William Happer,
Professor of Physics, Emeritus, Princeton University

Richard Lindzen,
Professor of Earth, Atmospheric, and Planetary Sciences, Emeritus,
Massachusetts Institute of Technology

CO2 Coalition
Gregory Wrightstone, Executive Director
Nonprofit 501(c)(3) Educational Foundation
Arlington, Virginia

Comment on the Department of Energy's Proposed Gas Stove Standards "Energy Conservation Standards For Consumer Conventional Cooking Products," Docket No. EERE-2014-BT-STD-0005

THE SCIENTIFIC METHOD PROVES THERE IS NO SCIENCE SUPPORTING THE PROPOSED ENERGY STANDARDS AND THE IWG SOCIAL COST OF CARBON USED IN THE PROPOSAL IS FATALLY FLAWED SCIENCE

April 17, 2023

Index

Comment and Declaration

I. Summary

Thank you for the opportunity to comment on the Department of Energy's ("DOE's") proposed Gas Stove Standards "Energy Conservation Standards for Consumer Conventional Cooking Products," 88 *Fed. Reg.* 6818 (Feb. 1, 2023), 88 *Fed. Reg.* 12603 (Feb. 28, 2023).

"DOE proposes new and amended conservation standards for consumer conventional cooking products," stoves. Id. at 6819.

The proposed standards are another of 110 other "energy efficiency" actions the Biden Administration reports it has taken on household items and industrial equipment, including furnaces, water heaters, clothes washers and dryers and lightbulbs, that are claimed will result in "projected consumer savings [of]… $570 billion cumulatively" over 30 years when finalized.[1]

Energy Savings. "DOE's analyses indicate that the proposed energy conservation standards for consumer conventional cooking products would save a significant amount of energy."

Specifically, DOE estimates the "lifetime energy savings for consumer conventional whole cooking products purchased in the 30-year period" after the standards take effect will be 0.46 quadrillion British Thermal Units, measured using what is called the Full Fuel Cycle ("FFC") method. 88 Fed. Reg. at 6821.

The Full Fuel Cycle method is not the price paid by end users, but tries to measure everything from the "energy consumed in extracting, processing, and transporting primary fuels (i.e. coal, natural gas, petroleum fuels)." Id. at 6821 n.5.

DOE admits the new standards will only provide "a savings of 3.4 percent relative to the energy use of these products in the case without amended standards." Id. at 6821(emphasis added).

Bans Gas Stoves. The practical effect of the new standards, in the blunt terms of the *Wall Street Journal* (Feb. 3, 2023), is "Banning Gas Stoves by Regulation," and switching people from gas to electric stoves. Replacing gas stoves with electric stoves is also the purpose of the $840 rebate in the Inflation Reduction Act. *Id.*

Electricity Costs 3.5 Times Natural Gas Currently. The Department of Energy reported in 2022 that electricity costs 3.5 times the cost of natural gas per energy unit, $42 versus $12 for natural gas.[2] This data implies that achieving the more efficient use of energy would be to do the opposite, switching people from electric stoves to gas stoves.

Added New Costs of Stoves. DOE also admits its new standards will impose on consumers "$32.5 million per year in increased equipment costs." Id. at 6822.

In addition, "Manufacturers would have to spend hundreds of millions of dollars redesigning stoves, if they bother." *Wall Street Journal, supra*.

---

[1] White House FACT SHEET: Biden-Harris Administration Takes More Than 100 Actions in 2022 to Strengthen Energy Efficiency Standards and Save Families Money (Dec. 19, 2022) (emphasis added) (https://www.whitehouse.gov/briefing-room/statements-releases/2022/12/19/fact-sheet-biden-harris-administration-takes-more-than-100-actions-in-2022-to-strengthen-energy-efficiency-standards-and-save-families-money/

[2] Department of Energy, Energy Conservation Program For Consumer Products: Representative Average Unit Cost of Energy, 87 *Fed. Reg.* 12681, 12682 (Mar. 7, 2022).

Asserted Consumer Savings: Applying the scientific methodology, DOE advances the theory that consumers that switch from gas stoves to electric stoves will save a lot of money:

- $130.7 million every year (at a 3% discount rate, $100.8 million every year at a 7% discount rate
- $1.71 billion, the net present value of total cumulative consumer savings at a 3% discount rate ($0.65 billion at a 7% discount rate). 88 *Fed. Reg.* pp 6821-23.

` As elaborated below, the DOE computed its 3.4% energy savings and these consumer savings using what is called the Full Fuel Cycle method of measuring energy savings. DOE did not explain details of how they performed these critical calculations, which is vague and easily manipulated, in the over 600 pages of materials supporting the proposed standards. The alternative is called the Site (Place of Use) method, which in essence measures the price of gas and electricity paid by consumers.

Environmental Benefits. The DOE further stated the new standards will provide two types of environmental benefits. First, the reduction of CO_2 emissions by 21.9 million metric tons and other emissions:

> [T]he proposed standards for consumer conventional cooking products are projected to yield significant environmental benefits. DOE estimates that the proposed standards would result in cumulative emission reductions (over the same period as for energy savings) of 21.9 million metric tons ("Mt") of carbon dioxide ("CO_2"), 2.2 thousand tons of sulfur dioxide ("SO2"), 51.8 thousand tons of nitrogen oxides ("NOX"), 244.9 thousand tons of methane ("CH4"), 0.1 thousand tons of nitrous oxide ("N2O"), and 0.01 tons of mercury ("Hg"). 66 *Fed. Reg.* p. 6822(footnote omitted).

Second, the DOE used the Interagency Working Group "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990" (Feb. 26, 2021) ("IWG SCC Estimates") to estimate the "global social benefits" of reducing CO_2, CH 4 and N2O ("SC-GHGs"):[3]

> The SC-GHGs is the monetary value of the net harm to society associated with a marginal increase in emissions in a given year, or the benefit of avoiding that increase…. As a member of the IWG involved in the development of the February 2021 SC-GHG TSD, DOE agrees that the interim SC-GHG estimates represent the most appropriate estimate of the SC-GHG until revised estimates have been developed reflecting the latest, peer-reviewed science. 88 Fed. Reg. at 6864.
>
> The DOE estimated the global social climate benefits were $67 billion. Id. at 6822.

We (Happer and Lindzen) are career physicists, and in our opinion the scientific method proves that there is no reliable science supporting the proposed standards based on the proposition that electric stoves are more energy efficient than gas stoves and the IWG SCC Estimates used in the proposal is fatally flawed science.

Thus, the DOE standards must not be adopted and the IWG SCC Estimates must not be used. If adopted, the DOE standards should be ruled invalid by the courts.

Further, the DOE should use the Site (Place of Use) method when measuring energy savings and not the Full Fuel Cycle method, and review any of the 110 energy actions that it has

[3] *www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.*

The DOE explained it did not use the IWG SCC estimates in developing these standards while the case Louisiana v. Biden was pending. The case was dismissed on April 5,2023 by the Fifth Circuit. State of Louisiana v. Biden, No. 22-30087 (5th Cir. 2023) :: Justia

made or other agency that made that similarly are similarly flawed by using the Full Fuel Cycle method.

Here's the science why.

II. Scientific Theories Are Determined by the Scientific Method, Validating Theoretical Predictions With Observations, Not By Fabricated or Omitted Data, Models That Do Not Work, Government Opinion, Consensus or Peer Review

Reliable scientific knowledge is determined by the scientific method, where theoretical predictions are validated by observations or rejected by failing to do so. Agreement with observations is the measure of scientific truth. Scientific progress proceeds by the interplay of theory and observation. Theory explains observations and makes predictions of what will be observed in the future. Observations anchor understanding and weed out theories that don't work. This has been the scientific method for more than three hundred years.

Prof. Richard Feynman, a Nobel Laureate in Physics, incisively explained the scientific method:

> "[W]e compare the result of [a theory's] computation to nature, ... compare it directly with observations, to see if it works. If it disagrees with experiment, it is wrong. In that simple statement is the key to science." *The Character of Physical Law* (1965), p. 150.

Thus, the scientific method is very simple and very profound: Does theory work with observations? If not, it is rejected and not used.

However, scientific knowledge is <u>not</u> determined by:

<u>Fabricated and Omitted Contradictory Data</u>. Since theories are tested with observations, fabricating data and omitting contradictory facts to make a theory work is an egregious violation of the scientific method.

Richard Feynman stated this fundamental principle of the scientific method:

> "If you're doing an experiment, you should report everything that you think might make it invalid – not only what you think is right about it.... Details that could throw doubt on your interpretation must be given, if you know them." 1974 Caltech commencement address, *Surely You're Joking, Mr. Feynman!* (1985), p. 311-12.

In our experience and as exemplified below, one of us (Lindzen) frankly explained:

> "Misrepresentation, exaggeration, cherry-picking, or outright lying pretty much covers all the so-called evidence" marshalled in support of the theory of imminent catastrophic global warming caused by fossil fuels and of the urgent need to achieve "Net Zero" fossil fuel and other human CO_2 emissions by 2050.[4]

<u>Models That Do Not Work</u>. Models are a type of theory; they predict physical observations. The scientific method requires models to be tested by observations to see if they work. If a model's prediction disagrees with observations of what it purports to predict, it is wrong and never used as science.

It is astounding that one of the most complex questions in physics (namely, the behavior of a multi-phase, radiatively active, turbulent fluid) should be labeled by the government — and

[4] Lindzen, "Global Warming for the Two Cultures," Global Warming Policy Foundation (2018), p. 10. *Accord* Lindzen, "The Absurdity of the Conventional Global Warming Narrative (April 20, 2022) & "Straight Talk About Climate Change," *Acad. Quest* (2017), p. 419.

funding agencies it controls — to be so settled that skeptics are told to be silent. That the models supporting the climate-crisis narrative fail to describe observations of the phenomena they are supposedly designed to predict confirms that the puzzle remains unsolved. Making this peculiar situation particularly dangerous are world leaders who have abandoned the science and intellectual rigor bequeathed to us by the Enlightenment and its forebears.

Government Opinion. Nobel physicist Richard Feynman put it unambiguously:

> "No government has the right to decide on the truth of scientific principles." *The Meaning of It All* (1998), p. 57.

The importance of the scientific principle that government does not determine science was chillingly underscored recently in Sri Lanka and earlier in Russia under Stalin.

"Ideologically driven government mandates on agriculture have usually led to disaster," one of us (Happer) explained. "The world has just witnessed the collapse of the once bountiful agricultural sector of Sri Lanka as a result of government restrictions on mineral [nitrogen] fertilizer."[5]

Earlier in Russia, Stalin made Trofim Lysenko the czar of Russian biology and agriculture. False biology prevailed for 40 years in the Soviet Union because Lysenko gained dictatorial control, providing one of the most thoroughly documented and horrifying examples of the politicization of science. Lysenko was strongly supported by "scientists" who benefitted from his patronage. Millions died as a result of his ruthless campaign against science in agriculture. William Happer, Chapter 1 "Harmful Politicization of Science," Michael Gough Ed., *Politicizing Science* (2003), pp. 29-35.

Consensus. What is correct in science is not determined by consensus, but by experiment and observations. Historically, scientific consensuses have often turned out to be wrong. The greatest scientists in history are great precisely because they broke with consensus. The frequent assertion that there is a consensus behind the idea that there is an impending disaster from climate change is not how the validity of science is determined. To quote the profoundly true observation of Michael Crichton:

"If it's consensus, it isn't science. If it is science, it isn't consensus."

Peer Review. Peer review can be helpful in many areas of science, but it does not determine scientific validity. Agreement of theoretical predictions with observation or experiment, the scientific method, is the real touchstone of truth in science.

In our decades of personal experience in the field, we have been dismayed that many distinguished scientific journals now have editorial boards that further the agenda of climate-change alarmism rather than objective science. Research papers with scientific findings contrary to the dogma of climate calamity are commonly rejected by reviewers, many of whom fear that their research funding will be cut if any doubt is cast on the coming climate catastrophe.

Journal editors have been fired for publishing papers that go against the party line of the climate-alarm establishment.

Alas, peer review of the climate literature is now a joke. It is more like "pal review" (review by one's pals), not peer review. The present situation violates the ancient principle that "no man shall be a judge in his own cause." Accordingly, all peer reviewed climate publications need to be viewed with skepticism. Some are right, but many have serious

---

[5] Happer *et al.*, "Nitrous Oxide and Climate," CO2 Coalition (November 10, 2022), p. 39 (emphasis added), link Nitrous Oxide and Climate - CO2 Coalition

problems with confirmation bias.

These fundamental principles of what science and the scientific method are, and are not, are applied to the DOE gas stove proposed standards, next.

III. The Scientific Method Proves There is No Reliable Science Supporting the Proposed DOE Energy Standards for Stoves

DOE takes the position that its proposed energy conservation standards are authorized by the Energy and Policy Conservation Act of 1975 ("EPCA").[6] Such standards are to be set to "achieve the maximum improvement in energy efficiency...which the Secretary determines is technologically feasible and economically justified."[7] Further, DOE cannot adopt any standard unless it will result in "a significant conservation of energy."[8]

The scientific method proves the proposed standards do not meet the statutory requirement of a significant conservation of energy.

DOE's theory, as noted, is their "proposed energy conservation standards for consumer conventional cooking products would save a significant amount of energy," supported by data they cite as 0.46 quadrillion British Thermal Units measured by the Full Fuel Cycle ("FFC") method.

This theory seems contradicted by the DOE reported fact that electricity is 3½ times more expensive per unit of energy than natural gas, $42 versus $12 per energy unit.

How does DOE explain the data supporting its recommendation and resolve the contradictory data that shows natural gas is much cheaper than electricity?

First, for the trivial 3.4% energy savings they report they use what is called the Full Fuel Cycle method to measure energy savings. As noted, DOE explained the FFC method measures everything from the energy consumed in extracting, processing, and transporting primary fuels.

The National Research Council's Review of Site (Point-of-Use) and Full-Fuel-Cycle Measurement Approaches to DOE/EERE Building Appliance Energy-Efficiency Standards : Letter Report (2009) explains the difference between measuring energy use by two methods:

Full-Fuel-Cycle

Site (Point-of-Use), that is, what consumers pay.

In that NAS report Ellen Berman in her dissent raises the important issue we explore below that the Full Fuel Cycle measurement method chosen by DOE opens the door to manipulating what is and is not included in the Full Fuel Cycle:

> The full-fuel-cycle measurement would expand the energy calculations beyond the direct consumption of energy by the consumer's appliance and would include those upstream costs incurred from the point of extraction of the fuel to the point the energy made from that fuel enters the home. As laudable as this intent is meant to be, this approach would not benefit consumers. Developing a full-fuel-cycle cost methodology is fraught with complexity and controversy. Id. at 39.

What did DOE do using Full Fuel Cycle measurement?

We could not find any detailed exposition of the data used to support their theory

---

[6] 42 U.S.C. §6291 *et seq.*

[7] 42 U.S.C. §6295(o)(2)(A).

[8] 42 U.S.C. §6295(o)(3)(B).

anywhere in the more than 600 pages in the Federal Register and Technical Support Document (TSD) *www.regulations.gov/docket/EERE-2014-BT-STD-0005/document*. That omission by itself means there is no scientific data that supports the proposed DOE standards. And such a lack of data means that the proposed rule is arbitrary and capricious. *See Motor Vehicle Mfrs. Ass'n of the U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29 (1983) ("the agency must examine the relevant data and articulate a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.' *Burlington Truck Lines v. United States*, 371 U.S. 156, 168 (1962).").

Further, the only explanation we could find is in Appendix 10B of the TSD. Just as Ms. Berman warned, DOE explained they excluded all the "upstream" costs of electricity generated by renewables but included upstream costs for electricity generated by fossil fuels:

> The treatment of electricity in full-fuel-cycle analysis must distinguish between electricity generated by fossil fuels and electricity generated from renewable sources (wind, solar, and hydro). For the former, the upstream fuel cycle relates to the fuel consumed at the power plant. There is no upstream component for the latter, because no fuel *per se* is used. Id. pp. 10B-1 - 10B-2 (emphasis added).

Pause here to recognize that costs must be computed on a consistent basis. DOE cannot ignore a whole category of costs (upstream renewable energy generation costs) because DOE and the Biden Administration favors the use of renewable energy generation over energy generation by conventional fossil fuels. That ignoring of a whole category of costs is arbitrary and capricious. *See, e.g., American Trucking Ass'ns, Inc. v. EPA*, 175 F.3d 1027, 1052 (D.C. Cir.) ("Legally, then, EPA must consider positive identifiable effects of a pollutant's presence in the ambient air in formulating air quality criteria under § 108 and NAAQS under § 109.") (EPA could not ignore the benefits of ground-level ozone and focus only on its health disbenefits), *opinion modified on reh'g and en banc denied*, 195 F.3d 4 (D.C. Cir. 1999), *aff'd in part, rev'd in irrelevant part sub nom. Whitman v. American Trucking Ass'ns*, 531 U.S. 457 (2001).

Obviously it is critical to know what is and is not in their Full Fuel Cycle measurement calculation. Nowhere did we find such detail. Nor could we find any explanation of how a fuel that costs 3.5 times more than natural gas - electricity – is more energy-efficient. Nor could we find a full presentation of the data that science requires to support the DOE theory that the proposed standards save a significant amount of energy as the EPCA statute requires. Nor did we find an explanation of why DOE used Full Fuel Cycle measurement when the EPCA seems clear that appliance energy conservation standards should be measured using "the quantity of energy directly consumed by a consumer product at point of use." 42 U.S.C. 6291(4)(emphasis added), Site (Point-of-Use) measurement.

Similarly, the proposed standards advance the theory that consumer savings will be $131 million annually, and $1.7 billion at net present value of total consumer savings cumulatively (both using a 3% discount rate).

Given the fact that the DOE provides contradictory data that electricity is 3½ times more expensive than natural gas, the obvious scientific question is how were the savings computed?

Nowhere in 600+ pages of the DOE's materials supporting the proposed standards could we find any detailed explanation of how these theoretical numbers were computed.

Accordingly, there is no adequate scientific support for the proposed standards using the FFC method or the theory that they will save consumers significant amount of money. Both theories also are contradicted by the fact that electricity costs more than 3 ½ times than natural gas using the Site (Point of Use) method of measuring energy savings.

Indeed, to the contrary, the data supports DOE action to issue new standards that

encourage people to switch to natural gas stoves from electric stoves.

IV. The IWG Social Cost of Carbon Analysis Used in the Proposed Standards Are Fatally Flawed Science for Multiple Reasons

The IWG SCC Estimates are scientifically invalid for four reasons by themselves.

A. The IWG SCC Estimates Omit the Enormous Social Benefits of CO_2

The combined three models, DICE, PAGE and FUND, together called Integrated Assessment Models (IAMs). However, two of the three models, DICE and PAGE, only computed the social costs of CO_2 and excluded data on the enormous social benefits of CO_2.[9] Once again, cooking the books on what cost and benefits are analyzed violates a basic application of arbitrary-and-capricious review as reflected in the D.C. Circuit unanimously rejecting EPA's attempt to ignore the benefits of ozone emissions so they could look only at their costs.

Omitting contradictory and unfavorable data is an egregious violation of the scientific method and a stereotypical arbitrary-and-capricious style agency error.. It is like promoting the theory the world is flat by only citing observations as far as the eye can see, excluding all the evidence the world is round.

There is overwhelming scientific evidence that CO_2 and fossils fuels provide many benefits such as preventing great harm to those living in poverty and providing enormous social benefits for the United States, people worldwide and future generations which the IWG SCC Estimates omit and render them fatally flawed science and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

CO_2's Six Extraordinary Social Benefits

1. CO_2 is Essential to Food Growth and Production and Thus To Life On Earth

We owe our existence to green plants that, through photosynthesis, convert CO2 and water, H2O, to carbohydrates with the aid of sunlight and release oxygen. Land plants get the carbon they need from the CO2 in the air. Other essential nutrients — water, nitrogen, phosphorus, potassium, etc. — come from the soil. Just as plants grow better in fertilized, well-watered soils, they grow better in air with several times higher CO2 concentrations than present values. As far as green plants are concerned, CO2 is part of their daily bread—like water, sunlight, nitrogen, phosphorus, potassium and other essential elements. And, in turn, livestock obviously depend on the availability of green plants for the livestock to consume so that humans can consume the livestock. Without CO2, there would be no photosynthesis, no food and no human or other life. The IWG SCC Estimates omission of this fact renders IWG SCC Estimates fatally flawed science and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

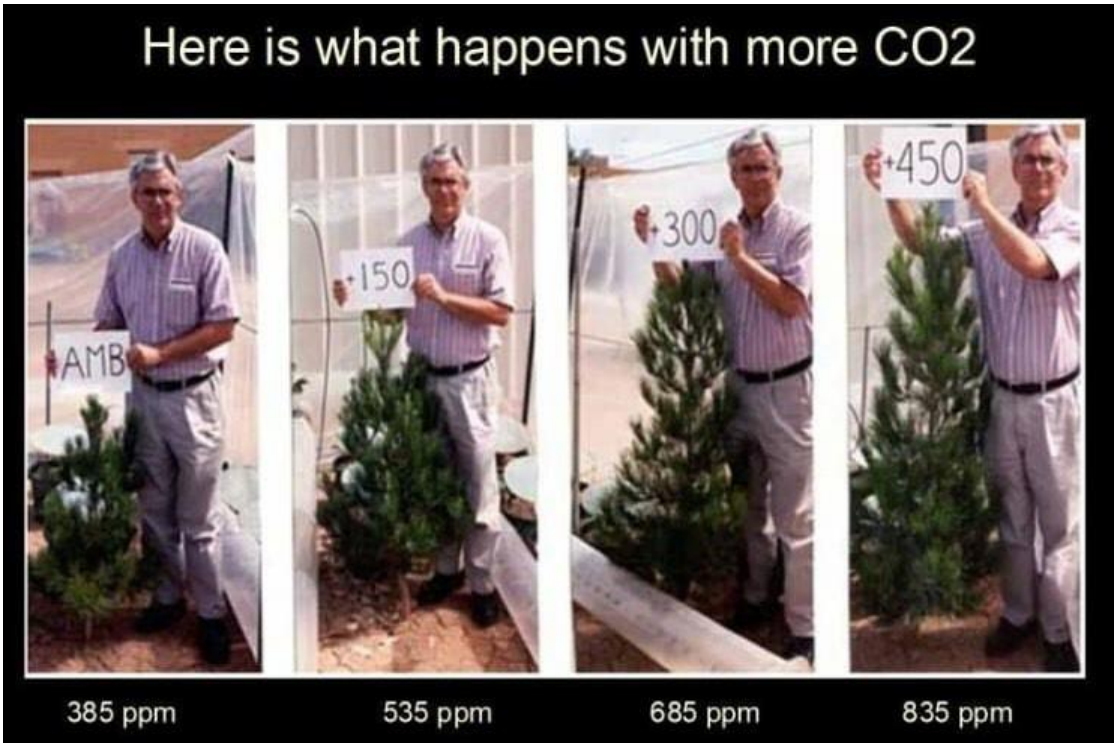
2. More CO_2, Including CO_2 from Fossil Fuels, Produces More Food

A major social benefit of increasing CO2 in the atmosphere is that it increases the amount of food plants produce through what is known as "CO2 fertilization." More CO2 means more food for people around the world.

A graphic illustration of the response of plants to increases in CO2 is shown below. Dr. Sherwood Idso grew Eldarica (Afghan) pine trees with increasing amounts of CO2 in

[9] Dayaratna, McKittrick & Michaels, "Climate Sensitivity, Agricultural Productivity and the Social Cost of Carbon in FUND," *Environmental Economics & Policy Studies* (2020), pp. 443-48

experiments, starting with an ambient CO2 concentration of 385 ppm. He showed what happens when CO2 is increased from 385 ppm to 535 ppm, 685 ppm and 835 ppm over 10 years:[10]



Thousands upon thousands of experimental results demonstrate that more CO2 increases the amount of food that a large variety of plants produce. See the Plant Growth Database on the Center for the Study of Carbon Dioxide and Global Change website (http://www.CO2science.org/data/plant_growth/dry/dry_subject.php).

Mathematically, there are two formulas to calculate the amount of food that results from increasing CO2 in the atmosphere.

Linear 15.4% Food Increase/100 ppm. Dr. Idso advised there is a linear relationship between CO2 levels and the amount of food produced between 280 ppm and 800 ppm. "Generally, increasing CO2 since the Industrial Revolution has elicited a linear response through the present. And that response remains linear for most plants through 800 ppm." (Personal communication).

He further explained that an increase of CO2 from 280 ppm in 1750 to 800 ppm would increase the amount of food by approximately 80% or more. "[W]hat is the total benefit from [increasing CO2 from] 280 to 700 or 800 ppm? When you use those values, your increase …is probably closer to 70-80% (or more!)." Id.

Accordingly, this implies a linear formula. A CO2 increase from 280 ppm to 800 ppm, a 520 ppm increase, produces approximately an 80% increase in crop production, which implies a 15.4% increase in food produced per 100 ppm increase of CO2 in the atmosphere.

Happer Formula. The second formula is one of the author's (Happer). Experiments with CO2 enrichment show that many crop yields increase by a factor $\sqrt{x}$ with adequate water and other nutrients, where x is the ratio of the current CO2 ppm level to the former level.

Since 1750, How Much More Food Resulted From the 120 ppm Increase in CO2?

[10] CO2 Coalition, CO2_3.jpg (1280×720) (CO2coalition.org)

Applying these two formulas to the frequently cited 120-ppm increase in CO2 since the beginning of the Industrial Age around 1750 shows the 120-ppm increase in CO2 greatly benefited people around the world by increasing the amount of food available by about 20%![11]

How Much More Food Would Result from Doubling CO2 400 to 800 ppm? What if the CO2 in the atmosphere doubled from about 400 ppm today to 800 ppm, the number used for the Equilibrium Climate Sensitivity (ECS)?

Using the Happer formula, the amount of food available to people worldwide would increase by about 40%.[12] Using the linear formula, the increase would be about 4×15.4%, about 60%.

Thus, doubling CO2 from 400 ppm to 800 ppm would increase the food available worldwide 40% – 60%.

What if the "Net Zero" fossil-fuel CO2 policy was in effect worldwide in 1750? The amount of food available to people around the world would have been a disastrous 20% less!

What if the "Net Zero" fossil-fuel CO2 policy stopped CO2 from doubling 400 ppm to 800 ppm? The amount of food available to people worldwide would be 40%-60% less, greatly increasing the possibility of massive human starvation. The IWG SCC Estimates omission of this fact renders IWG SCC Estimates fatally flawed science and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

3. In Drought Stricken Areas, More CO_2 Produces More Food

Another social benefit of increasing CO2 in the atmosphere is that drought-stricken areas will have more food. Science demonstrates that increasing CO2 increases plant water-use efficiency by lessening water lost by plant transpiration.

"In some cases, a doubling of the air's CO2 content may actually double plant" water use efficiency. C. Idso & S. Idso, *The Many Benefits of Atmospheric CO2 Enrichment* (2011), p. 340. The IWG SCC Estimates omission of this fact renders IWG SCC Estimates fatally flawed science and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

4. Different Plants With More CO_2 Produce Vastly More Food

Another major social benefit of raising the amount of CO2 in the atmosphere is there are huge variations in how different plants respond to increased CO2.

Dr. Idso's *Climate Change Reconsidered II: Fossil Fuels* reported how six categories of plants responded to a 120-ppm increase in CO2 ranging from 28% to 70%:[13]

> "Since the start of the Industrial Revolution, it can be calculated…that the 120-ppm increase in atmospheric CO2 concentration [from 280 ppm to about 400 pm today] increased agricultural production per unit land area" for various crops averaging 57% and

[11] Using the linear formula, 1.2 × 15.4% = 18% increase. Using the Happer formula with an increase from 280 ppm to 400 ppm, x = 410/280 = 1.46 and √x = 1.21, a 21% increase in food.

[12] x = 800/400 = 2 and √2 = 1.41, approximately a 41% increase.

[13] *climate Change Reconsidered II: Fossil Fuels,* p. 322, section 3.3.2 Aerial Fertilization.

ranging from 28% to 70% as follows, listed in order of the largest increase:

> "70% for C3 cereals"
>
> "67% for root and tuber crops"
>
> "62% for legumes"
>
> "51% for vegetables"
>
> "33% for fruits and melons"
>
> "28% for C4 cereals."

Similarly, *2050 Global Food Estimates* Table 2 shows that the 90 crops that make up 95% of the total food produced in the world respond to a 300 ppm increase in CO2 over a wide range – a 176% increase for coffee, 135% increase for onions, 110% increase for pigeon peas and a 5% increase for pineapples. Id. at 12.

Thus, the opportunity to significantly increase food production is to identify and harvest the plants that produce the most food in response to CO2 fertilization. The IWG SCC Estimates omission of this fact renders IWG SCC Estimates fatally flawed science and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

5. Different Varieties of the Same Plant With More CO_2 Produce Vastly More Food

Another way more CO2 produces more food is because different varieties of the same plant, called genotypes, respond to increased CO2 fertilization in widely different amounts.

For example, 16 varieties of rice respond to CO2 fertilization by producing an amount of rice that ranges from decreasing 7% to increasing 263%. Id. pp. 30-31.

Thus, identifying and harvesting the crop varieties that produce the most food in response to CO2 fertilization, like the rice variety that increases the amount of rice produced by 263%, is another opportunity to significantly increase food production.

Dr. Idso underscored the remarkable impact this method by itself can have reducing human starvation by 2050. If we "learned to identify which genotypes provided the largest yield increases per unit of CO2 rise, and then grew those genotypes, it is quite possible that the world could collectively produce enough food to supply the needs of all of its inhabitants."
Id. at 31 (emphasis added).

Accordingly, identifying and harvesting the crop varieties with the largest yield increases, for example, the rice variety that yields 263%, would have a major impact in helping to prevent massive human starvation by 2050. The IWG SCC Estimates omission of this fact renders IWG SCC Estimates fatally flawed science and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

6. CO_2 and Other Greenhouse Gases Keep Us from Freezing To Death

CO2 and other greenhouse gases hinder the escape of thermal radiation to space. We should be grateful for them. Greenhouse gases keep the Earth's surface temperature warm enough and moderate enough to sustain life on Earth. Without them, we'd freeze to death. The IWG SCC Estimates omission of this fact renders IWG SCC Estimates fatally flawed science and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

Fossil Fuels' Four Extraordinary Social Benefits

There are four little-reported, extraordinary social benefits of fossil fuels.

1. Burning Fossil Fuels Creates More CO2 and Thus More Food

As explained, increasing the CO2 in the atmosphere can substantially increase the amount of food available to people worldwide. But where can we get more CO2? Continue using and, even better, increase the use of fossil fuel. Fossil-fuel CO2 has the same power to create more food through photosynthesis. The IWG SCC Estimates omission of this fact of the social benefit of fossil fuels and CO2 renders the IWG SCC Estimates fatally flawed science and as a matter of administrative law makes the IWG SCC Estimates no support for the DOE proposed rule.

2. Fossil Fuels Are Essential to Making Fertilizers

Also, as explained previously, in the early 1900s, Fritz Haber and Carl Bosch developed a process and method of production by which natural gas and atmospheric N_2 could be converted into ammonia (NH_3), an extraordinarily effective fertilizer for growing plants as shown above.

As noted, today it "is estimated that nitrogen fertilizer now supports approximately half of the global population," and the elimination of fossil fuels would result in about half the world's population not having enough food.

This is not theory. Sri Lankan President Rajapaksa in April 2021 banned "the importation and use of synthetic fertilizers and pesticides and ordered the country's 2 million farmers to go organic."[14] The result was disastrous. "Its rice production has dropped more than 50%, while domestic rice prices have increased more than 80%." Id. This is a real-life warning of the worldwide disaster that will result by eliminating fossil fuels.

The IWG SCC Estimates omission of this fact of the social benefit of fossil fuels and CO2 renders the IWG SCC Estimates fatally flawed science and as a matter of administrative law makes the IWG SCC Estimates no support for the DOE proposed rule.

3. Fossil Fuels Are Essential to Making Key Pesticides

Many pesticides (and countless other chemicals in everyday use) are produced from gas and oil, including chlorobenzene, neonicotinoids, pyrethroids, and glyphosate. About one billion pounds of pesticides are used each year in the United States to control weeds, insects, and other pests.

The use of pesticides has resulted in a range of benefits, including increased food production and reduction of insect-borne disease. Those benefits would be greatly diminished and more expensive if nitrogen derived from fossil fuels were unavailable.

Thus, eliminating fossil fuels would be disastrous by itself for eliminating fertilizers and pesticides that the world's food supply depends on and without which there will be massive human starvation.

The IWG SCC Estimates omission of this fact of the social benefit of fossil fuels and CO2 renders the IWG SCC Estimates fatally flawed science and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

4. Fossil Fuels Are the Most Reliable and Low-Cost Source of Energy

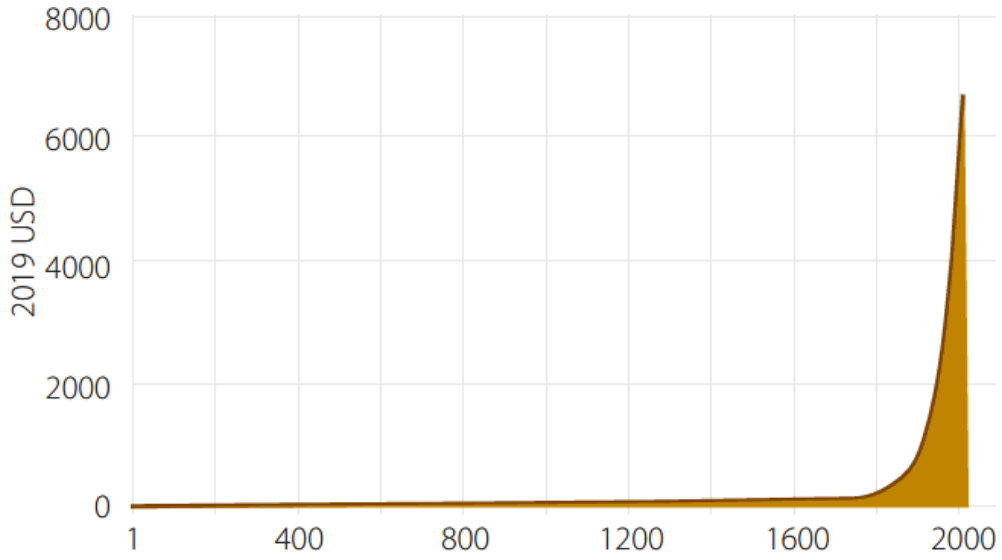
The fourth extraordinary social benefit of fossil fuels, of course, is that they provide low-cost energy and resulting jobs.

Affordable, abundant fossil fuels have given ordinary people the sort of freedom,

[14] Raleigh, "Sri Lanka Crisis Shows the Damning Consequences of Western Elites Green Revolution," *Federalist* (July 15, 2022).

prosperity and health that were reserved for kings in ages past.

The following chart of the GDP per person for the last 2,000 years powerfully illustrates what has happened:[15]



The IWG SCC Estimates omission of the six extraordinary social benefits of CO2 and the four extraordinary social benefits of fossil fuels renders the IWG SCC Estimates fatally flawed science and as a matter of administrative law makes the IWG SCC Estimates no support for the DOE proposed rule.

B. The IWG SCC Estimates Omit the Disastrous Consequences of Eliminating Fossil Fuels and CO2

There is also overwhelming scientific evidence that eliminating CO2 and fossil fuels will have disastrous consequences by causing great harm to those living in poverty and destroying the enormous social benefits for the United States, people worldwide and future generations that the IWG SCC Estimates totally omit and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

Eliminating Fossil Fuels Will Eliminate Nitrogen Fertilizer That Feeds Half the World. The importance of fossil fuel-derived nitrogen fertilizers cannot be overstated. It is "estimated that nitrogen fertilizer now supports approximately half of the global population" by itself.[16]

As background, Fritz Haber and Carl Bosch in the early 1900s developed a process and method of production by which natural gas and atmospheric N2 are converted into ammonia (NH3), a game changing fertilizer for growing plants as shown in the following chart:[17]

---

[15] Rupert Darwall, *Climate Noose: Business, Net Zero and the IPCC's Anticapitalism* Global Warming Policy Foundation (2020), p. 21.

[16] Ritchie, "How Many People Does Synthetic Fertilizer Feed?," Our World in Data (November 7, 2017), How many people does synthetic fertilizer feed? - Our World in Data.

[17] Happer *et al.*, *supra*, p. 39.

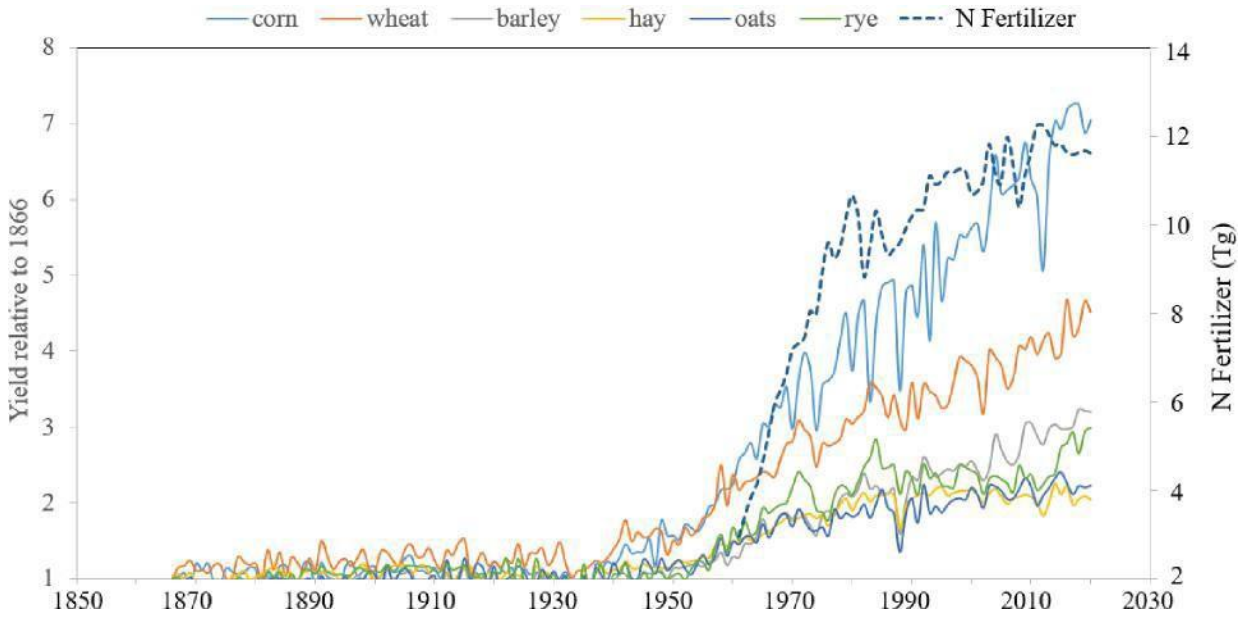


Figure 14: *Crop yields relative to yields in 1866 for corn, wheat, barley, grass hay, oats and rye in the United States. Also shown from the year 1961 is the annual mineral nitrogen fertilizer (in Tg = megatonnes) used in agriculture. Crop yields are from the USDA, National Statistical Service [62] and nitrogen fertilizer usage is from the Food Agriculture Organization statistical database [58]. Note the high correlation between yields and the use of nitrogen fertilizer.*

The chart shows a remarkable increase in crop yields after the widespread use of fossil fuel-derived nitrogen fertilizer began around 1950 compared to crop yields from 1866 to 1950.

The following chart shows more specifically what happened after the widespread use of nitrogen fertilizer started around 1950, with a threefold increase in cereal crop production between 1950 and 2020. Id. at 38:

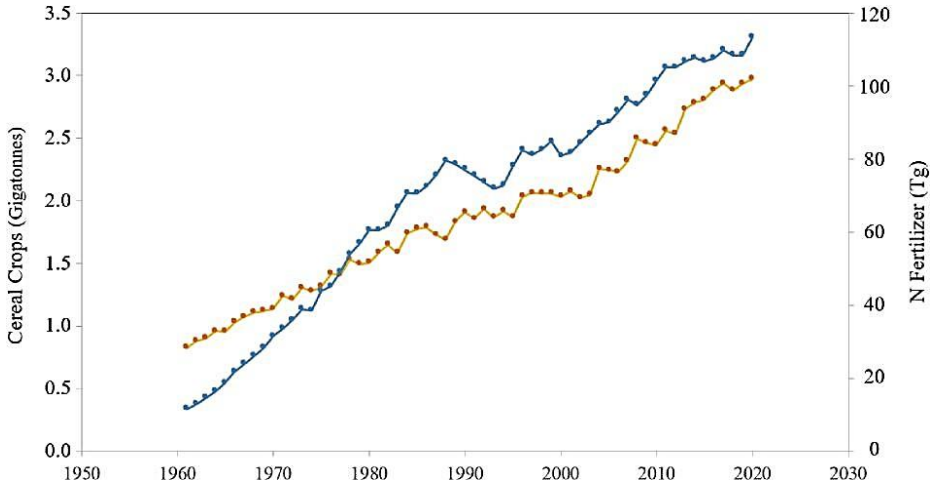
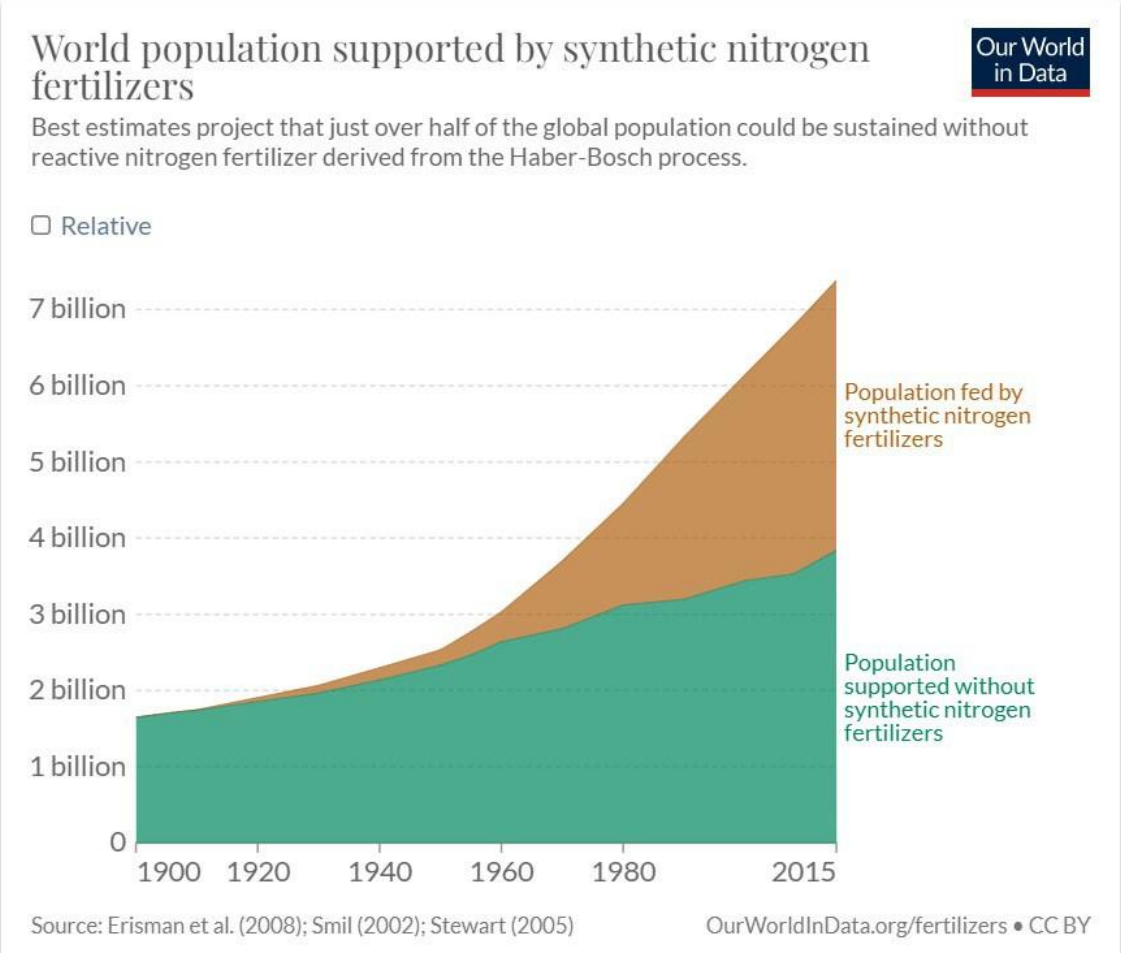


Figure 13: *Annual world production of nitrogen fertilizer used in agriculture (blue, in Tg) and world production of all cereal crops (orange, in gigatonnes) from 1961 to. Data from reference [58]. The threefold increase of cereal crop yields was largely due to the use of mineral nitrogen fertilizer. Additional contributors to the increased yields were other mineral fertilizers like phosphorus and potassium, better plant varieties like hybrid corn, increasing concentrations of atmospheric CO2, etc.*

Today, as noted, it "is estimated that nitrogen fertilizer now supports approximately half of the global population," shown in the following chart:[18]



Accordingly, the IWG SSC Estimates omit analysis that eliminating fossil fuels and the elimination of fossil fuel-derived nitrogen fertilizers and pesticides will result in about half the world's population not having enough food to eat. Accordingly, the IWC SCC estimates are fatally flawed science because they omit the disastrous consequences eliminating CO2 and fossil fuels and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

C. The IWG SCC Estimates Relied on IPCC Findings, Which Are Government Opinion, Not Science

The IWG SCC Estimates were based on IPCC government findings and opinions from the IPCC's Fourth Assessment Synthesis Report in 2007 (IPCC AR4) and four "recent scientific assessments by the IPCC." IWG SCC Estimates, p.32. The five IPCC government opinions relied on were:

- IPCC 2007 Synthesis Report, Contribution of Working Groups I, II and III to the Fourth Assessment Report
- IPCC 2014 Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report

[18] Ritchie, *supra*.

- IPCC 2018 Global Warming of 1.5°C.
- IPCC 2019a Climate Change and Land
- IPCC 2019b Special Report on the Ocean and Cryosphere in a Changing Climate.

Relying on IPCC government findings contaminates the science in the IWG SCC Estimates and renders them fatally flawed science and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

Unknown to most, two IPCC rules require that IPCC governments control what it reports as "scientific" findings on CO2, fossil fuels and manmade global warming, not scientists. IPCC governments meet behind closed doors and control what is published in its Summaries for Policymakers ("SPMs") detailed below, which controls what is published in full reports.

The picture below shows government delegates (not scientists) voting on what to include in the Summary for Policymakers, which the Lysenko tragedy underscores should never be considered as science.[19]

IPCC Summary for Policymakers writing meeting

Deliberation by politically designated officials is not how scientific knowledge is determined. In science, as the Lysenko experience chillingly underscores, and as Richard Feynman emphasized:

"No government has the right to decide on the truth of scientific principles."

The two IPCC rules are:

[19] Donna Framboise, US Scientific Integrity Rules Repudiate the UN Climate Process (January29, 2017) link US Scientific Integrity Rules Repudiate the UN Climate Process | Big Picture News, Informed Analysis.

IPCC SPM Rule No. 1: All Summaries for Policymakers (SPMs) Are Approved Line By Line By Member Governments.

"IPCC Fact Sheet: How does the IPCC approve reports? 'Approval' is the process used for **IPCC Summaries for Policymakers (SPMs). Approval signifies that the material has been subject to detailed, line-by-line discussion, leading to agreement among the IPCC member countries**, in consultation with the scientists responsible for drafting the report."[20]

Since governments control the SPMs, the SPMs are merely government opinions. Therefore, they have no value as reliable science.

What about the thousands of pages in the IPCC reports? A second IPCC rule requires that everything in an IPCC published report must be consistent with what the governments agree to in the SPMs about CO2 and fossil fuels. Any drafts the independent scientists write are rewritten as necessary to be consistent with the SPM.

IPCC Reports No. 2: Government SPMs Override Any Inconsistent Conclusion Scientists Write for IPCC Reports

IPCC Fact Sheet: "'Acceptance' is the process used for the full underlying report in a Working Group Assessment Report or a Special Report after its SPM has been approved.... **Changes ...are limited to those necessary to ensure consistency with the Summary for Policymakers**." IPCC Fact Sheet, *supra*. (Emphasis added).

IPCC governments' control of full reports using Rule No. 2 is poignantly demonstrated by the IPCC's rewrite of the scientific conclusions reached by independent scientists in their draft of Chapter 8 of the IPCC report *Climate Change 1995, The Science of Climate Change ("1995 Science Report").*

The draft by the independent scientists concluded:

"No study to date has positively attributed all or part (of the climate warming observed) to (manmade) causes."

"None of the studies cited above has shown clear evidence that we can attribute the observed [climate] changes to the specific cause of increases in greenhouse gases." Frederick Seitz, "A Major Deception on Climate Warming," *Wall Street Journal* (June 12, 1996).

However, the government written SPM proclaimed the exact opposite as to human influence:

"The balance of evidence suggests a discernible human influence on global climate." *1995 Science Report* SPM, p. 4 (emphasis added).

What happened to the independent scientists' draft? IPCC Rule No. 2 was applied, and their draft was rewritten to be consistent with the SPM in numerous ways:

- Their draft language was deleted.
- The SPMs opposite language was inserted in the published version of Chapter 8 in the

[20] Intergovernmental Panel on Climate Change, Principles Governing IPCC Work, the Procedures for the Preparation, Review, Acceptance, Adoption, Approval and Publication of IPCC Reports, Appendix A Sections 4.4-4.6, https://archive.ipcc.ch/news_and_events/docs/factsheets/FS_ipcc_approve.pdf; http://www.ipcc.ch/pdf/ipcc-principles/ipcc-principles-appendix-a-final.pdf (Emphasis added).

1995 Science Report, on page 439: "The body of statistical evidence in chapter 8 ...

- now points towards a discernible human influence on global climate.
- The IPCC also changed "more than 15 sections in Chapter 8 of the report ... after the scientists charged with examining this question had accepted the supposedly final text." Seitz, *supra*.

As to the full IPCC reports, hundreds of world-class scientists draft some very good science. What to do? Use a presumption that anything in IPCC reports should be presumed to be government opinion with no value as reliable science unless independently verified by the scientific method.

As Richard Feynman made clear, as noted:

"No government has the right to decide on the truth of scientific principles."

The legitimacy of scientific content is determined by the scientific method. None of the IPCC SPMs, models, scenarios and other findings asserting that dangerous climate warming is caused by CO2, GHG emissions and fossil fuels is valid science; they are merely the opinions of IPCC governments.

Thus, the IWG SCC Estimates extensive reliance on IPCC government opinions corrupts the IWG SCC Estimates as science and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

D. The IWG SCC Estimates Relied on Peer Review and Consensus, Not the Scientific Method

The IWG SCC Estimates expressly state they relied on peer review and consensus to determine its estimates, not the scientific method:

> "In developing the SC-GHG estimates in 2010, 2013, and 2016 the IWG used **consensus**-based decision making, relied on **peer-reviewed** literature and models …. Going forward the IWG commits to maintaining a **consensus** driven process for making evidence-based decisions that are guided by the best available science and input from the public, stakeholders, and **peer reviewers**." IWG SCC Estimates, p. 36 (emphasis added).

As explained, peer review and consensus do not determine scientific knowledge, the scientific method does. Accordingly, the IWG SCC Estimates are scientifically invalid and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

E. The NAS' Valuing Climate Damages is Based on Peer Review and Consensus, Not the Scientific Method, and Thus Cannot Be Used by IWG or DOE as Science.

In 2017, the National of Sciences (NAS) published *Valuing Climate Damages: Updating Estimating the Social Cost of Carbon Dioxide* (2017).

DOE states Executive Order 13990 "instructs the IWG to undertake a fuller update of the SC-GHG estimates … that takes into consideration, *inter alia*, "the advice of the National Academies (2017)" above. 88 Fed. Reg. at 6866.

For whatever reason, the NAS book expressly stated that it was not following the scientific method, but stated instead it was adopting "peer reviewed literature" as the "Scientific basis" for all "modules, their components, their interactions, and their implementation."

> "RECOMMENDATION 2-2 The Interagency Working Group should use three criteria to evaluate the overall integrated SC-CO_2 framework and the modules to be used in that framework: scientific basis, uncertainty characterization, and transparency.

- **"Scientific basis**: Modules, their components, their interactions, and their implementation should be consistent with **the state of scientific knowledge as reflected in the body of current, peer-reviewed literature**.'' Id., p. 47 (emphasis added).

With all due respect, this very prestigious scientific group chose not to follow the scientific method. Instead, they based their analysis and thus all of its recommendations on peer review and consensus, which provide opinions but have no value as scientific evidence. No matter how distinguished the group, groupthink support of theories does not make them reliable science. Theories become reliable science when their predictions agree with observations. Climate models' predictions of warming have turned out to be hundreds of percent larger than observed warmings.

Accordingly, any update of the IWG SC-GHG estimates or other use of the NAS book's recommendation by the IWG or the DOE will corrupt their science and render them of no scientific value and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule. The DOE should also so instruct the IWG agencies.

F. The IWG SCC Estimates Relied on Scientifically Invalid Models, Extreme Weather Conclusions and Catastrophic Global Warming Theory

The IWG estimate relied on models, damages from various extreme weather events such as sea level rise and high temperatures, and the theory that rising levels of CO_2 from fossil fuels and other human sources will cause catastrophic global warming related events.

We incorporate by reference our paper "Challenging 'Net Zero' With Science"[21] that scientifically demonstrates:

- the models IWG relied on fail the fundamental test of science -- their predictions do not work,
- there are no long-term trends that extreme weather events are getting worse or more frequent even though human CO_2 emissions and influences have increased and
- the theory CO_2 from fossil fuels and other human sources will cause catastrophic global warming events is scientifically invalid.

The IWG SCC Estimate reliance on these three propositions renders it fatally flawed science and as a matter of administrative law make the IWG SCC Estimate no support for the DOE proposed rule.

V. Additional Administrative Law Comments

1. NEPA. DOE has improperly failed to perform NEPA analysis for this proposed rule. Its consequences are significant and thus a full environmental impact statement (not merely an environmental assessment is required). DOE is relying on a categorical exclusion it has adopted to shield its energy efficiency rules from NEPA review. "DOE anticipates that this rulemaking qualifies for categorical exclusion". *See* 88 Fed. Reg. at 6,899 (citing 10 C.F.R. pt. 1021)

But 10 C.F.R. § 1021.410(b)(2) provides that DOE may not make use of any of its categorical exclusions where "scientific controversy about the environmental effects of the proposal; uncertain effects or effects involving unique or unknown risks; and unresolved conflicts concerning alternative uses of available resources."

We are eminent scientists and submit that there is significant scientific controversy about

[21] Challenging-Net-Zero-with-Science-digital-CO2-Coalition.pdf

this proposed rule and as to the issues in the SCC methodology that we challenge here (and by incorporation of the *Louisiana v. Biden* litigation arguments (see below). Because the IPCC process is a political one, it is not sufficient to claim there is no scientific controversy based on invocation of IPCC summaries for policy makers or the backwards edits to scientific conclusions necessary to comport with the summaries for policymakers.

Additionally, because we have pointed out the significant benefits of carbon dioxide emissions—an issue DOE has not acknowledged or studied, uncertain effects, as well as unique or unknown risks are involved in this rulemaking.

Finally, unresolved conflicts about the use of resources are involved because DOE's proposed rule is an attempt to shift stoves to electric power, a competing form of power to the gas typically used to heat home stoves.

To the extent these arguments do not cause DOE to stand down from this proposed rulemaking and abandon it or significantly alter the proposal, if DOE persists in doing so without performing a full-fledged NEPA analysis that considers all environmental effects (positive and negative), we put you on notice that there will be a legal challenge to the validity of the categorical exclusion on which DOE relies.

A traditional energy efficiency rule that for instance saves gallons of water per toilet flush after showing there is a market failure and that the benefit-over-cost analysis is possible can fit within the categorical exclusion. But DOE cannot transform the energy efficiency program it administers into a rabid climate-change regulatory policy without at least performing a NEPA analysis and so the categorical exclusion must either be interpreted not to apply (in which case DOE should get to work preparing a NEPA EIS) or alternatively the categorical exclusion regulation is invalid on its face or as applied to this proposed rulemaking.

2. *West Virginia v. EPA.* Banning or attempting to significantly drive gas stoves out of the market for home cooking is a significant economic and political question. Yet DOE does not point to any clear statement by Congress that Congress intended to ban or significantly curtail the technology ordinary Americans have used for decades to cook their food. Indeed, this is an even more fundamental attempt to transform American life than the EPA Clean Power Plan that the Supreme Court invalidated. *See West Virginia v. EPA*, 142 S. Ct. 2587, 2622 (2022) ("[O]blique or elliptical language" will not supply a clear statement … *see Spector v. Norwegian Cruise Line Ltd.*, 545 U.S. 119, 139 (2005) (plurality opinion) (cautioning against reliance on 'broad or general language'). Nor may agencies seek to hide 'elephants in mouseholes,' *Whitman v. American Trucking Assns., Inc*., 531 U.S. 457, 468, or rely on "gap filler" provisions „„„"). And banning or severely curtailing Americans' beloved gas stoves is clearly an elephant that DOE cannot attempt to hide in the mousehole of the EPCA statute and its progeny.

3. Information Quality Act. The Information Quality Act ("IQA") is contained in the Treasury and General Government Appropriations Act for FY 2001, Pub. L. 106-554, § 515, 114 Stat. 2763 (Dec. 21, 2000). The IQA is also set out at 44 U.S.C. § 3516 (note). The IQA provides in relevant part that the Office of Management and Budget ("OMB") and the federal agencies must establish guidelines "for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies." IQA Section (a) & (b)(2)(A).

Most importantly, the IQA creates this mandatory duty: the agencies "shall ... establish administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency that does not comply with the guidelines issued" by OMB. Id. Section (b)(2)(B).

DOE's cost-benefit analysis flunks the IQA's demanding requirements. As noted above,

DOE did not use true peer-reviewed science. This flunks the IQA. *Cf. Nat;l Black Media Coal. v. FCC*, 791 F.2d 1016, 1023 (2d Cir. 1986) ("it is the methodology used in creating the maps and studies, and the meaning to be inferred from them" that must be open to public comment) (citation and internal quotation marks omitted). Similarly, DOE simply handwaves at the problem it concedes exist with its use of damage functions, *see* 88 Fed. Reg. at 6,867. All that is occurring is that the model developers are making up functional forms and corresponding parameter values. *See, e.g.*, R.S. Pindyck, *Climate Change Policy: What Do the Models Tell Us?*, NBER Working Paper Series, WP 19244, at 11 (July 2013)).

4. State of Louisiana Arguments in *Louisiana v. Biden*. Finally, we incorporate by reference all of the arguments made against use of the social cost of carbon by the State of Louisiana in *Louisiana v. Biden*, 585 F. Supp. 3d 540 (W. D. La. 2022). Specifically, we incorporate by reference legal arguments as summarized by and adopted to support the grant of a preliminary injunction by Judge Cain. The Fifth Circuit dismissed the case when it went on appeal. But that will not be a problem as to this proposed rule because the SCC is clearly an ingredient in the proposed DOE rule at issue here, which clearly will injure consumers by making gas stoves unavailable or more expensive.

Conclusion

We (Happer and Lindzen) are career physicists, and in our opinion the scientific method proves that there is no reliable science supporting the proposed standards based on the proposition that electric stoves are more energy efficient than gas stoves and the IWG SCC Estimates used in the proposal are fatally flawed science value and as a matter of administrative law make the IWG SCC Estimates no support for the DOE proposed rule.

Thus, the DOE standards must not be adopted and the IWG SCC Estimates must not be used. If adopted, the DOE standards should be ruled invalid by the courts.

Further, the DOE should use the Site (Place of Use) method when measuring energy savings and not the Full Fuel Cycle method, and review any of the 110 energy savings that it has made or other agency that made that similarly are similarly flawed by using the Full Fuel Cycle. method.

SUMMARY OF COMMENTERS' QUALIFICATIONS

William Happer, Ph.D.

I am a Professor Emeritus in the Department of Physics at Princeton University.

I began my professional career in the Physics Department of Columbia University in 1964, where I served as Director of the Columbia Radiation Laboratory from 1976 to 1979. I joined the Physics Department of Princeton University in 1980.

I invented the sodium guidestar that is used in astronomical adaptive optics systems to correct the degrading effects of atmospheric turbulence on imaging resolution. I have published over 200 peer-reviewed scientific papers, am a Fellow of the American Physical Society, the American Association for the Advancement of Science, and a member of the American Academy of Arts and Sciences, the National Academy of Sciences and the American Philosophical Society.

I served as Director of Energy Research in the U.S. Department of Energy from 1991 to 1993. I was a co-founder in 1994 of Magnetic Imaging Technologies Incorporated (MITI), a small company specializing in the use of laser-polarized noble gases for magnetic resonance imaging. I served as Chairman of the Steering Committee of JASON from 1987 to 1990.

I served as Deputy Assistant to the President and Senior Director for Emerging Technologies at The National Security Council in the White House from 2018 to 2019.

I am the Chair of the Board of Directors of the CO2 Coalition, a nonprofit 501(c)(3) organization established in 2015 to educate thought leaders, policy makers and the public about the vital contribution made by carbon dioxide to our lives and our economy.

Richard Lindzen, Ph. D.

I am an Alfred P. Sloan Professor of Atmospheric Science Emeritus at MIT. After completing my doctorate at Harvard in 1964 (with a thesis on the interaction of photochemistry, radiation and dynamics in the stratosphere), I did postdoctoral work at the University of Washington and at the University of Oslo before joining the National Center for Atmospheric Research as a staff scientist. At the end of 1967, I moved to the University of Chicago as a tenured associate professor, and in 1971 I returned to Harvard to assume the Gordon McKay Professorship (and later the Burden Professorship) in Dynamic Meteorology. In 1981 I moved to MIT to assume the Alfred P. Sloan Professorship in Atmospheric Sciences. I have also held visiting professorships at UCLA, Tel Aviv University, and the National Physical Laboratory in Ahmedabad, India, and the Hebrew University in Jerusalem, the Jet Propulsion Laboratory in Pasadena, and the Laboratory for Dynamic Meteorology at the University of Paris.

I developed our current understanding of the quasi-biennial oscillation of the tropical stratosphere, the current explanation for dominance of the solar semidiurnal and diurnal tides at various levels of the atmosphere, the role of breaking gravity waves as a major source of friction in the atmosphere, and the role of this friction in reversing the meridional temperature gradient at the tropopause (where the equator is the coldest latitude) and the mesopause (where temperature is a minimum at the summer pole and a maximum at the winter pole). I have also developed the basic description of how surface temperature in the tropics controls the distribution of cumulus convection and led the group that discovered the iris effect where upper-level cirrus contract in response to warmer surface temperatures. I have published approximately 250 papers and books. I am an award recipient of the American Meteorological Society and the American Geophysical Union. I am a fellow of the American Meteorological Society, the American Geophysical Union and the American Association for the Advancement of Science, and a member of the National Academy of Sciences and the American Academy of Arts and Sciences.

I have served as the director of the Center for Earth and Planetary Sciences at Harvard and on

numerous panels of the National Research Council. I was also a lead author on the Third Assessment Report of the UN's Intergovernmental Panel on Climate Change – the report for which the IPCC shared the Nobel Peace Prize with Al Gore. I am currently a member of the CO2 Coalition.

Gregory Wrightsone

I am a geologist with degrees in geology from Waynesburg University (BS) and West Virginia University (MS). I was deeply involved in the early research and exploration for the vast shale gas reserves in the eastern United States. I was the co-author of the first peer-reviewed comprehensive paper on the Marcellus Shale Mega giant Gas Field, the largest natural gas accumulation in the world. I also authored studies on a previously undocumented Super-Giant field, the Burket Shale.

I am the author of the climate change-related *Inconvenient Facts*, a #1 bestseller. I was accepted as an Expert Reviewer for the Intergovernmental Panel on Climate Change (AR6). I am Executive Director of the CO2 Coalition.

CO2 Coalition

The CO2 Coalition is the nation's leading organization providing facts, resources and information about the vital role carbon dioxide plays in our environment. Membership is comprised of more than 100 of the world's foremost experts on climate change and represents a wide range of expertise including atmospheric physics, geology, oceanography, economics and more. The Coalition provides facts and science without political ideology to the public through publications, public presentations, commentaries and interviews. Our membership has published many thousands of peer-reviewed scientific papers over a wide spectrum of climate-related topics.