NOAA disrupt staffing and weather forecasts, *Guardian* (Apr. 1, 2025), <https://www.theguardian.com/us-news/2025/apr/01/trump-cuts-noaa-spam-emails>.



and Rescue crews as they had done in the past.<sup>29,30</sup> The resulting price of inaction in the face of rising threats from climate change was catastrophic: at least 121 lives lost, including 36 children.<sup>31</sup> The short-sighted funding cuts to weather research from this administration will likely result in additional loss of life across the United States in the near future.

Funding cuts were also reported at the National Oceanic and Atmosphere Administration (NOAA), which specializes in improving weather forecasting<sup>18</sup> to ensure that newer models can better detect the timing and intensity of extreme weather events. For instance, weather balloons are fitted with weather instruments that provide critical data to improve weather forecasts. Furthermore, extreme weather events lead to significant material damage. Critical infrastructure, including the power grid, is vulnerable to extreme heat and cold, wildfires, flooding, and hurricanes.<sup>32</sup> Accurate forecasts are essential to protect these assets. Overall, recent funding cuts from the current administration seem to undermine its own DOE Report conclusions, that emphasize the importance of reducing losses from extreme weather events through improved weather forecasting and pose serious risks to the U.S. economy and to national security.

## **7. What the DOE Report gets wrong.**

In the following appendix, CARB addresses a limited list of misleading, false, and or misinformed statements and arguments presented in the report by this DOE. These claims primarily involve attributing natural variability (including solar, volcanic, and large-scale ocean oscillations), questioning the accuracy of temperature records and climate models, the reliability of statistical attribution methods, the assertion that extreme weather events are not worsening and that a warmer climate will be beneficial for public health, and that national regulations and policies will not impact global levels of GHG emissions over the long-term.

## **8. Conclusion**

The DOE Report disregards science and long-established scientific processes. The result is a biased study that relies on misleading statements, cherry-picking of data, and lack of recognition of the health and economic benefits of the greenhouse gas regulations in total. In addition, the study relies on federal programs to minimize extreme weather impacts but does not acknowledge the federal de-funding of weather forecasting and added bureaucracy for disaster mitigation and

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<sup>29</sup> [Christopher Flavelle](https://www.nytimes.com/2025/07/05/us/politics/texas-floods-warnings-vacancies.html). As Floods Hit, Key Roles Were Vacant at Weather Service Offices in Texas (July 2025). <https://www.nytimes.com/2025/07/05/us/politics/texas-floods-warnings-vacancies.html>

<sup>30</sup> Gabe Cohen and Michael Williams. FEMA's response to Texas Flood slowed by Noem's cost controls. <https://www.cnn.com/2025/07/09/politics/fema-texas-flood-noem>

<sup>31</sup> Christopher FlavelleJ. David Goodman and Andrea Fuller. Before Tragedy, Texas Repeatedly Rejected Pleas for Flood Alarm System, New York Times (July 10, 2025), <https://www.nytimes.com/2025/07/10/us/politics/texas-flood-alarm-system.html>.

<sup>32</sup> <https://www.epa.gov/climateimpacts/climate-change-impacts-energy>

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recovery programs. It also relies on only a few climate skeptics vs. the thousands of scientists from around the world. In sum, the resulting DOE Report reaches conclusions that are unsupported by previous federal reports and findings, which were based on robust facts and science, common sense, and broad scientific consensus.

## **Attachment B:**

### **California Air Resources Board Full Comments**

#### **"A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate"**

**U.S. Department of Energy, July 23, 2025**

**Docket No. DOE-HQ-2025-0207**

Attachment B provides a list of misleading, false, and or misinformed statements and arguments presented in the Department of Energy (DOE) Report. This list is not exhaustive.

#### **Human Influences on the Climate, Models and Measurements, Uncertainties, and Environmental Impacts**

1. **The DOE Report misrepresents the net impact of increasing atmospheric CO<sub>2</sub> on agriculture (Technical Comment).** Sections 2 and 9, pages 6 and 107, in the DOE Report emphasize that the "CO<sub>2</sub> fertilization effect" can enhance plant growth and potentially increase crop yields. However, the report misrepresents the net impact of increasing atmospheric CO<sub>2</sub> on agriculture by failing to account for the overall negative effects of climate change and oversimplifying its complex relationship with greenhouse (GHG) emissions, particularly in relation to agriculture. According to the Intergovernmental Panel on Climate Change (IPCC), climate change has decreased agricultural productivity in North America, with more significant reductions in drought-prone, rain-fed systems and areas further south.<sup>33</sup> The increased frequency and intensity of extreme weather events are also expected to further stress agricultural systems, especially with limited adaptation.<sup>34,35,36</sup> Pushing the story that rising GHG is beneficial is reckless, and data show it endangers global food supplies.
2. **The DOE Report wrongly states that solar activity may be an underestimated contributor to global warming (Technical Comment).** Section 3, "Human Influences on

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<sup>33</sup> Hicke, J.A., S. Lucatello, L.D., Mortsch, J. Dawson, M. Domínguez Aguilar, C.A.F. Enquist, E.A. Gilmore, D.S. Gutzler, S. Harper, K. Holsman, E.B. Jewett, T.A. Kohler, and K. Miller, 2022: North America. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 1929-2042.

<sup>34</sup> Hultgren, Andrew, et al. "Impacts of climate change on global agriculture accounting for adaptation." *Nature* 642.8068 (2025): 644-652.

<sup>35</sup> Gornall, Jemma, et al. "Implications of climate change for agricultural productivity in the early twenty-first century." *Philosophical Transactions of the Royal Society B: Biological Sciences* 365.1554 (2010): 2973-2989.

<sup>36</sup> Schlenker, Wolfram, and Michael J. Roberts. "Nonlinear temperature effects indicate severe damages to US crop yields under climate change." *Proceedings of the National Academy of sciences* 106.37 (2009): 15594-15598.

the Climate,” pages 11-13, in the DOE Report states that solar activity may be an underestimated contributor to global warming. The authors base their conclusions on Connolly et al. (2021).<sup>37</sup> However, there are major concerns about the statistical errors in this paper that make the solar contribution to warming larger than it is.<sup>38</sup> Studies indicate that solar activity does not contribute significantly to the rapid global warming observed over the past 50 years. While there was a slight increase in solar output in the first half of the 20th century, this trend has since reversed. The current period of rapid warming has coincided with a period of low and decreasing solar activity.<sup>39,40</sup> In the IPCC Sixth Assessment Report (AR6), experts concluded that the best estimate for the influence of the Sun on climate between the pre-industrial (1850-1900) and the present (2010-2019) was that it added 0.01 Watts per square meter to the global energy imbalance, causing global warming. As such, a small energy imbalance (scientists call it radiative forcing) is likely to be responsible for no more than 0.01 degrees Celsius of warming over that period. This estimate is 100 times smaller than the overall warming that has occurred on Earth over the industrial period, which the IPCC estimates as 0.95-1.2 degrees Celsius in 2011-2020 compared to 1850-1900.<sup>41</sup>

3. **The DOE Report cherry-picks figures and statements to support a narrative that minimizes the risk of climate change (Technical Comment).** Section 3.2, page 15, in the DOE Report states that the bias of the IPCC Special Report on Emissions Scenarios (SRES) was confirmed by the later analysis of Hausfather et al. (2020).<sup>42</sup> In this study, the authors concluded that climate models from the past five decades were skilled at predicting subsequent global mean surface temperature (GMST) changes. When accounting for discrepancies between the forcings (like CO<sub>2</sub> emissions) used in the models and what was observed, most models in their study showed warming that was consistent with real-world observations. However, the DOE report cited a less prominent figure from its supplementary materials (Figure S4) to support a conclusion about observed atmospheric CO<sub>2</sub> concentrations tracking the lower end of climate scenarios, rather than directly citing figures within the main body of the paper. This is indicative of a problem in the DOE Report where

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<sup>37</sup> Connolly, Ronan, et al. "How much has the Sun influenced Northern Hemisphere temperature trends? An ongoing debate." *Research in Astronomy and Astrophysics* 21.6 (2021): 131.

<sup>38</sup> M.T. Richardson, and R.E. Benestad, "Erroneous use of Statistics behind Claims of a Major Solar Role in Recent Warming", *Research in Astronomy and Astrophysics*, vol. 22, pp. 125008, 2022. <http://dx.doi.org/10.1088/1674-4527/ac981c>.

<sup>39</sup> Kopp, G., Krivova, N., Wu, C. J., & Lean, J. (2016). The Impact of the Revised Sunspot Record on Solar Irradiance Reconstructions. *Solar Physics*, 291(9-10), 2951-2965. <https://doi.org/10.1007/s11207-016-0853-x>.

<sup>40</sup> Upton, L. A., & Hathaway, D. H. (2018). An updated Solar Cycle 25 prediction with AFT: The Modern Minimum. *Geophysical Research Letters*, 45, 8091-8095.

<sup>41</sup> IPCC, 2021: Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekci, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

<sup>42</sup> Hausfather, Z., Drake, H. F., Abbott, T., & Schmidt, G. A. (2020). Evaluating the performance of past climate model projections. *Geophysical Research Letters*, 47, e2019GL085378. <https://doi.org/10.1029/2019GL085378>.

the fossil fuel-aligned authors cherry-pick figures and statements to support a narrative that minimizes the risk of climate change. In this case, the actual content of the Hausfather et al. (2019) paper went counter to their narrative and thus was ignored.

4. **The DOE Report incorrectly argues that urban heat island effects are creating upward biases in the temperature record data (Technical Comment).** Section 3.3, "Urbanization influence on temperature trends," pages 20-21, in the DOE Report argues that urban heat island (UHI) effects are biasing the temperature record data high. They reference a small number of studies that support their narrative. However, a substantial body of scientific literature acknowledges the existence and impact of the UHI effect, and various methods have been developed to correct for its influence on temperature records, particularly when assessing long-term climate trends.<sup>43,44,45</sup>
5. **The DOE Report uses a flawed study on surface warming (Technical Comment).** Section 5.2, "Surface warming," page 33, in the DOE Report relies on a few studies, including ones from Nicola Scafetta, to argue that the IPCC range of Equilibrium Climate Sensitivity (ECS) is too large and likely biased high. However, Scafetta's findings are heavily criticized in the literature. A comment on Geophysical Research Letters<sup>46</sup> offers a scathing critique of their findings and identifies numerous conceptual and statistical errors that undermine all the conclusions from the study.
6. **The DOE Report misrepresents findings related to stratospheric cooling (Technical Comment).** Section 5.5, pages 34-36, in the DOE Report claims that stratospheric warming since 2000 conflicts with climate models and an anthropogenic fingerprint, citing Santer et al. (2023) to argue that no cooling trend has re-emerged in the lower stratosphere. However, a UCLA-led study with Santer et al.<sup>47</sup> found significant cooling in the middle and upper stratosphere over the past three decades, linked to human-driven GHG increases. The study also indicated that temperature changes across atmospheric layers provide stronger evidence of human influence than focusing only on the lower stratosphere. Overall,

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<sup>43</sup> Spencer, R. W., Christy, J. R., & Braswell, W. D. (2025). Urban Heat Island Effects in U.S. Summer Surface Temperature Data, 1895-2023. *Journal of Applied Meteorology and Climatology*, 64(7), 1201-1216. *Journal of Applied Meteorology and Climatology*.

<sup>44</sup> Hausfather, Zeke, et al. "Quantifying the effect of urbanization on US Historical Climatology Network temperature records." *Journal of Geophysical Research: Atmospheres* 118.2 (2013): 481-494.

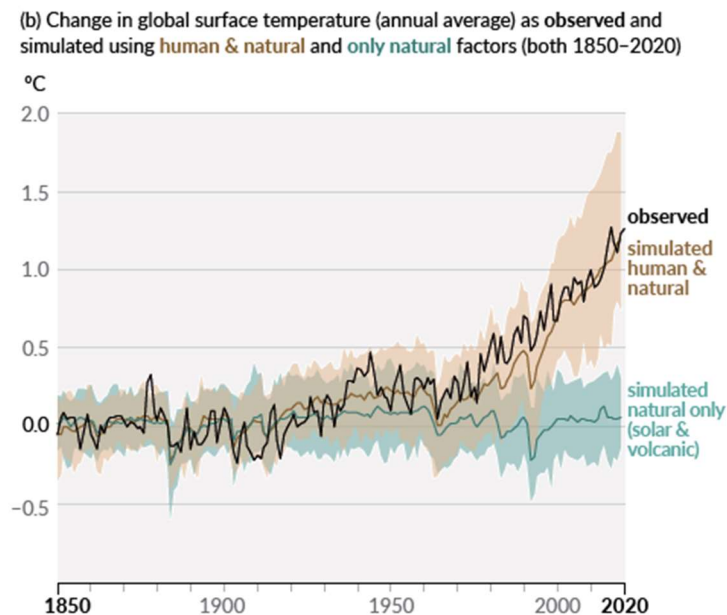
<sup>45</sup> Jones, P., Lister, D., Osborn, T., Harpham, C., Salmon, M. & Hu, M., 2008: Urbanization effects in large-scale temperature records, with an emphasis on China. *Journal of Geophysical Research: Atmospheres*, 113(D16), doi:10.1029/2007JD009780.

<sup>46</sup> Schmidt, Gavin A., Gareth S. Jones, and John J. Kennedy. "Comment on "advanced testing of low, medium, and high ECS CMIP6 GCM simulations versus ERA5-T2m" by N. Scafetta (2022)." *Geophysical Research Letters* 50.18 (2023): e2022GL102530.

<sup>47</sup> B.D. Santer, S. Po-Chedley, L. Zhao, C. Zou, Q. Fu, S. Solomon, D.W.J. Thompson, C. Mears, & K.E. Taylor, (2023) Exceptional stratospheric contribution to human fingerprints on atmospheric temperature, *Proc. Natl. Acad. Sci. U.S.A.* 120 (20) e2300758120, <https://doi.org/10.1073/pnas.2300758120>.

while the DOE Report notes inconsistencies, the scientific consensus identifies continued stratospheric cooling from rising GHGs as a clear marker of human-caused climate change.

7. **The DOE Report inaccurately claims climate models cannot reproduce past temperature trends (Technical Comment).** In the Summary of Section 5, page 43, the DOE Report attacks climate models for failing to reproduce past temperature trends. The report argues that this discrepancy, when combined with what the authors consider to be excessively high emission scenarios, results in potentially inflated projections of future warming. This section implies that the reliability of climate model projections for short-term temperature trends is questionable. The report focuses on regional discrepancies between observed temperature trends and climate model projections, suggesting that these discrepancies undermine the models' overall validity. While acknowledging that climate models are complex and constantly being refined, scientists highlight that the models are designed to estimate long-term trends rather than short-term events. The prevailing scientific view and supporting research indicate that historical climate models have demonstrated a good track record in projecting global warming over time. Several studies have examined historical climate models and found that they most accurately projected global warming trends.<sup>48,49</sup> Expert analysis shows that climate models have demonstrated the ability to reconstruct historic temperature trends over the past decades (see figure below. Source: IPCC AR6 WG I, Figure SPM.1, page 6). Observed warming trends cannot be reproduced using natural forcing only.



<sup>48</sup> Historical Climate Models Accurately Projected Global Warming | MIT Climate Portal.

<sup>49</sup> NASA, Study confirms Climate Models are Getting Future Warming Projections Right (Jan. 9, 2020), <https://climate.nasa.gov/news/2943/study-confirms-climate-models-are-getting-future-warming-projections-right/>.



8. **The DOE Report makes misleading statements regarding weather records (Technical Comment).** Section 6, "Extreme weather," page 46, in the DOE Report argues that "[...] there are only about 130 years of reliable observational records that can be analyzed statistically. That brief interval does not begin to contain all the extreme events that the climate system can create on its own. Over geologic time the climate system has generated an (essentially) infinite variety of weather patterns and extremes that humans have never observed and thus are absent from the databases used to determine extreme statistics." These assertions are misleading. First, the climate cannot generate "an (essentially) infinite variety of weather patterns." Thermodynamics often places a limit on extreme weather events. For instance, precipitation *extremes* were shown to be linked to increased temperature, and the scaling was consistent with Clausius-Clapeyron<sup>50</sup> (also see IPCC AR6 WGI Section 1.5.1). Models and observations agree on the amplification of heavy precipitation with climate warming. Second, climate scientists do not rely solely on "reliable observational records" from the last 130 years. Instrumental observations began as early as the 17<sup>th</sup> century, but climate scientists also use paleoclimate data that extend much deeper into the past (see figure below). Observations from multiple data records are combined to produce a more complete picture of the past climate. See the figure below from the IPCC (AR6 WGI, Section 1.3.1, Figure 1.7).

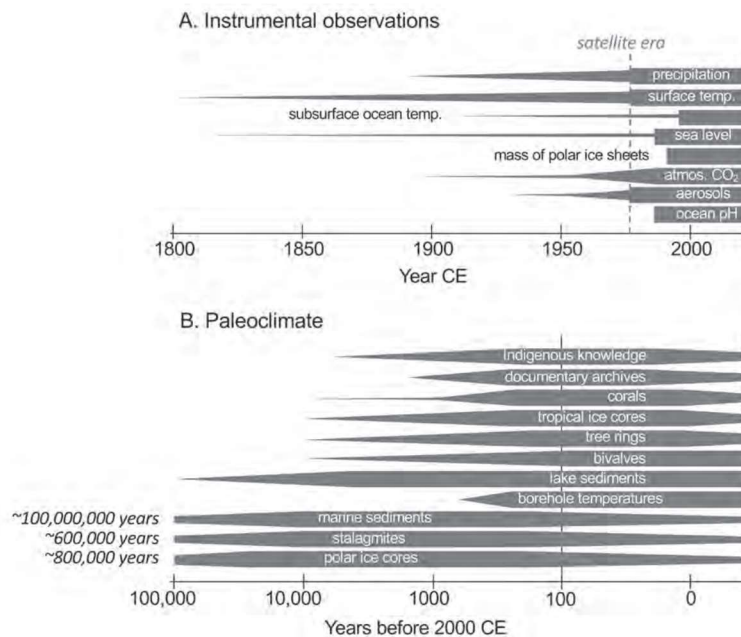


Figure 1.7 | Schematic of temporal coverage of (a) selected instrumental climate observations and (b) selected paleoclimate archives. The satellite era began in 1979 CE. The width of the taper gives an indication of the number of available records. (Source: IPCC AR6, WGI)

<sup>50</sup> Allan, Richard P., and Brian J. Soden. "Atmospheric warming and the amplification of precipitation extremes." *Science* 321.5895 (2008): 1481-1484.



9. **The DOE Report inaccurately claims that extreme weather events are not increasing in frequency or intensity (Technical Comment).** Section 6 in the DOE Report, pages 48-70, concludes that most extreme weather events in the U.S. do not show long-term trends. The report states that claims of increased frequency or intensity of hurricanes, tornadoes, floods, and droughts are not supported by U.S. historical data. However, this is a change in position from previous U.S. EPA administrators who have made statements and overseen reports that show extreme weather events are increasing in frequency and intensity. The agency publishes climate indicators that draw on long-term data to track these trends, citing evidence such as more intense heat waves, heavy precipitation, and wildfires.<sup>51</sup> Additional scientific sources and reports<sup>52</sup> specifically highlight the increased frequency and intensity of extreme weather events as a direct consequence of climate change. Other studies indicate that climate change is increasing the intensity of tropical cyclones (including hurricanes)<sup>53,54,55</sup> and summarize attributable influences on hurricanes during five recent North Atlantic hurricane seasons (2019-2023) and a case study of Hurricane Ian (2022).
10. **The DOE Report wrongly says that increased global temperatures have shown no effect on increased hurricane frequency (Technical Comment).** Section 6.2, page 49, in the DOE Report refers to a figure from Dr. Ryan Maue (see below<sup>56</sup>) to argue that increased global temperatures have shown no effect on increased hurricane frequency. It is important to note that the IPCC AR6 does not cite this figure because it has not been peer-reviewed, and the chart below offers no information regarding precipitation and flooding associated with hurricanes.

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<sup>51</sup> U.S. Environmental Protection Agency. (2024). Climate change indicators in the United States (Fifth ed., EPA 430-R-24-003). [www.epa.gov/climate-indicators](http://www.epa.gov/climate-indicators).

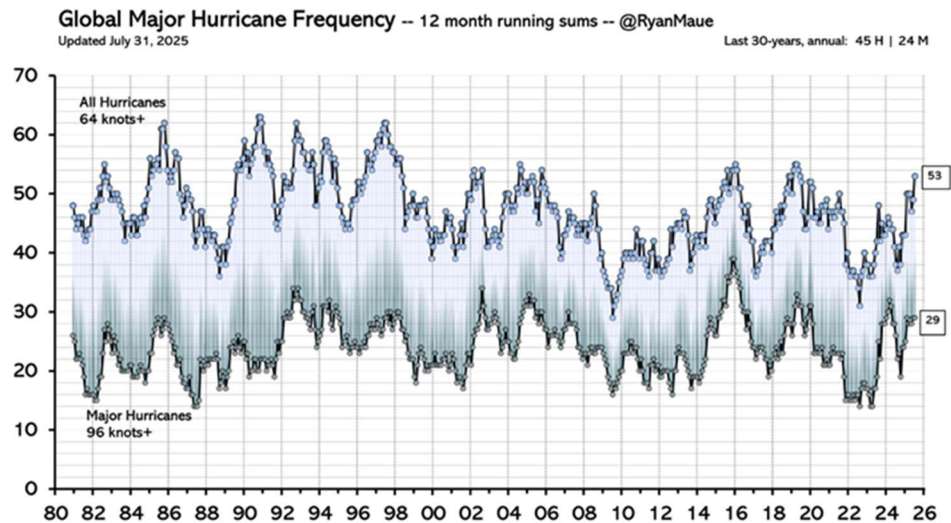
<sup>52</sup> National Academies of Sciences, Engineering, and Medicine. 2023. Review of the Draft Fifth National Climate Assessment. Washington, DC: The National Academies Press. <https://doi.org/10.17226/26757>.

<sup>53</sup> Collins, M., et al. "Extremes, Abrupt Changes and Managing Risks. IPCC Special Report on the Ocean and Cryosphere in a Changing Climate." 589-655. 2019.

<sup>54</sup> Murakami, Hiroyuki, et al. "Detected climatic change in global distribution of tropical cyclones." Proceedings of the National Academy of Sciences 117.20 (2020): 10706-10714.

<sup>55</sup> Gilford, Daniel & Giguere, Joseph & Pershing, A. (2024). Human-caused ocean warming has intensified recent hurricanes. Environmental Research: Climate. 3. 10.1088/2752-5295/ad8d02.

<sup>56</sup> Dr. Ryan N. Maue, 2025 Accumulated Cyclone Energy (Aug. 29, 2025), <https://climatlas.com/tropical/>.



Furthermore, on page 51, the DOE Report argues that the speed of hurricanes making landfall has slowed since 1900: "*Table 6.2.1 shows the 10 strongest hurricanes (plus ties) to make U.S. landfall. Of the hurricanes that have made landfall with sustained winds greater than 150 mph, only one has occurred in the 21st century.*" However, the Report is silent on the fact that slower landfall speeds are causing higher precipitation and floods (medium confidence) and that anthropogenic climate change has contributed to extreme precipitation associated with recent intense hurricanes, such as Harvey in 2017 (high confidence) (IPCC AR6 WGII, Section 14.2.1). Overall, climate change is projected to magnify the impact of tropical cyclones in US-NE, US-SP, and US-SE by increasing rainfall (Patricola and Wehner, 2018)<sup>57</sup> and extreme wind speed (high confidence) (IPCC AR6 WGII, Section 14.2.1).

11. **The DOE Report misstates that the number of heatwave days per year in the U.S. has not changed for over a century (Technical Comment).** Section 6.3.3, "Heatwaves," pages 57-60, in the DOE Report argues that the number of heatwave days per year has not changed for over a century over the Contiguous United States (CONUS): "*For CONUS as a whole, the evidence in this section suggests GHG emissions have had little-to-no effect on heatwaves against the background of urbanization and natural climate variability.*" (Page 59 of the DOE Report). The data supporting this assertion are scarce and do not support the conclusion. Furthermore, such conclusions disagree with the broader consensus presented in the IPCC report. The IPCC AR6 report clearly states that the increase in frequency, duration, and intensity of heatwaves is extremely likely on all continents for different future warming levels (e.g., Lelieveld et al., 2014<sup>58</sup>) (IPCC AR6 WGI, Section 6.5.3).

<sup>57</sup> Patricola, Christina M., and Michael F. Wehner. "Anthropogenic influences on major tropical cyclone events." *Nature* 563.7731 (2018): 339-346.

<sup>58</sup> Lelieveld, Jos, et al. "Model projected heat extremes and air pollution in the eastern Mediterranean and Middle East in the twenty-first century." *Regional Environmental Change* 14.5 (2014): 1937-1949.

**12. The DOE Report makes misleading statements regarding extreme rain events**

**(Technical Comment).** Section 6.4, "Extreme precipitation," pages 61-66, in the DOE Report attempts to argue that extreme precipitation patterns have not changed recently, especially over CONUS. The hydrological literature, supported by studies cited in the DOE report, has long acknowledged the existence of naturally occurring long-term oscillations in rainfall patterns. However, according to a 2014 study, these are not always straightforward trends but can involve irregular fluctuations over extended periods.<sup>59</sup> Furthermore, this point goes against findings from NCA4 and NCA5 that reported an increase in the occurrence of extreme precipitation, primarily in the eastern half of CONUS, especially the Northeast.<sup>60</sup> This is not surprising given that warmer air can hold ~7% more water vapor per °C, priming storms to deliver more rain or snow in short bursts. This physical relationship and its implications for extremes underpin assessments that heavy precipitation intensity and frequency increase with warming.<sup>61,62</sup> The IPCC AR6 (Synthesis report Section 3.1.1)<sup>63</sup> is clear on the impacts of rising temperatures on heavy precipitation: *"At 1.5°C global warming, heavy precipitation and flooding events are projected to intensify and become more frequent in most regions in Africa, Asia (high confidence), North America (medium to high confidence) and Europe (medium confidence). At 2°C or above, these changes expand to more regions and/or become more significant (high confidence)."*

**13. The DOE Report incorrectly dismisses CO<sub>2</sub> as the main driver of observed global warming (Technical Comment).**

In Section 8, page 87, of the DOE Report, the authors cherry-pick information from Hegerl et al. 2019 (see figure below) by highlighting 1905 to 1941 as a period of low volcanic activity, suggesting that this explains the observed warming because reduced aerosols allowed more sunlight to reach the Earth's surface. They dismiss CO<sub>2</sub> as the main driver since its concentration over that same period rose modestly compared to temperature. However, what matters is cumulative CO<sub>2</sub>. Furthermore, there is a lag in climate responses with changing GHG concentrations. Observations and climate models consistently demonstrate that models incorporating GHG increases since 1850 are significantly more successful in reproducing the observed trends in radiative forcing and

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<sup>59</sup> Marani, M., and S. Zanetti (2015), Long-term oscillations in rainfall extremes in a 268 year daily time series, *Water Resour. Res.*, 51, 639-647, doi:10.1002/2014WR015885.

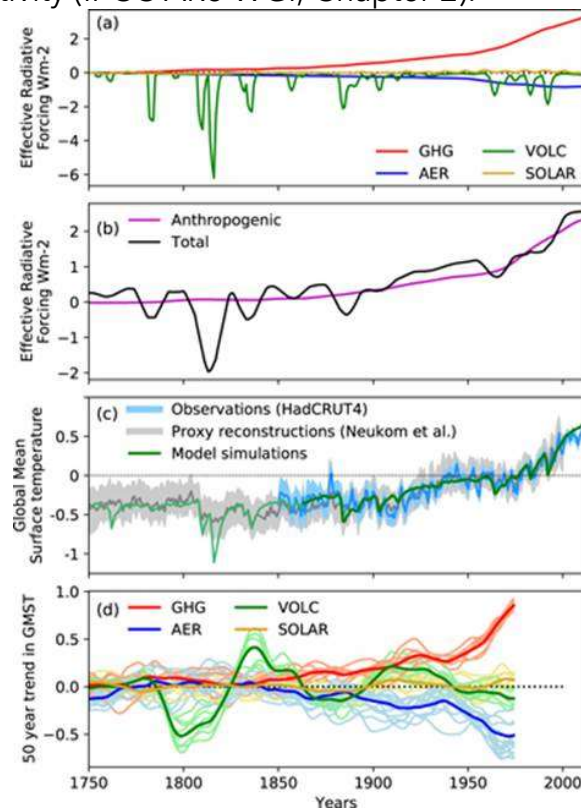
<sup>60</sup> US National Climate Assessment (NCA5, 20.23): national heavy-precipitation and flood-damage attribution findings. (U.S. Climate Resilience Toolkit).

<sup>61</sup> IPCC, 2021: Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 3-32, doi:10.1017/9781009157896.001.

<sup>62</sup> U.S. EPA, Extreme Precipitation. <https://www.epa.gov/climatechange-science/extreme-precipitation> (last visited Aug. 29, 2025).

<sup>63</sup> IPCC, 2023: *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, 184 pp., doi: 10.59327/IPCC/AR6-9789291691647. <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>

global mean temperature than models that solely rely on natural forcings, like solar variability and volcanic activity (IPCC AR6 WGI, Chapter 2).



14. **The DOE Report misstates that the literature is uncertain on the impact of solar flux on global temperature (Technical Comment).** Section 8.3.1, page 85, in the DOE Report mentions that: "[...] *the impact of solar variations on the climate is uncertain and subject to substantial debate (Lockwood, 2012; Connolly et al., 2021) - something that is not evident in the IPCC assessment reports.*" This statement incorrectly cites Lockwood et al. (2012)<sup>64</sup> as evidence that the literature is uncertain on the impact of solar flux on global temperature. Looking at the abstract of Lockwood et al. (2012), the above passage is clearly misconstrued: "*The best estimates of the solar influence on the global mean air surface temperature show relatively small effects, compared with the response to anthropogenic changes.*" Furthermore, the Connolly et al. (2021) paper has been heavily criticized in the literature, as was previously mentioned.
15. **The DOE Report makes inaccurate statements about solar impacts on recent warming trends (Technical Comment).** Section 8.3.1, page 85, of the DOE Report makes vague claims regarding solar indirect effects on recent warming trends: "*There are numerous candidate processes, including solar ultraviolet changes; energetic particle precipitation; atmospheric-electric-field effect on cloud cover; cloud changes produced by solar-*

<sup>64</sup> Lockwood, Mike. "Solar influence on global and regional climates." *Surveys in Geophysics* 33.3 (2012): 503-534.

*modulated galactic cosmic rays... Such solar indirect effects are not included in climate models, although indirect methods of estimating their impacts suggest they are significant."* In contrast, the IPCC is clear on some of these factors. For instance, regarding galactic cosmic rays (GCR) (IPCC AR6, WGI, Section 7.3.4.5): *"There is high confidence that GCRs contribute a negligible ERF over the period 1750–2019."* Furthermore, the IPCC AR6 makes no references to factors like energetic particle precipitation or atmospheric electric field effects on cloud cover. In short, the authors of the DOE report misleadingly focus on obscure factors to create a false impression, while dismissing the well-established role of rising anthropogenic GHG emissions.

16. **The DOE Report falsely claims that a method for the detection and attribution of climate change is invalid (Technical Comment).** Section 8.3.2, pages 88–89, in the DOE Report criticizes the main tools used by scientists to attribute observed warming to either anthropogenic emissions or natural variability. The report cites a series of papers to argue that the "fingerprinting" approach, a commonly used method in climate science, is inherently unreliable and advocated for the use of econometric practices to achieve more valid results. "Fingerprinting" is a multivariate linear regression-based method that has been widely used for detection of climate change and attribution of the change to different external drivers, and holds generally true for large-scale variables (see IPCC AR6 WGI Section 3.2); yet the DOE Report suggest that *"there is very little literature examining the statistical properties of the results it generates"* (page 88 of the DOE Report). However, the DOE Report's selective use of information and its apparent misrepresentation of scientific findings have drawn strong criticism from the scientific community. Numerous climate scientists have publicly disagreed with the controversial DOE Report. Critics cite issues with misrepresented data, cherry-picking of evidence, and biased author selection.<sup>65</sup> The AR6 has clearly applied such tools to increase confidence of their results compared to AR5 (AR6 WGI, Section 3.3.1.1.2): *"Alternative techniques, based purely on statistical or econometric approaches, without the need for climate modelling, have also been applied [...] and match the results of physically-based methods. The larger range of attribution techniques and improvements to those techniques increase confidence in the results compared to AR5."* In conclusion, the DOE Report authors fail to offer any strong evidence to support their claim that the fingerprinting method is not valid and/or produces biased results.
17. **The DOE Report incorrectly attributes warming to a drop in planetary albedo (Technical Comment).** Section 8.4, pages 90–92, in the DOE Report attributes record warming since 2015 to a drop in planetary albedo, citing a recent paper from Hansen and Karecha (2025)<sup>66</sup>. A lower albedo implies that the Earth reflects less incoming solar

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<sup>65</sup> Science Feedback, Misleading U.S. Department of Energy climate report chooses bias over science, climate scientists say (Aug. 5, 2025), <https://science.feedback.org/review/misleading-u-s-department-energy-climate-report-chooses-bias-over-science-climate-scientists-say/>.

<sup>66</sup> Hansen J and P Karecha (2025) Large cloud feedback confirms high sensitivity.  
<https://www.columbia.edu/~jeh1/mailings/2025/CloudFeedback.13May2025.pdf>.



radiation, amplifying global temperatures. While the IPCC AR6 identifies several positive cloud climate feedbacks that can reduce albedo, the DOE Report focuses narrowly on natural variability in cloud cover, while offering no peer-reviewed evidence to support their claim.

18. **The DOE Report emphasizes how key work by NOAA and NWS can help mitigate against damages from climate change but ignores how both agencies are being defunded (Technical Comment).** Section 10.1 (page 110) in DOE Report states that *“Technological advances have substantially reduced losses from extreme weather events. Early warning systems, satellite monitoring, and improved weather forecasting have reduced deaths.”* This statement is at odds with recent steps from the current administration to cut funding to NOAA and NWS. Per recent articles,<sup>67</sup> *“[...] the Trump administration’s Department of Government Efficiency (DOGE) has significantly reduced National Oceanic and Atmospheric Administration (NOAA) staff, research capacity, and data-sharing capabilities.”* The administration has also cut weather balloon launches, which are used to gather critical data to improve weather forecasts. Furthermore, funding cuts were reported to the Research Arm of NOAA, which specializes in improving weather forecasting. This branch is critical to ensure that newer models can better detect the timing and intensity of extreme weather events. Overall, recent funding cuts from the current administration seem to undermine its own DOE Report conclusions that emphasize the importance of reducing losses from extreme weather events through improved weather forecasting. Also worrying are the current attempts to privatize weather forecasting.<sup>68</sup> Such a move would provide weather forecasts only for the people who can afford it, further driving climate inequalities.

## **Economic Impacts**

1. **The DOE Report makes misleading statements that discount the impact of climate change on the economy (Technical Comment).** Section 10.1 (page 110) in the DOE Report discounts the narrative that climate change is already causing economic damages by stating: *“The evolution of climate risk in the U.S. has been dominated by societal factors, rather than by changes to the actual weather and climate hazards.”* The DOE Report relies on a single study (Pielke Jr., 2024)<sup>69</sup> that found no increasing trends in U.S. disaster losses normalized by GDP over time. However, the practice of normalizing disaster losses by GDP is widely recognized in climate and disaster economics research as a crude and potentially misleading method. While intended to adjust for population growth and wealth, a declining losses-to-GDP ratio may simply reflect that the economy expanded faster than disaster

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<sup>67</sup> Margaret Cooney, Codey Hankerson, The Lasting Threat of Trump’s Cuts to NOAA and NWS on American Communities (July 10, 2025), <https://www.americanprogress.org/article/the-lasting-threat-of-trumps-cuts-to-noaa-and-nws-on-american-communities/>.

<sup>68</sup> Brian Slodysko, Michael Biesecker, As Trump slashes weather agency, his appointees have ties to communities that stand to benefit from privatizing forecasts (July 9, 2025), <https://www.pbs.org/newshour/politics/as-trump-slashed-weather-agency-his-appointees-have-ties-to-companies-that-stand-to-benefit-from-privatizing-forecasts>.

<sup>69</sup> Pielke Jr., R. (2024). Scientific integrity and U.S. 'billion dollar disasters'. *npj Natural Hazards*, 1, Article 12.

losses, and not that underlying hazard risk decreased. Relying on this single metric, therefore, risks misrepresenting long-term hazard trends. Studies have emphasized these limitations, underscoring that GDP-normalized losses alone are not appropriate for determining whether climate hazards are intensifying. A more robust assessment requires supplementing this measure with direct climate and weather data.<sup>70,71</sup> The IPCC AR6 is clear on the economic and non-economic damage sustained by climate change (AR6 WGII, p11, section B.1.6.): *“Economic damages from climate change have been detected in climate-exposed sectors, with regional effects to agriculture, forestry, fishery, energy, and tourism (high confidence), and through outdoor labor productivity (high confidence). Some extreme weather events, such as tropical cyclones, have reduced economic growth in the short-term (high confidence).”*

2. **The DOE Report contains misleading statements regarding the Social Cost of Carbon (SCC) (Technical Comment).** Section 11 in the DOE Report, pages 116-125, provides misleading statement regarding SCC. While uncertainties remain in estimates of the Social Cost of Carbon (SCC), it has been extensively studied, with over 100 peer-reviewed papers and several key meta-analyses.<sup>72,73</sup> Section 11 in the DOE Report relies on misleading statements that do not reflect this body of research.<sup>74,75</sup> One of the meta-analyses found that reducing GHG emissions today is justified economically, with even the most conservative SCC estimates. Another meta-analysis suggests that experts believe published estimates are too low.<sup>76</sup> A third meta-analysis demonstrates that SCC estimates have risen significantly over the past decade across both low and high discount rates, with statistically robust results that account for the quality of the study.<sup>77,78</sup>

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<sup>70</sup> Eric Neumayer, Fabian Barthel, Normalizing economic loss from natural disasters: A global analysis, Global Environmental Change, Volume 21, Issue 1, 2011, Pages 13-24, ISSN 0959-3780, <https://doi.org/10.1016/j.gloenvcha.2010.10.004>.

<sup>71</sup> Alstadt, B., Hanson, A., & Nijhuis, A. (2022). Developing a Global Method for Normalizing Economic Loss from Natural Disasters. Natural Hazards Review, 23(1). [https://doi.org/10.1061/\(ASCE\)NH.1527-6996.0000522](https://doi.org/10.1061/(ASCE)NH.1527-6996.0000522).

<sup>72</sup> Moore, Frances C., et al. "Synthesis of evidence yields high social cost of carbon due to structural model variation and uncertainties." Proceedings of the National Academy of Sciences 121.52 (2024): e2410733121.

<sup>73</sup> Cai, Y. , & Lontzek, T. S. (2019). The social cost of carbon with economic and climate risks. Journal of Political Economy, 127(6), 2684-2734.

<sup>74</sup> Tol, R. S. J. (2023). Social cost of carbon estimates have increased over time. Nature Climate Change, 13(6), 532-536. DOI: 10.1038/s41558-023-01680-x.

<sup>75</sup> Tol, R. S. J. (2025). Database for the meta-analysis of the social cost of carbon (v2025.1) [Data set]. arXiv. <https://doi.org/10.48550/arXiv.2402.09125>.

<sup>76</sup> F.C. Moore, M.A. Drupp, J. Rising, S. Dietz, I. Rudik, & G. Wagner, Synthesis of evidence yields high social cost of carbon due to structural model variation and uncertainties, Proc. Natl. Acad. Sci. U.S.A. 121 (52) e2410733121, <https://doi.org/10.1073/pnas.2410733121> (2024).

<sup>77</sup> Pezzey, J. C. V. (2019). Why the social cost of carbon will always be disputed. WIREs Climate Change, 10(1), e558.

<sup>78</sup> Tol, Richard. (2023). Social cost of carbon estimates have increased over time. Nature Climate Change. 13. 1-5. 10.1038/s41558-023-01680-x.



3. **The DOE Report makes misleading statements about the large and increasing costs of global warming (Technical Comment).** Section 11 (pages 116-120) in the DOE Report contradicts many studies showing large and growing costs from sea-level rise, extreme weather, and agricultural losses. The United States sustained 403 weather and climate disasters from 1980 to 2024, with overall damages/costs exceeding \$2.915 trillion.<sup>79,80,81</sup> There is substantial evidence that suggests warming is economically damaging in the long term, while mitigation can bring major benefits, though the scale remains debated. A World Resources Institute (WRI) study suggests that every dollar invested in climate adaptation yields over \$10 in benefits over ten years. This translates into potential returns exceeding \$1.4 trillion on the analyzed investments.<sup>82</sup>
4. **The DOE Report wrongly offers the need for low energy costs as a justification for higher global greenhouse gas emissions (Technical Comment).** Section 10.3 (pages 113-114), and Section 11.1 (pages 116-118) in the DOE Report emphasizes cheap electricity's historic role in reducing mortality, but using this to justify high GHG emissions is flawed. Climate change is already raising electricity demand, which is projected to rise by 5.3% per °C in the U.S. Relying on higher polluting energy creates a feedback loop of higher emissions, temperature warming, and energy demand. The DOE Report also ignores rising insurance costs tied to climate risks. Senate and FEMA data link increased non-renewals and soaring premiums to wildfires, hurricanes, and other extremes. The NYT reports sharp premium increases since 2014, especially in high-risk areas.<sup>83</sup>

## **Climate and Health**

1. **The DOE Report incorrectly claims that a warmer climate will reduce mortality from temperature extremes (Technical Comment).** Section 10.3 (pages 113-114), "Mortality from Temperature Extremes" in the DOE Report argues that mortality is higher under extreme cold weather compared to hot weather, and so transitioning to a warmer climate will likely be beneficial to society. The argument is naïve in the sense that under a warmer climate, extreme drought and heatwave events are likely to increase in frequency and duration, which will significantly exacerbate mortality rates associated with higher temperatures. The peer-reviewed literature is scarce regarding the impacts of ambient temperatures on mortality. According to the IPCC (AR6 WGII, Section 16.2.3.5): *"No conclusive evidence emerges regarding recent temporal trends in excess mortality*

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<sup>79</sup> NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2025). <https://www.ncei.noaa.gov/access/billions/>, DOI: 10.25921/stkw-7w73.

<sup>80</sup> Islam, Md Ziaul, and Chao Wang. "Cost of high-level flooding as a consequence of climate change driver?: A case study of China's flood-prone regions." *Ecological Indicators* 160 (2024): 111944.

<sup>81</sup> Oxera Consulting, 2024. The Economic Cost of Extreme Weather Events, ICC

<sup>82</sup> WRI (2025). Strengthening the Investment Case for Climate Adaptation: A Triple Dividend Approach. <https://www.wri.org/research/climate-adaptation-investment-case>.

<sup>83</sup> Senate Budget Committee, Staff Report (Dec. 2024). [https://www.budget.senate.gov/imo/media/doc/next\\_to\\_fall\\_the\\_climate-driven\\_insurance\\_crisis\\_is\\_here\\_and\\_getting\\_worse.pdf](https://www.budget.senate.gov/imo/media/doc/next_to_fall_the_climate-driven_insurance_crisis_is_here_and_getting_worse.pdf).

*attributable to cold exposure (Vicedo-Cabrera et al., 2018b)<sup>84</sup>. Quantitative detection and attribution studies of temperature-related mortality are still rare. [...] Studying excess mortality associated with past heatwaves, such as the 2003 or 2018 events in Europe, even higher proportions of deaths attributable to anthropogenic climate change have been reported for France and the UK (Mitchell et al., 2016<sup>85</sup>; Clarke et al., 2021<sup>86</sup>). Formal attribution studies encompassing cold-related mortality are quasi nonexistent. The very few studies from Europe and Australia (Christidis et al., 2010<sup>87</sup>; Åström et al., 2013<sup>88</sup>; Bennett et al., 2014<sup>89</sup>) find weak impacts of climate change on cold-associated excess mortality, with contradictory outcomes both towards higher and lower risks (low confidence)."* Furthermore, Vicedo-Cabrera et al. (2021)<sup>90</sup> projected that under a warmer climate, heat-related deaths will rise and begin to offset the cold-related mortality advantage in many regions by mid-to-late century.

2. **The DOE Report misuses U.S. EPA's Climate Change Indicators<sup>91</sup> report and states incorrectly that risks from cold temperatures far exceed risks from heat (Technical Comment).** In Section 10.3 of the DOE Report, pages 111-114, the authors argue that cold-related mortality significantly exceeds heat-related mortality. U.S. EPA clarifies that many winter deaths are not solely attributable to cold exposure (e.g., flu season) and emphasizes that heat waves are becoming more frequent, intense, and prolonged, posing a significant public health risk. The DOE Report, however, fails to reflect U.S. EPA's broader conclusion that heat-related mortality risks are rising due to increasing temperatures and more extreme heat events across the country. Moreover, several studies that provide evidence of climate

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<sup>84</sup> Vicedo-Cabrera AM, Sera F, Guo Y, Chung Y, Arbuthnott K, Tong S, Tobias A, Lavigne E, Coelho MD, Saldiva PH, Goodman PG. "A multi-country analysis on potential adaptive mechanisms to cold and heat in a changing climate." *Environment international* 111 (2018): 239-246.

<https://www.sciencedirect.com/science/article/pii/S0160412017310346>.

<sup>85</sup> Mitchell D, Heaviside C, Vardoulakis S, Huntingford C, Masato G, Guillod BP, Frumhoff P, Bowery A, Wallom D, Allen M. "Attributing human mortality during extreme heat waves to anthropogenic climate change." *Environmental Research Letters* 11.7 (2016): 074006. <https://iopscience.iop.org/article/10.1088/1748-9326/11/7/074006/meta>.

<sup>86</sup> Clarke, Ben J., Friederike EL Otto, and Richard G. Jones. "Inventories of extreme weather events and impacts: Implications for loss and damage from and adaptation to climate extremes." *Climate Risk Management* 32 (2021): 100285. <https://www.sciencedirect.com/science/article/pii/S2212096321000140>.

<sup>87</sup> Christidis, Nikolaos, G. C. Donaldson, and P. A. Stott. "Causes for the recent changes in cold- and heat-related mortality in England and Wales." *Climatic Change* 102.3 (2010): 539-553. <https://link.springer.com/article/10.1007/s10584-009-9774-0>.

<sup>88</sup> Åström, D. O., B. Forsberg, K. L. Ebi, and J. Rocklöv. "Attributing mortality from extreme temperatures to climate change in Stockholm, Sweden." *Nature Climate Change* 3.12 (2013): 1050-1054. <https://www.nature.com/articles/nclimate2022>.

<sup>89</sup> Bennett, Charmian M., Keith B. G. Dear, and Anthony J. McMichael. "Shifts in the seasonal distribution of deaths in Australia, 1968-2007." *International Journal of Biometeorology* 58.5 (2014): 835-842. <https://link.springer.com/article/10.1007/s00484-013-0663-x>.

<sup>90</sup> Vicedo-Cabrera AM, Scovronick N, Sera F, Royé D, Schneider R, Tobias A, Astrom C, Guo Y, Honda Y, Hondula DM, Abrutzky R. "The burden of heat-related mortality attributable to recent human-induced climate change." *Nature climate change* 11.6 (2021): 492-500. <https://www.nature.com/articles/s41558-021-01058-x>.

<sup>91</sup> Environmental Protection Agency. (2025). *Climate Change Indicators in the United States*. <https://www.epa.gov/climate-indicators>.

impacts are misrepresented through selective quoting and omission of context. For example, the DOE Report cites Gasparini et al. to suggest that most mortality arises from both moderately hot and cold temperatures. Yet the same study makes clear that these events are mutually exclusive and should not be directly compared.<sup>92</sup> Similarly, the DOE Report misrepresents Ritchie's analysis, which explains that higher mortality associated with moderately cold conditions results from longer exposure duration, not from greater inherent risks. Ritchie also finds elevated relative mortality risks for both extreme cold and extreme heat.<sup>93</sup> Contrary to the DOE's framing, the broader body of research demonstrates that climate change is expected to increase, not decrease, overall mortality. While Zhao et al. found that global warming has reduced some cold-related deaths and moderately increased heat-related deaths,<sup>94</sup> their study also concludes that even if net temperature-related deaths decrease slightly, climate change is expected to increase the overall mortality burden over time. By omitting these nuances, the DOE Report reaches inaccurate and misleading conclusions.

3. **The DOE Report incorrectly claims adaptation measures have significantly reduced heat-related mortality (Technical Comment).** In Section 10.3, the DOE Report, pages 112-114, misrepresents the IPCC Working Group's findings.<sup>95</sup> The IPCC states that non-optimal temperatures globally increase mortality, with rising relative risks at extreme temperatures. While healthcare improvements and air conditioning have reduced heat vulnerability, overall temperature-related mortality risk is rising due to worsening heat waves and climate change. The DOE Report willfully omits this broader context, resulting in a misleading interpretation. It also selectively quotes and misrepresents multiple relevant studies. For instance, Allen and Sheridan found early-season cold events deadlier due to increased susceptibility and lack of preparation, not general cold-weather risks.<sup>96</sup> Bobb et al. emphasize that significant heat-related mortality risks remain, and climate change will likely increase health burdens, with no substantial evidence that air conditioning has reduced

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<sup>92</sup> Gasparini A, Guo Y, Hashizume M, Lavigne E, Zanobetti A, Schwartz J, Tobias A, Tong S, Rocklöv J, Forsberg B, Leone M. "Mortality risk attributable to high and low ambient temperature: a multicountry observational study." *The Lancet* 386.9991 (2015): 369-375. DOI: [10.1016/S0140-6736\(14\)62114-0](https://doi.org/10.1016/S0140-6736(14)62114-0).

<sup>93</sup> Ritchie, Hannah. "How many people die from extreme temperatures, and how this could change in the future: Part one." *Our World in Data* (2024). <https://ourworldindata.org/part-one-how-many-people-die-from-extreme-temperatures-and-how-could-this-change-in-the-future>.

<sup>94</sup> Zhao Q, Guo Y, Ye T, Gasparini A, Tong S, Overcenco A, Urban A, Schneider A, Entezari A, Vicedo-Cabrera AM, Zanobetti A. (2021). Global, regional, and national burden of mortality associated with non-optimal ambient temperatures from 2000 to 2019: A three-stage modelling study. *The Lancet Planetary Health*. 2021 Jul 1;5(7):e415-25.

<sup>95</sup> O'Neill BC, van Aalst M, Zaiton Ibrahim Z, Berrang-Ford L, Bhadwal S, Buhaug H, Diaz D, Frieler K, Garschagen M, Magnan AK, Midgley G. (2022). Key risks across sectors and regions. In AR6 Working Group II Climate Change 2022: Impacts, Adaptation and Vulnerability (pp. 2411-2538). Intergovernmental Panel on Climate Change. <https://www.ipcc.ch/report/ar6/wg2/chapter/chapter-16/>.

<sup>96</sup> Allen, Michael J., and Scott C. Sheridan. "Mortality risks during extreme temperature events (ETEs) using a distributed lag non-linear model." *International journal of biometeorology* 62.1 (2018): 57-67. <https://link.springer.com/article/10.1007/s00484-015-1117-4>.

heat-related deaths.<sup>97</sup> Lee and Dessler predict a fivefold increase in temperature-related deaths under 3°C warming, noting future warming will reduce cold-related mortality but increase heat-related mortality.<sup>98</sup> Nordio et al. explicitly warn that increased temperature variability may have greater health impacts than average warming and that their findings cannot estimate future climate-related health risks.<sup>99</sup> Wang et al. report minimal change in heat wave mortality when accounting for adaptation but highlight regional differences, underscoring the need for localized adaptation strategies.<sup>100</sup> Extreme weather severely impacts vulnerable populations, leading to heightened risks for the elderly, children, people with pre-existing conditions, low-income households, and communities of color who disproportionately lack access to cooling and are more exposed to dangerous heat and other climate-related hazards.<sup>101</sup> Lastly, DOE oversimplifies Davis et al.'s findings on national trends, analyzing retrospective data to assess public adaptation to rising temperatures without predicting future mortality.<sup>102</sup> The DOE Report's willful lack of context results in mischaracterizations which distorts these studies' intent and findings.

4. **The DOE makes incorrect claims about the impact of energy costs on mortality risks (Technical Comment).** In Section 10.3, pages 113-114, the DOE Report's factual statements that electrification and widespread heating and air conditioning dramatically reduced weather-related mortality, especially for low-income households, do not lead to the conclusion that overall mortality is reducing. The DOE's cited studies lack critical context and are misleading. While citing Barreca et al. to support claims on energy affordability,<sup>103</sup> it omits the links found by the researchers between increased air conditioning adoption, higher electricity demand, and the resultant increase in greenhouse gas emissions contributing to climate change. Additionally, the DOE Report overlooks that many low-income households lack air conditioning or heating equipment due to high upfront costs. The DOE Report's statements on energy spending differences omit Doremus et al.'s

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<sup>97</sup> Bobb JF, Peng RD, Bell ML, Dominici F. "Heat-related mortality and adaptation to heat in the United States." *Environmental health perspectives* 122.8 (2014): 811-816.  
<https://ehp.niehs.nih.gov/doi/full/10.1289/ehp.1307392>.

<sup>98</sup> Lee, Jangho, and Andrew E. Dessler. "Future temperature-related deaths in the US: The impact of climate change, demographics, and adaptation." *GeoHealth* 7.8 (2023): e2023GH000799.  
<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2023GH000799>.

<sup>99</sup> Nordio F, Zanobetti A, Colicino E, Kloog I, Schwartz J. "Changing patterns of the temperature-mortality association by time and location in the US, and implications for climate change." *Environment international* 81 (2015): 80-86.  
<https://www.sciencedirect.com/science/article/abs/pii/S0160412015000938>.

<sup>100</sup> Wang Y, Nordio F, Nairn J, Zanobetti A, Schwartz JD. "Accounting for adaptation and intensity in projecting heat wave-related mortality." *Environmental research* 161 (2018): 464-471.

<sup>101</sup> National Council on Disability, May 4, 2023. *The Impacts of Extreme Weather Events on People with Disabilities*.  
<https://www.ncd.gov/assets/uploads/reports/2023/ncd-extreme-weather-2023.pdf>.

<sup>102</sup> Davis, Robert E., Paul C. Knappenberger, Patrick J. Michaels and Wendy M. Novicoff (2003) "Changing Heat-Related Mortality in the United States" *Environmental Health Perspectives* 111(14), pp. 1712-1718.  
<https://ehp.niehs.nih.gov/doi/abs/10.1289/ehp.6336>.

<sup>103</sup> Barreca A, Clay K, Deschenes O, Greenstone M, Shapiro JS. "Adapting to climate change: The remarkable decline in the US temperature-mortality relationship over the twentieth century." *Journal of Political Economy* 124.1 (2016): 105-159. <https://www.journals.uchicago.edu/doi/abs/10.1086/684582>.

clarification that such differences during extreme weather reflect household consumption patterns, not poverty-related pricing or billing practices.<sup>104</sup> In sum, the DOE Report's willful selective quoting and lack of context misrepresent the intent and conclusions of the referenced studies.

## **Global Impact of National Efforts**

1. **The DOE Report inaccurately and dangerously states that U.S. regulations are inconsequential in stopping global warming (Technical Comment).** Section 12.1 (page 129) of the DOE Report, "The scale problem," argues that U.S. regulations are inconsequential in stopping global warming: *"Consequently, any reduction in U.S. emissions would only modestly slow, but not prevent, the rise of global CO<sub>2</sub> concentration. And even if global emissions were to stop tomorrow, it would take decades or centuries to see a meaningful reduction in the global CO<sub>2</sub> concentration and hence human influences on the climate."* This view is in obvious disagreement with global pledges to reduce GHG emissions.<sup>105,106</sup> The fossil fuel-aligned and climate change denying authors argue that United States regulations alone will not dramatically decrease GHGs globally. This fails to acknowledge that U.S. regulations signal markets, accelerate clean technology development, lower costs through scale deployment, and change investment expectations worldwide.<sup>107</sup> While China has surpassed the U.S. as the largest annual emitter of GHGs, the U.S. still holds the top position for cumulative emissions since the pre-industrial era due to its long history of industrialization and high emissions. For instance, the "World in Data" shows that the U.S. has contributed the most to historical CO<sub>2</sub> emissions, with a share that dwarfs that of China.<sup>108</sup>
2. **The DOE Report incorrectly states that controlling GHG emissions will lead to negligible cooling by 2100 (Technical Comment).** Section 12.1 (page 129) of the DOE Report further argues that it is futile to control GHG emissions because cutting emissions will lead to negligible cooling by 2100. They base their argument on a single study: *"Lomborg (2016) estimated that full compliance with the initial commitments in the Paris Accord would not stop warming, it would only prevent about 0.1[°]C warming and delay hitting the baseline year 2100 temperature levels by about a decade."* In a comment to Lomborg

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<sup>104</sup> Doremus, Jacqueline M., Irene Jacqz, and Sarah Johnston. "Sweating the energy bill: Extreme weather, poor households, and the energy spending gap." *Journal of Environmental Economics and Management* 112 (2022): 102609.

<sup>105</sup> Paris Agreement, Article 2.1(a); UNFCCC, Article 2.

[https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf).

<sup>106</sup> CCAC, Global Methane Pledge, <https://www.globalmethanepledge.org/#pledges> (last visited Aug. 29, 2025).

<sup>107</sup> U.S. EPA, U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2022, EPA 430-R-24-004 (Apr. 2024), [https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf).

<sup>108</sup> Simon Evans (May 2021). Analysis: Which countries are historically responsible for climate change? - Carbon Brief. <https://www.carbonbrief.org/analysis-which-countries-are-historically-responsible-for-climate-change>.



(2016), Ward (2016)<sup>109</sup> highlights serious flaws in Lomborg's work. Ward (2016) argues that Lomborg (2016) only focuses on cumulative annual emissions during the period up to 2030 and not on assumptions that are made about the cumulative annual global emissions over the 70 years after 2030, which is unreasonable. Ward (2016) also argues that the emissions assumptions made by the Lomborg paper are so extreme that they far exceed the temperature projected in 'business as usual' scenarios and are therefore unrealistic.

3. **The DOE makes a flawed argument regarding the global warming impact of U.S. motor vehicle standards reducing CO<sub>2</sub> emissions (Technical Comment).** Section 12.2 (pages 129-130), "Case study: U.S. motor vehicle emissions," of the DOE Report singles out U.S. vehicle GHG regulations by attacking the U.S. EPA's 2009 Endangerment Finding focused on reducing CO<sub>2</sub> emissions from cars and light-duty trucks in the U.S. based on a scope issue, in other words, by arguing that the scope of such regulation is too small (only 3% of global energy-related CO<sub>2</sub> emissions): *"In 2022, the emissions from U.S. cars and light duty trucks totaled 1.05 billion metric tons of carbon dioxide (GtCO<sub>2</sub>, U.S. EPA 2024). Meanwhile global CO<sub>2</sub> emissions from energy use totaled 34.6 GtCO<sub>2</sub> (Energy Institute 2024). Hence U.S. cars and light trucks account for only 3.0 percent of global energy-related CO<sub>2</sub> emissions. To a first approximation we can say that even eliminating all U.S. vehicle-based emissions would retard the accumulation of CO<sub>2</sub> in the atmosphere by a year or two over a century."* While the DOE Report emphasizes the "small" 3% share of the global emissions from U.S. vehicles, it overlooks the broader context that the U.S. is the world's second largest emitter, responsible for over 10% of global energy-related CO<sub>2</sub> emissions.<sup>110</sup> By focusing narrowly on the vehicle sector, the DOE Report downplays the overall contribution of U.S. emissions and obscures the substantial cumulative impact of domestic regulations. Moreover, the DOE Report is misleading for several additional reasons.

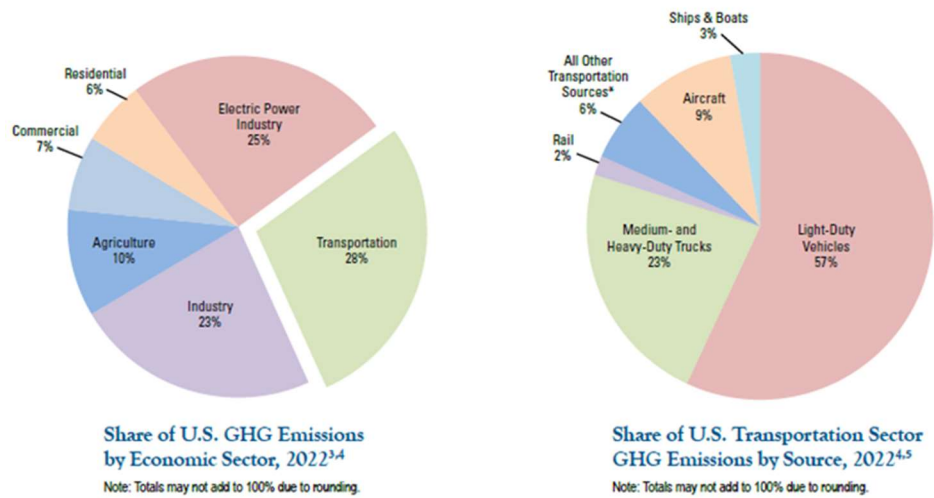
First, comparing the CO<sub>2</sub> share of U.S. vehicles to global CO<sub>2</sub> emissions from energy use is an apples-to-oranges comparison. In 2022, GHG emissions from transportation accounted for 28% of the entire GHG emissions in the U.S. (left panel below, Figure from U.S. EPA<sup>111</sup>). Light-duty vehicles account for about 57% of all transportation GHG emissions (right panel below). Therefore, GHG emissions from vehicles are, in fact, significant.

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<sup>109</sup> Ward, Robert ET. Comment on Impact of Current Climate Proposals by Bjorn Lomborg. No. 218. Grantham Research Institute on Climate Change and the Environment, 2015.

<sup>110</sup> IEA, Global Energy Review 2025, CO<sub>2</sub>, <https://www.iea.org/reports/global-energy-review-2025/co2-emissions> (last visited Aug. 29, 2025). See also IEA, Global Energy Review 2025 (Mar. 2025), <https://iea.blob.core.windows.net/assets/5b169aa1-bc88-4c96-b828-aaa50406ba80/GlobalEnergyReview2025.pdf>.

<sup>111</sup> U.S. EPA, Fast Facts on Transportation Greenhouse Gas Emissions, <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions> (last visited Aug. 29, 2025).



Second, it ignores cumulative effects. In fact, the average global temperature response to cumulative emissions is approximately linear (IPCC). Eliminating U.S. cars and light-duty truck emissions permanently means ~1 Gt/year less CO<sub>2</sub> every year. Over decades, that is tens of GtCO<sub>2</sub> avoided, reducing long-term atmospheric concentration and warming compared to business-as-usual.

Third, it is important to note that GHG emissions from passenger cars historically accounted for a larger share of GHG emissions in the U.S.<sup>112</sup> Even though in 2022 light-duty vehicles (LDV) accounted for around 57% of GHG emissions from the transportation sector, the fraction was closer to 65% in 1990. Because CO<sub>2</sub> is a cumulative pollutant, today's 3% contribution to global energy-related CO<sub>2</sub> emissions significantly underestimates the true historical role of LDVs in the cumulative atmospheric CO<sub>2</sub> burden.

Fourth, achieving the greatest benefits from cleaning GHG emissions from the transportation sector will require the generation of clean, affordable, and renewable energy. In fact, the levelized cost of electricity (LCOE) for Solar PV LCOE is already lower than natural gas combined-cycle LCOE on average and, in most regions, even without tax credits.<sup>113</sup> The DOE Report completely ignores the cascading GHG emissions reductions that can be achieved with a holistic strategy to decarbonize the transportation sector.

4. **The DOE Report fails to mention the substantial consumer benefits of motor vehicle standards (Technical Comment).** Section 12.2 (pages 129-130) of the DOE Report fails to mention the multiple fuel benefits associated with more stringent motor vehicle standards. Federal rules that encouraged the production of vehicles with higher fuel economy avoided

<sup>112</sup> U.S. EPA, U.S. Greenhouse Gas Inventory (2024), Chapter 3, <https://www.epa.gov/system/files/documents/2024-02/us-ghg-inventory-2024-chapter-3-energy.pdf>.

<sup>113</sup> U.S. Energy Information Administration Levelized Costs of New Generation Resources in the Annual Energy Outlook (2023) [https://www.eia.gov/outlooks/aeo/electricity\\_generation/pdf/LCOE\\_methodology.pdf](https://www.eia.gov/outlooks/aeo/electricity_generation/pdf/LCOE_methodology.pdf).



14 billion tons of GHG emissions from vehicles and saved consumers trillions of dollars in reduced fuel costs.<sup>114</sup>

Reducing gasoline consumption delivers multiple benefits, including enhanced U.S. energy security, lower exposure to global oil price shocks, and reductions in harmful upstream pollutants emitted by refineries and oil extraction that damage human health, ecosystems, and the global climate.<sup>115</sup>

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<sup>114</sup> Greene, David L., Judith M. Greenwald, and Rebecca E. Ciez. "US fuel economy and greenhouse gas standards: What have they achieved and what have we learned?" Energy Policy 146 (2020): 111783.

<sup>115</sup> Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027 and Beyond and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030 and Beyond. National Highway Traffic Safety Administration. Final Rule. Full version is obtained at: <https://www.federalregister.gov/documents/2024/06/24/2024-12864/corporate-average-fuel-economy-standards-for-passenger-cars-and-light-trucks-for-model-years-2027>.