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**Department of Energy, Energy Conservation Program: Energy Conservation
Standards for Commercial Refrigerators, Freezers,
and Refrigerator-Freezers; Notification of Data Availability
and Request for Comment
Docket Number EERE-2017-BT-STD-0007
89 FR 68,788
August 28, 2024**

Comment Submitted by the Competitive Enterprise Institute

I. Introduction

The Competitive Enterprise Institute is a policy and analysis organization committed to advancing the principles of free markets and limited government. For over 20 years, we have participated in rulemakings conducted by the Department of Energy (DOE) regarding energy and water conservation standards for home appliances. Most recently, we have submitted comments for proposed DOE rules targeting residential furnaces, stoves, dishwashers, washing machines, and water heaters. Each is incorporated by reference herein.¹

Our focus has been on ensuring that the consumer protections built into the underlying statute, the Energy and Policy Conservation Act of 1975 (EPCA), are given full weight by DOE in the rulemaking process.² In our view, these consumer protections have frequently been downplayed or ignored by the agency when setting excessively stringent appliance efficiency standards that raise overall costs and/or compromise product choice, features, performance, and reliability.

¹ Comments of Free Market Organizations to the Department of Energy, Energy Conservation Standards for Consumer Furnaces, Notice of Proposed Rulemaking, October 5, 2022, <https://cei.org/wp-content/uploads/2022/10/FurnaceComment-10-5-2022-final.pdf>; Comments of the Competitive Enterprise Institute to the Department of Energy, Energy Conservation Standards for Conventional Cooking Products, Notice of Proposed Rulemaking and Direct Final Rule, June 3, 2024, <https://cei.org/wp-content/uploads/2024/06/Stoves-Comment-5-30-2024.pdf>; Comments of Free Market Organizations to the Department of Energy, Energy Conservation Standards for Dishwashers, July 18, 2023, <https://cei.org/wp-content/uploads/2023/07/dishwashers-7-18-2023.pdf>; Comments of the Competitive Enterprise Institute and Michael Mannino to the Department of Energy, Energy Conservation Standards for Residential Clothes Washers, May 17, 2023, https://cei.org/regulatory_comments/comments-to-thedepartment-of-energy-on-its-proposed-clothes-washer-regulation/; Comments of Free Market Organizations to the Department of Energy, Energy Conservation Standards for Consumer Water Heaters, Notice of Proposed Rulemaking, September 26, 2024, <https://cei.org/wp-content/uploads/2023/09/WaterHeaters-9-2023.pdf>.

² 42 U.S.C. §6291 et seq.

In addition to questionable claims of net consumer benefits, DOE also includes the calculated climate change benefits as part of its justification for these appliance rules. In response, we have provided in each of our comments a critical assessment of these claimed benefits, which we believe have been greatly exaggerated by the agency. We have also noted that any such monetized climate benefits, regardless of amount, ought to play a limited role given EPCA's overriding emphasis on the direct consumer impacts of appliance standards.

But now, with the notification of data availability and request for comment for commercial refrigeration equipment at issue here, the agency is considering a major change in its methodology that would further inflate the climate benefits by at least three-fold. Our comment will focus on the problems with the current methodology and how the proposed change would make things worse.

II. DOE's Current Methodology for Calculating Climate Change Benefits Is Flawed

Using DOE's furnace rule as an example of its current methodology, the agency estimated \$16.2 billion dollars' worth of climate benefits, which the agency added to its claimed consumer benefits in justifying the rule.³ DOE arrived at this figure by calculating the reduced energy use attributable to the new efficiency standards and then estimating the amount of greenhouse gas emissions avoided as a result—mostly carbon dioxide emitted to produce electricity at coal or natural gas-fired power plants, as well as natural gas used directly in residences. It then multiplied the tons of emissions avoided by the estimated per unit dollar cost to society of such emissions.

Prior to the notice of data availability and request for comment at issue here, DOE relied upon the Interagency Working Group's February 2021 technical support document providing interim estimates of the social cost of greenhouse gases (IWG 2021).⁴ IWG 2021 provided the agency with per ton estimates of the social cost of carbon (SC-CO₂), methane (SC-CH₄), and nitrous oxide (SC-N₂O)—collectively, the social cost of greenhouse gases (SC-GHG).⁵

There are numerous flaws with IWG 2021, nearly all of which serve to overstate the calculated benefits of avoided emissions. Among them are the use of improperly low discount rates, reliance on climate models that have consistently overstated actual warming, reliance on baseline emission scenarios that implausibly assume an increasingly coal-centric global energy system through 2100 and beyond, and the downplaying of the capacity for adaptation to mitigate climate impacts. Other questionable assumptions, such as the inclusion of claimed climate benefits out to the year 2300 and the use of global rather than national benefits, further inflate the end results.

³ Department of Energy, "Energy Conservation Program: Energy Conservation Standards for Consumer Furnaces," 88 FR 87,502, (December 18, 2023), <https://www.federalregister.gov/documents/2023/12/18/2023-25514/energy-conservation-program-energy-conservation-standards-for-consumer-furnaces>.

⁴ *Id.*, at 87613-7.

⁵ IWG, *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide, Interim Estimates under Executive Order 13990*, February 2021, https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

In our furnace rule comment, CEI documented these limitations and concluded that the calculations of the social cost of greenhouse gas emissions are far too speculative and assumption-driven to have any real policy value and that they were clearly being misused in support of an aggressive regulatory agenda.⁶ Indeed, we noted that if more reasonable assumptions were substituted for those used in IWG 2021, the climate damage estimates plummet and in some scenarios become negative—in other words, the improvements in agricultural activity attributable to increases in ambient carbon dioxide can exceed any modest harms.⁷

III. The Proposed Methodological Change Would Make Things Worse

Relying on IWG 2021 was bad enough, but in the latest notice regarding commercial refrigeration equipment at issue here, DOE is switching to a 2023 version of SC-GHG provided by the Environmental Protection Agency (EPA 2023).⁸ DOE states that this new way of quantifying the social cost of greenhouse gas emissions would “reflect the best available scientific and analytical evidence and methodologies,” and thus is the most appropriate one to use going forward.⁹

Discarding the IWG’s Inflated Emission Baselines

In one respect the EPA’s methodology is better than the IWG’s. Since 2010, the IWG has been using a baseline emission projection that was dubious from the get-go, increasingly out of touch with market and policy reality, and wildly inflated by the 2020s. EPA 2023 replaced the old baseline trajectory with a more realistic baseline.

Specifically, the IWG estimated social cost of carbon (SCC) values using an average of five emissions trajectories. Four are no-policy emission scenarios from a 2009 Stanford Energy Modeling Forum study known as EMF-22.¹⁰ Each plots socioeconomic development and emissions from 2000 to 2100. The fifth is a policy future, added by the IWG, in which CO₂ concentrations stabilize at 550 parts per million (ppm) in 2100.¹¹ The IWG then extended the five trajectories out to the year 2300, and in an almost comical manner.

⁶ CEI Furnace Comment, pp. 5-12.

⁷ See, Kevin Dayaratna, Ross McKittrick, Patrick Michaels, “Climate sensitivity, agricultural productivity and the social cost of carbon in FUND,” *Environmental Economics and Policy Studies*, Vol. 22, pp. 433-448, (2020), <https://link.springer.com/article/10.1007/s10018-020-00263-w>.

⁸ EPA, *Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances*, November 2023, https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf.

⁹ 89 FR 68,801.

¹⁰ Leon Clarke et al. 2009. International climate policy architectures: Overview of the EMF 22 International Scenarios. *Energy Economics* Volume 31, Supplement 2, S64-S81, <https://www.sciencedirect.com/science/article/pii/S0140988309001960?via%3Dihub>.

¹¹ Interagency Working Group on the Social Cost of Carbon (IWG), *Technical Support Document: - Social Cost of Carbon Regulatory Impact Analysis under Executive Order 12886*, February 2010, pp. 15-16, https://www.epa.gov/sites/default/files/2016-12/documents/scc_tsd_2010.pdf.

Lacking socioeconomic scenarios for the 22nd and 23rd centuries, the IWG made the more-or-less arbitrary assumption that whatever rates of carbon intensity decline¹² were projected for 2090-2100 in the five trajectories would hold constant over the next 200 years.¹³ In other words, the extensions implicitly assume no technological breakthroughs such as might dramatically accelerate rates of carbon intensity decline.

The IWG did not report the total quantity of emissions in each of the five trajectories over the 300-year analysis period or provide any sort of context to assess their realism. Fortunately, the Electric Power Research Institute (EPRI) did just that in a 2014 technical review of the IWG’s 2010 and 2013 TSDs. EPRI toted up the emissions and compared those quantities to total potential CO₂ emissions in the world’s estimated fossil fuel reserves.¹⁴

Table 4-6
Cumulative fossil and industrial CO₂ emissions in the USG assumptions and estimated fossil fuel reserves

	Cumulative CO ₂ emissions (GtCO ₂)	
	By 2200	By 2300
USG1	11,207	16,741
USG2	20,024	33,023
USG3	8,113	10,864
USG4	14,092	20,504
USG5	3,691	4,843
Estimated reserves (GtCO ₂)	3,674 - 7,113	

Source: EPRI (2014).

The IWG’s baseline is the average of five emission trajectories (USG1-USG5) with gigatons of CO₂ emissions held constant from 2100 to 2300 and compared to estimated fossil fuel reserves.

Cumulative emissions in the five trajectories average out to 17,195 GtCO₂—roughly 2.4 to 4.6 times estimated fossil fuel reserves. That should have raised eyebrows even in 2010. To produce emission totals that high, the same governments that negotiated the Kyoto Protocol in 1997 and Copenhagen Agreement in 2009 would have to abandon “climate action” for almost three centuries and make burning fossil fuels a global priority. It was a fanciful construct.

The IWG’s 2016 TSD¹⁵ did not address or even acknowledge EPRI’s 2014 critique, and the 2021 TSD was silent about the baselines’ reasonableness (or lack thereof).

¹² Carbon intensity defined as the amount of CO₂ emitted per unit of GDP.

¹³ IWG, 2010 TSD, p. 43.

¹⁴ EPRI, Understanding the Social Cost of Carbon: A Technical Assessment, Section 4, pp.14-15, October 2014, <https://www.epri.com/research/products/3002004657> (hereafter EPRI 2014).

¹⁵ IWG, *Technical Support Document: - Technical Update of the Social Cost of Carbon for Regulatory Analysis under Executive Order 12866*, August 2016, https://www.epa.gov/sites/default/files/2016-12/documents/sc_co2_tsd_august_2016.pdf.

Several scholars, notably Roger Pielke, Jr., Justin Ritchie, and Hadi Dowlatabadi, documented the increasing unrealism of “return to coal” emission scenarios. Prominent examples of such unrealistic baselines include RCP8.5, which served as the “reference case” or “business-as-usual” scenario for the 2013-2014 Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC), the IPCC’s 2018 Special Report on Global Warming of 1.5°C, and the 2017-2018 Fourth National Climate Assessment (NCA4) of the U.S. Global Change Research Program (USGCRP); SSP5-8.5, the most frequently cited scenario in the 2021-2022 IPCC Sixth Assessment Report (AR6); and the IWG scenarios labeled USG1, USG2, and USG4 (see EPRI table above).¹⁶

NOTE ON TERMINOLOGY

RCP stands for Representative Concentration Pathway. An RCP is an estimate of the future GHG emissions and atmospheric concentrations required to achieve a specific “radiative forcing” by 2100. SSP stands for Shared Socioeconomic Pathway. An SSP is a baseline socioeconomic development scenario that achieves a specific forcing by 2100. Radiative forcing is the imbalance, measured in watts per square meter (W/m²), between incoming short-wave solar radiation and outgoing longwave infrared radiation. Thus, in both RCP8.5 and SSP5-8.5, the rise in greenhouse gas concentration by 2100 adds 8.5W/m² of warming pressure compared to the pre-industrial climate.

In 2022, Resources for the Future published updated emission baselines for the 21st century and beyond based on recent market trends, updated technology assessments, and the proliferation of adopted and pledged climate policies.¹⁷

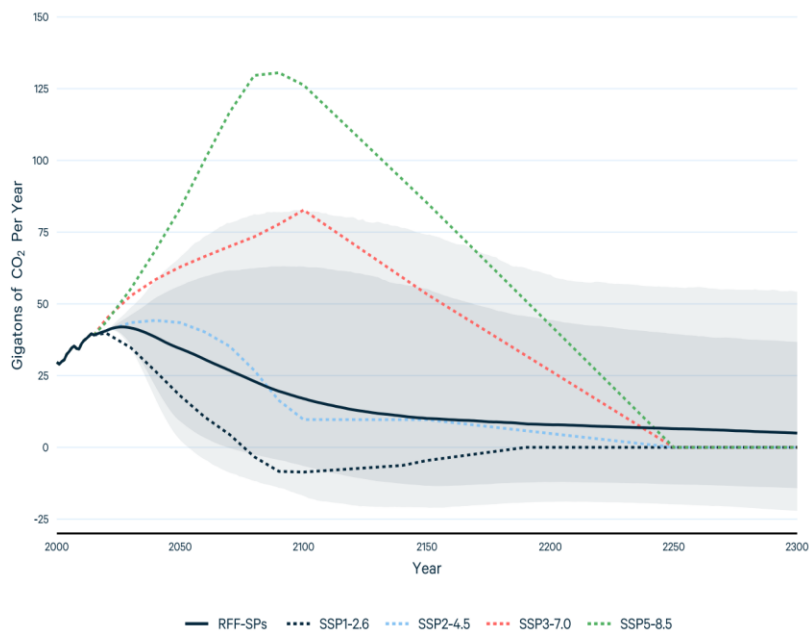
Briefly, in the new RFF 21st century baseline, CO₂ emissions are less than half those projected by SSP5-8.5 for 2050, and less than one-fifth those projected for 2100.¹⁸

¹⁶ Roger Pielke, Jr. and Justin Ritchie, “How Climate Scenarios Lost Touch with Reality,” *Issues in Science & Technology*, Vol. XXXVII, No. 4, Summary 2021, <https://issues.org/climate-change-scenarios-lost-touch-realitypielke-ritchie/>; Justin Ritchie and Hadi Dowlatabadi, The 1,000 GtC Coal Question: Are Cases of High Future Coal Combustion Plausible? Resources for the Future, RFF DP 16-45, 2016, <https://media.rff.org/documents/RFF-DP-16-45.pdf>; Justin Ritchie and Hadi Dowlatabadi. 2017. Why Do Climate Change Scenarios Return to Coal? *Energy* 140: 1276-1291, <https://www.sciencedirect.com/science/article/abs/pii/S0360544217314597>; Roger Pielke, Jr., “The Biden Administration Abandons RCP8.5,” *The Honest Broker*, February 17, 2023, <https://rogerpielkejr.substack.com/p/the-biden-administration-abandons>.

¹⁷ Kevin Rennert et al. 2022. *The Social Cost of Carbon: Advances in Long-Term Probabilistic Projections of Population, GDP, Emissions, and Discount Rates*. Resources for the Future, <https://www.rff.org/publications/working-papers/the-social-cost-of-carbon-advances-in-long-term-probabilistic-projections-of-population-gdp-emissions-and-discount-rates/>.

¹⁸ Rennert et al. (2022), p. 24.

Figure 8. Net Annual Emissions of CO₂ from RFF-SPs and SSPs

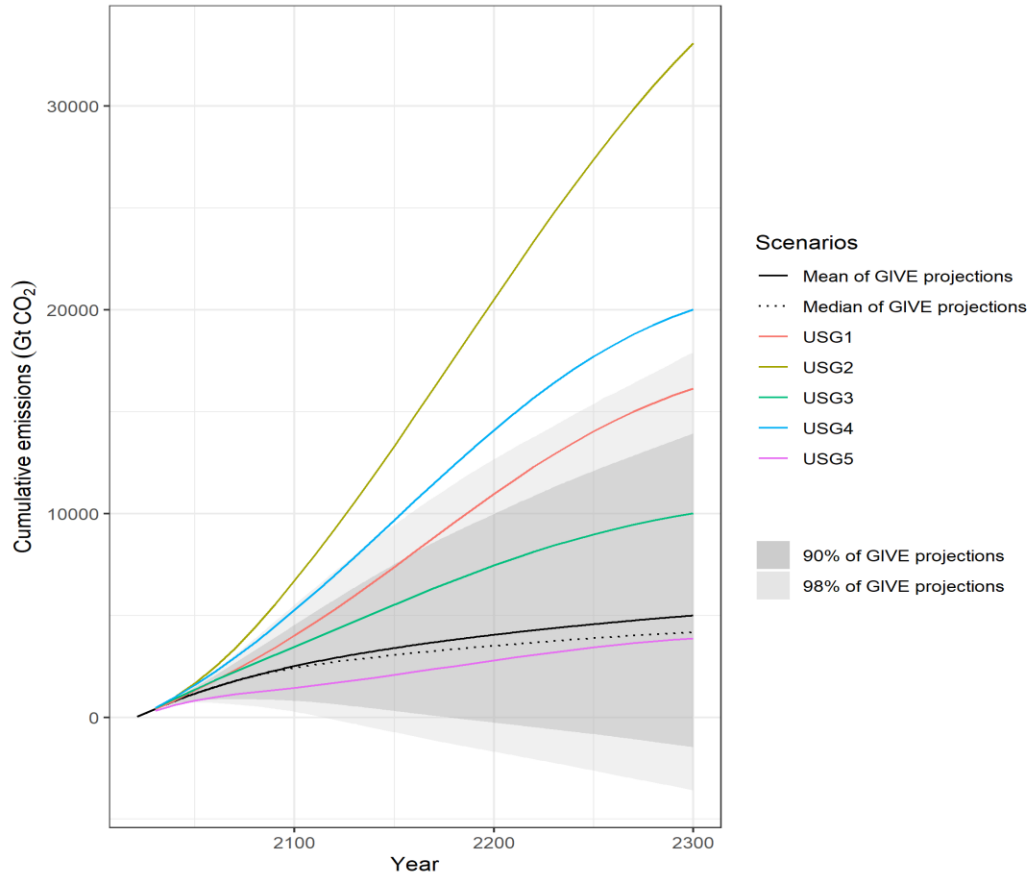


Notes. Lines represent median values, and dark and light shading represent the 5th to 95th (darker) and 1st to 99th (lighter) percentile ranges of the RFF-SPs.

Upon request, RFF lead author Kevin Rennert created a chart comparing the updated baselines to the IWG baselines. The EPA regards the RFF baselines as the most accurate available and uses them in its November 2023 SC-GHG report.¹⁹

Comparing the RFF and IWG baselines spotlights the implausibility of the latter. The RFF baselines for 2000-2300 (labeled “GIVE” in the chart below) project less than one-third of the CO₂ emissions previously assumed in the IWG’s 2010, 2013, 2016, and 2021 TSDs.

¹⁹ EPA (2023), Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances, pp. 23-26.



Source: Kevin Rennert. *The mean projection of GIVE in 2300 is 5,000 GtCO₂—less than one-third of the USG1-5 mean of 17,195 GtCO₂.*

So far, so good. The EPA’s reboot of federal SC-GHG estimation adopts more realistic emission scenarios. The EPA 2023 baseline projects less than one-third the total quantity of CO₂ emissions as the old IWG baseline.

Less-Is-More Social Cost Paradox

Yet the EPA now projects much greater social damage from each ton of CO₂ emitted. For example, in the 2021 IWG central estimate (3% discount rate), the SCC in 2050 is \$85/ton. In the EPA 2023 central estimate (2% discount rate), the SCC in 2050 is \$310/ton. The EPA’s “updated” central estimate is more than three times larger than the IWG’s 2021 estimate.

Table ES-1: Social Cost of CO₂, 2020 – 2050 (in 2020 dollars per metric ton of CO₂)³

Emissions Year	Discount Rate and Statistic			
	5% Average	3% Average	2.5% Average	3% 95 th Percentile
2020	14	51	76	152
2025	17	56	83	169
2030	19	62	89	187
2035	22	67	96	206
2040	25	73	103	225
2045	28	79	110	242
2050	32	85	116	260

Table 3.1.1: Social Cost of Carbon (SC-CO₂) by Damage Module, 2020-2080 (in 2020 dollars per metric ton of CO₂)

Emission Year	Near-Term Ramsey Discount Rate and Damage Module								
	2.5% Near-Term Rate			2.0% Near-Term Rate			1.5% Near-Term Rate		
	DSCIM	GIVE	Meta-Analysis	DSCIM	GIVE	Meta-Analysis	DSCIM	GIVE	Meta-Analysis
2020	110	120	120	190	190	200	330	310	370
2030	140	150	150	230	220	240	390	350	420
2040	170	170	170	280	250	270	440	390	460
2050	210	200	200	330	290	310	500	430	520
2060	250	220	230	370	310	350	550	470	570
2070	280	240	250	410	340	380	600	490	610
2080	320	260	280	450	360	410	640	510	650

This ‘much worse than we thought’ conclusion from a ‘much better than we expected’ emissions trajectory is highly paradoxical. The most basic idea in SCC analysis is that the damage from the next ton of emissions chiefly depends on the cumulative quantity of tons previously emitted. That basic idea is the reason SCC estimates increase from decade-to-decade and even year-to-year. It is the reason “climate change mitigation” and “emissions mitigation” are interchangeable phrases.

To infer dramatically higher per-ton social costs from dramatically smaller quantities of total emissions is one of those surprising analytic outcomes that demands a clear explanation. Far from explicating this paradox, the EPA’s 170-page report does not even acknowledge it.

RCP8.5 ‘Secret Sauce’

EPA 2023 uses “transparent” and similar forms of the word 14 times to describe its new social cost methodology. However, the report contains nothing like a table, chart, or paragraph explaining which factors contribute what percentage of the more than threefold increase in social cost—despite the more than two-thirds reduction in emission baselines.

One factor contributing to the higher SCC values is the EPA’s reduction of the central discount rate for estimating the present value of future climate benefits from 3 percent to 2 percent.²⁰ However, that is not the main factor, as can be seen from comparing the two tables above.

When discounted at 2.5 percent, the SCC in 2050 is \$116/ton in the IWG’s calculation and \$200-210/ton in the EPA’s calculation. The EPA’s SCC estimate is 73-84 percent higher, even when both are discounted at the same rate.

In early December 2023, science writer Roger Pielke, Jr. identified RCP8.5 as the “secret sauce” in the EPA’s updated SCC. Although the EPA abandoned RCP8.5 as a baseline emission scenario, the Agency now relied on three damage functions “based on RCP8.5 and not EPA’s emissions scenarios or climate projections.”²¹

By damage function, the EPA means a computer code that “translate[s] changes in temperature and other physical impacts of climate change into monetized estimates of net economic damages.”²² Despite the EPA’s switch to more realistic baselines, each damage function selected by the EPA assumes that an incremental ton of emissions causes the same amount of warming and social damage as modelers might project under RCP8.5.

For example, the Data-driven Spatial Climate Impact Model (DSCIM) damage function developed by the Climate Impact Lab²³ incorporates RCP8.5 mortality damages from an increase in global warming of 10°C by 2100. As Pielke commented, no one thinks that warming projection is remotely plausible.²⁴

Citing Carleton et al. (2022),²⁵ Pielke further observes that “More than 75 percent of the DSCIM SCC results from mortality due to extreme heat, driven by RCP8.5.” Labor losses, which are the second-largest portion of SCC damages, are “also based on RCP8.5.”

Nor is that all. Pielke, Jr. finds that the EPA has combined the forcing trajectory of RCP8.5 with the socioeconomic storyline of SSP3. The latter is a scenario in which investments in education and technology “decline” and economic growth is “slow.” Only in SSP5, a world prioritizing “technological progress and development of human capital as the path to sustainable

²⁰ For two decades, the Office of Management and Budget (OMB) recommended using discount rates of 3 percent and 7 percent in regulatory benefit-cost analysis. See OMB, Circular A-4, September 13, 2003, <https://obamawhitehouse.archives.gov/omb/circulars/a004/a-4/>. Defying OMB, the IWG used discount rates ranging from 2.5 percent to 5 percent. OMB’s updated Circular A-4 approves the use of 2 percent as the central discount rate. See OMB, No. A-4, November 9, 2023, p. 76, <https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-4.pdf>.

²¹ Roger Pielke, Jr., “Secret Sauce: You’ll Never Guess What Drives the Biden Administration’s Social Cost of Carbon,” December 4, 2023, <https://rogerpielkejr.substack.com/p/secret-sauce>.

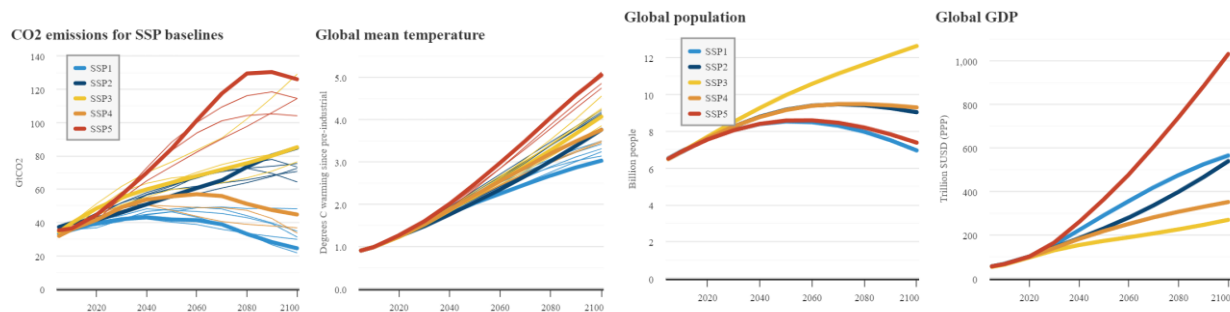
²² EPA. 2023. *Report on the Social Cost of Greenhouse Gases*, p. 45.

²³ Climate Impact Lab, Data-driven Spatial Climate Impact Model (DSCIM), <https://impactlab.org/research/data-driven-spatial-climate-impact-model-user-manual-version-092023-epa/> (accessed September 3, 2024).

²⁴ Pielke, *supra* note 21.

²⁵ Carleton et al. 2022. Labor Disutility in a Warmer World: The Impact of Climate Change on the Global Workforce, SSRN, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4221478.

development,”²⁶ do emissions increase to the point of creating a radiative imbalance of 8.5 W/m². In SSP3, global per capita income is \$20,000 per year in 2100. In SSP5, global per capita GDP is almost \$140,000. The SSP5 world has much higher emissions than the SSP3 world but also much greater wealth and adaptive capabilities.



Source: *Carbon Brief. CO2 emissions are in gigatons.*

In short, EPA 2023’s SCC estimates derive from a wildly implausible amalgam of SSP3 social vulnerability and SSP5 emissions. That is not science. It is not even good science fiction, as the hybrid storyline is internally incoherent.²⁷

IV. Conclusion

Even if accurate, SCC values should play no role in either regulatory justification or net-benefits analysis. The climate change mitigation resulting from DOE’s projected emission reductions are too small for scientists to detect or for people and other living things to experience. Non-verifiable, non-experiential effects are “benefits” in name only. Such conjectural effects do not belong in the same scales with verifiable economic impacts on specific businesses and consumers.

The mere fact that official federal agency SCC estimates—purportedly a measure of cumulative climate damages over centuries—could increase more than threefold in just three years is evidence that SCC analysis is too speculative, too prone to user manipulation, and too reliant on dubious assumptions to either justify regulatory decisions or estimate their net benefits to the public.

In 2013, MIT professor Robert Pindyck cautioned that agencies’ use of social damage calculation models “suggests a level of knowledge and precision that is simply illusory and can be highly misleading.”²⁸ The EPA’s reboot of the IWG’s analysis gives no reason to modify Pindyck’s assessment. Indeed, it strengthens it.

²⁶ Carbon Brief, *Explainer: How ‘Shared Socioeconomic Pathways’ explore future climate change*, April 19, 2018, <https://www.carbonbrief.org/explainer-how-shared-socioeconomic-pathways-explore-future-climate-change/>.

²⁷ Roger Pielke, Jr., “Public Health and Climate Change: How to be an informed consumer in public discussions of climate change,” *Substack*, April 24, 2023, <https://rogerpielkejr.substack.com/p/public-health-and-climate-change>.

²⁸ Robert S. Pindyck, *Climate Change Policy: What Do the Models Tell Us?* Working Paper 19244, National Bureau of Economic Research, July 2013, https://www.nber.org/system/files/working_papers/w19244/w19244.pdf.

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