

Testimony of Dr. Mark Paul

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Chairman Fallon, Ranking Member Bush, and members of the subcommittee, thank you for inviting me to testify today. My name is Mark Paul. I am an Assistant Professor of Economics at Rutgers University, a member of the Rutgers University Climate Institute, and a fellow of the Climate and Community Project, a think tank developing cutting-edge research at the climate and inequality nexus. I received a PhD in economics from the University of Massachusetts Amherst. My research agenda concerns economic and climate policy, in particular the economic and distributional impacts of different pathways to achieve deep decarbonization in the United States. My testimony today is based on that research, and the views I will share with you are my own.

Climate change is the greatest crisis humanity has faced. It poses an existential threat to the wellbeing of the American people and to the strength and stability of the American economy. And it is a threat we have to deal with *now*. The planet has already warmed by 1.1°C above pre-industrial averages and is on pace to warm by 1.5°C by as early as 2030. If we continue with “business as usual,” the planet will be on track to warm by an estimated 3°C by the end of the century.¹ The effects of this level of warming would be catastrophic, rendering large swaths of the Southeast uninhabitable, and causing **catastrophic** damage to the economic and physical security of the United States. At the same time, recent price spikes in energy fueled by Russia’s invasion of Ukraine and geopolitical instability highlight the need to rapidly transition to a clean energy economy to protect American consumers and achieve our shared goals for economic prosperity and energy independence. It is crucial to recognize that the United States already has the tools at its disposal not

¹ Nina Chestney and Chung Jane, “Temperatures to Rise 1.5 Degrees Celsius by 2030-2052 Without Rapid Steps - U.N. Report,” *Reuters*, October 8, 2018, <https://www.reuters.com/article/climatechange-ipcc-idUSL8N1WM0JJ>; Climate Change 2022: Mitigation of Climate Change. Summary for Policymakers. Intergovernmental Panel on Climate Change. https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf

only to mitigate the worst effects of the climate crisis, but to equitably decarbonize the economy in ways that protect workers, consumers, and frontline communities while, indeed, building a stronger, more prosperous, and more stable economy.

My testimony today will focus on three key points.

First, the economic costs of inaction are substantially *larger* than the cost of rapidly and equitably decarbonizing the economy.

Second, the evidence is clear that an investment-led decarbonization effort, as is being undertaken following the passage of the Inflation Reduction Act, will *create millions of good jobs, strengthen the economy of the United States, and lower energy costs for consumers.*

And third, decarbonizing the economy will *bolster domestic energy security and reduce inflationary pressures* associated with volatile fossil fuel prices, thus promoting economic and national security goals. Indeed, *high energy prices are not the result of the energy transition, but rather are being fueled by a combination of international conflict and profiteering by big oil.*

I begin with the costs of inaction. Climate change is not a problem for future generations—it is a clear and present danger to American lives and livelihoods. In 2017, for example, costs from extreme weather and climate events ran to over \$300 billion, *biting off more than half of economic growth that year.* Over the last five years, more intense weather events have caused \$742 billion in damage, nullifying a substantial portion of economic growth. And the frequency and intensity of these storms, along with the economic pain and loss of life they herald, are expected to grow as global warming continues.^{2,3}

² <https://www.climate.gov/news-features/blogs/beyond-data/2021-us-billion-dollar-weather-and-climate-disasters-historical>

³ The Congressional Budget Office estimates that federal spending on hurricane relief and recovery alone is projected to increase 33% faster than growth in the economy through 2075. “Potential Increases in Hurricane Damage in the United States: Implications for the Federal Budget.” <https://www.cbo.gov/publication/51518>

The costs of “business as usual” are enormous. Failing to limit global warming to 1.5–2°C above pre-industrial levels—as promised under the Paris Agreement—would mean unprecedented economic and human disasters. The U.S. Global Change Research Program estimates that climate change, if unabated, will permanently reduce economic growth, leaving the economy 4-5% smaller—a number that I believe to be quite conservative.⁴ Peer-reviewed scientific research studies demonstrate that limiting warming to such levels necessitates no new fossil fuel extraction, and a phased wind-down of existing extracting.⁵ In a world that is 3°C warmer than pre-industrial levels, recent studies estimate that we are looking at a 10% reduction in GDP—though this too may be an underestimate, given that an unstable and increasingly uninhabitable planet undermines *all* economic activity.⁶ Moreover, these are not one-time costs, but costs that will be incurred year after year due to the permanent nature of harm caused by a heating world.

The physical and economic damage fueled by climate change will not be felt equally. Indeed, it will exacerbate inequality, posing the greatest threat to those least able to bear it: low-income households, communities of color, and residents of the American Southeast. Economic losses will result from an array of causes: the destruction of physical assets as coastlines are inundated and wildfires run rampant; reduced worker and agricultural productivity as drought and extreme weather events damage crops and the heat keeps humans from working safely outdoors; rising morbidity and mortality as deadly storms and air pollution continue to intensify; and an increasingly unstable world as warming-induced violence forces hundreds of millions globally to flee their homes.⁷ It is for this

⁴ Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, U.S. Global Change Research Program, Accessed November 4, 2021, <https://nca2018.globalchange.gov/>.

⁵ Trout, Kelly, Greg Muttitt, Dimitri Lafleur, Thijs Van de Graaf, Roman Mendelevitch, Lan Mei, and Malte Meinshausen. "Existing fossil fuel extraction would warm the world beyond 1.5 C." *Environmental Research Letters* 17, no. 6 (2022): 064010. For a discussion of policies to facilitate a wind-down of fossil fuel extraction, see Mark Paul and Lina Moe, *An Economist's Case for Restrictive Supply Side Policies: Ten Policies to Manage the Fossil Fuel Transition*. 2023. Climate and Community Project.

https://www.climateandcommunity.org/files/ugd/d6378b_6f4e6bc38aa74051ac435c1fe9d96624.pdf

⁶ Howard, Peter H., and Thomas Sterner. "Few and not so far between: a meta-analysis of climate damage estimates." *Environmental and Resource Economics* 68, no. 1 (2017): 197-225; Hänsel, Martin C., Moritz A. Drupp, Daniel JA Johansson, Frikk Nesje, Christian Azar, Mark C. Freeman, Ben Groom, and Thomas Sterner. "Climate economics support for the UN climate targets." *Nature Climate Change* 10, no. 8 (2020): 781-789.

⁷ Hsaing et al. "Estimating economic damage from climate change in the United States" *Science* 356, no. 6345 (June 2017): 1362-69; Martinich, Jeremy and Allison Crimmins. "Climate damages and adaptation potential across diverse sectors of the United States." *Nature climate change* 9, no. 5 (2019): 397-404; <https://openknowledge.worldbank.org/handle/10986/36248>

reason that the Pentagon calls climate change a “threat multiplier” and why Treasury Secretary Yellen has described it as the biggest emerging risk to the U.S. financial system.^{8 9}

The longer climate action is delayed, the more these dire economic costs will mount. Waiting just one additional decade to act, rather than starting now, will drive up the costs associated with decarbonization by 40-70%, which amounts to well over \$3 trillion in additional costs.¹⁰ A failure to rapidly reduce emissions will also contribute to a greater likelihood of an acute, climate-linked economic crisis. This is especially true for the US financial system, as U.S. banks are the primary financiers of global fossil fuels, and therefore are heavily exposed to risks from holding stranded assets.¹¹

The combustion of fossil fuels is not only driving climate change: it is also a major driver of morbidity and mortality globally as well as right here in the United States. The World Health Organization recently concluded that air pollution is “the single largest environmental threat to human health and well-being.”¹² Every year air pollution—primarily generated through combusting fossil fuels—is responsible for 250,000 premature deaths in the United States. Globally, air pollution from fossil fuels is responsible for nearly 1-in-5 deaths. All told, air pollution kills about 20 times as many people as war, murder, and terrorism combined. That’s ten million premature deaths a year globally that can be prevented by decarbonizing across economies.¹³

Turning to my second point, enacting green investments and regulations at adequate pace and scale can ensure the United States does not suffer the deadly and economically costly outcomes of unabated climate change. In fact, these investments will bring jobs, economic activity, and stability to the American people. Drastically reducing GHG emissions in the United States, would provide

⁸ Victoria Gudia, “Janet Yellen: Climate change poses ‘existential threat’ to financial markets,” *Politico*, March 31, 2021 <https://www.politico.com/news/2021/03/31/yellen-climate-change-fsoc-478769#:~:text=Treasury%20Secretary%20Janet%20Yellen%20on,guard%20against%20its%20harmful%20effects.>

⁹ <https://history.defense.gov/Portals/70/Documents/quadrennial/QDR2014.pdf?ver=tXH94SVvSQLVw-ENZ-a2pQ%3d%3d>

¹⁰ https://energyinnovation.org/wp-content/uploads/2021/01/Cost_of_Delay.pdf; <https://voxeu.org/article/cost-delaying-action-stem-climate-change-meta-analysis#fn>

¹¹ Since the Paris Agreement was signed, the world largest 60 banks have agreed to finance over \$4.6 trillion in fossil fuel investments, thus generating more assets that will eventually become stranded assets, creating further economic instability. https://www.ran.org/wp-content/uploads/2022/03/BOCC_2022_vSPREAD.pdf; <http://priceofoil.org/2021/03/24/banking-on-climate-chaos-2021/>

¹² <https://apps.who.int/iris/bitstream/handle/10665/345329/9789240034228-eng.pdf?sequence=1&isAllowed=y>

¹³ <https://www.sciencedirect.com/science/article/abs/pii/S0013935121000487>

upwards of \$700 billion in benefits per year domestically from improved health and labor productivity alone, enough to more than offset the cost of the transition. And that is to say nothing of the moral imperative to save lives.¹⁴

It is true that decarbonization will require substantial investments, of which the Inflation Reduction Act has made a sizable down payment. Transitioning to a green economy will be a significant undertaking, requiring upwards of 3-4% of GDP per year in investment until the economy is decarbonized. That investment will go toward building out solar and wind power; decarbonizing and improving the energy efficiency of America's buildings, which account for 40% of energy use; and decarbonizing the transportation sector, the largest emitting sector in the economy. All this economic activity creates good jobs and revitalizes manufacturing for the American people.

The benefits of the energy transition are substantially larger than the costs of inaction. Research by scholars at Stanford and the National Bureau of Economic Research found that just in GDP terms—which, in the context of preserving the very habitability of the planet, is an extraordinarily narrow measure to use—would bring trillions in economic benefits.¹⁵ Yes, a rapid buildout of clean and renewable energy will require substantial investment, but *those investments are not fueling inflation*. Instead, this undertaking will further ensure that the transition to a green economy will create an economic boom—one that will leave the economy, and the American people, substantially better off.

Decarbonization is an *opportunity* for the U.S. economy—estimates find it will create upwards of 25 million new jobs in the next fifteen years alone.¹⁶ New jobs will be created to upgrade the nation's crumbling infrastructure; build out a clean and renewable energy system; increase energy efficiency throughout the economy; upgrade water systems to ensure all safe drinking water; and much more.

¹⁴ Drew Shindel, Testimony to the House Committee on Oversight and Reform Hearing on “The Devastating Impacts of Climate Change on Health,” Aug 5, 2020, <https://oversight.house.gov/sites/democrats.oversight.house.gov/files/Testimony%20Shindell.pdf>.

¹⁵ Burke, Marshall, W. Matthew Davis, and Noah S. Diffenbaugh. "Large potential reduction in economic damages under UN mitigation targets." *Nature* 557, no. 7706 (2018): 549-553.

¹⁶ <https://www.rewiringamerica.org/jobs-report>

The green economy is already taking off. In fact, jobs in solar and wind comprise two of the five fastest growing occupations in America. Clean energy projects produce three times more jobs per dollar invested and two times as much economic activity compared to the fossil fuel sector.^{17 18} The transition off of fossil fuels represents a tremendous economic opportunity, one that will reinvigorate manufacturing in the United States and generate high-quality domestic union jobs.¹⁹ It can be key to revitalizing the American manufacturing sector and building energy independence, developing American-made turbines, batteries, electric vehicles, and more.²⁰

Taking action now on energy transition will position the United States to maintain its global leadership in energy, further solidifying America's prominent role in the global 21st century economy. Simply put, these are investments in America's future, investments that will leave the economy on substantially stronger footing for current and future generations.

Climate action will be instrumental in lowering utility and transportation costs—among others—for consumers, thus disproportionately benefiting low-income households and reducing energy insecurity across the nation. A recent study out of the University of California, Berkley finds that the electricity grid can reach 90% clean energy by 2035 with no additional costs to consumers.²¹ But when this is coupled with investments in energy efficiency—investments which substantially reduce a household's energy needs—households will save money on their monthly energy bills.²² Other studies, such as those conducted by Rewire America, estimate that decarbonization could help the

¹⁷ <https://www.americanprogress.org/article/clean-energy-investment-creates-jobs-in-every-state/#:~:text=Clean%20energy%20creates%20jobs%20across,that%20people%20work%20in%20today.>

¹⁸ Batini, Nicoletta, Mario Di Serio, Matteo Fragetta, Giovanni Melina, and Anthony Waldron. "Building back better: How big are green spending multipliers?." *Ecological Economics* 193 (2022): 107305.

<https://www.sciencedirect.com/science/article/pii/S0921800921003645#:~:text=The%20point%20estimates%20of%20the,depending%20on%20horizon%20and%20specification.>

¹⁹ Robert Pollin and Shouvik Chakraborty, "Job Creation Estimates Through Proposed Economic Stimulus Measures" Political Economy Research Institute (PERI) Working Paper, Amherst, Mass, April 21, 2020.

<https://www.peri.umass.edu/component/k2/item/1297-job-creation-estimates-through-proposed-economic-stimulus-measures>, accessed June 21, 2021. The upper end includes direct, indirect, and induced jobs. Jobs are for "job years."

²⁰ https://www.climateandcommunity.org/_files/ugd/d6378b_9f3331a1be9346b8b18fc8b7a1b37c47.pdf

²¹ <https://gspp.berkeley.edu/faculty-and-impact/news/recent-news/the-us-can-reach-90-percent-clean-electricity-by-2035-dependably-and-without-increasing-consumer-bills>

²²The Net Zero study, out of Princeton, finds that the nation can reach net zero by 2050, without any substantial increase in consumer costs, but with substantial benefits in employment across the energy sector.

https://netzeroamerica.princeton.edu/img/Princeton_NZA_Interim_Report_15_Dec_2020_FINAL.pdf

average American save between \$1,050 and \$2,585 per year on their energy bills, all while bringing immense health, safety, and employment benefits to the nation.²³

Additionally, decarbonizing the economy is crucial to bolster domestic energy security and help insulate the United States from international conflicts that have time and time again led to energy instability. Putting the nation on the path towards decarbonization must be understood as a path that prioritizes both national security and economic prosperity. While the United States has long sought energy independence, increases in the extraction of fossil fuels have not achieved these goals, and simply cannot because of the international nature of fossil fuel commodity markets. A robust domestic clean and renewable economy can better guarantee American energy independence. The clean energy transition will delink the U.S. economy from hostile authoritarian regimes and those that repeatedly violate human rights and position the U.S. to support other nations in doing the same.

Finally, I want to talk about inflation. Inflation is simply a general rise in the price level across the economy, but not all goods and services experience price changes at the same rate. Energy prices played a key role in the inflationary events of 2022. Research published in *Nature Energy* demonstrates that most of the price increase in energy markets were 1) experienced across nations, and thus not a phenomenon unique to the U.S., and 2) largely attributable to the illegal Russian invasion in Ukraine.²⁴ Complementary research finds that a substantial portion of energy price increases faced by American consumers can be attributed to corporate profiteering. Big Oil took advantage of the crisis by artificially driving prices up, raking in record profits and hurting the American people and economy in the process.²⁵

These price increases disproportionately burdened low-income Americans, and further fueled inflation, thus adding to macroeconomic instability. There is strong evidence that President Biden's policies, including his administration's use of the Strategic Petroleum Reserve (SPR), and the passage of the Inflation Reduction Act, helped bring energy prices down, thus reducing inflationary pressures in the economy. Estimates from the Treasury Department suggest that releases from the

²³ <https://www.rewiringamerica.org/policy/household-report>

²⁴ Guan, Yuru, Jin Yan, Yuli Shan, Yannan Zhou, Ye Hang, Ruoqi Li, Yu Liu et al. "Burden of the global energy price crisis on households." *Nature Energy* (2023): 1-13.

²⁵ Weber, Isabella M. "Big Oil's Profits and Inflation: Winners and Losers." *Challenge* (2022): 1-9.

SPR, coupled with those from the International Energy Administration, resulted in price declines of \$0.17 - \$0.42 per gallon of gas in the U.S..²⁶

In conclusion, green investment is good for the American economy. The economic and social cost of inaction on climate will be decimating. In contrast, passing legislation like the Inflation Reduction Act creates millions of good jobs and lowers everyday costs for consumers. A clean energy system also increases U.S. energy security and reduces the inflationary pressures of volatile fossil fuel prices, increasing macroeconomic stability into the future. Thank you for the opportunity to speak to you today, and I look forward to your questions.

²⁶ The Price Impact of the Strategic Petroleum Reserve Release. Department of the Treasury. July 26, 2022. <https://home.treasury.gov/news/press-releases/jy0887>