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**Comment and Declaration on the SEC's Proposed Rule  
"The Enhancement and Standardization of  
Climate-Related Disclosures for Investors,"  
File No. S7-10-22, 87 Fed. Reg. 21334 (April 11,2022)**

**AS CAREER PHYSICISTS, SCIENCE DEMONSTRATES  
THERE IS NO CLIMATE RELATED RISK  
CAUSED BY FOSSIL FUELS AND CO<sub>2</sub>,  
THUS NO SCIENTIFIC BASIS FOR THE PROPOSED RULE,  
AND, IF ADOPTED, DISASTROUS CONSEQUENCES  
FOR PEOPLE WORLDWIDE AND THE U. S. BECAUSE  
IT WOULD REDUCE CO<sub>2</sub> AND THE USE OF FOSSIL FUELS**

**June 17, 2022**

**CURRICULUM VITAE**

**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 for 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 CO<sub>2</sub> Coalition, a non-profit (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 a Professor Emeritus in the Department of Earth, Atmospheric, and Planetary Sciences 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, 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.

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## Comment and Declaration

Thank you for the opportunity to comment on the proposed SEC requiring disclosures of climate related risk caused by fossil fuels and CO<sub>2</sub>.

We are career physicists who have specialized in radiation physics and dynamic heat transfer for decades.

In our opinion, science demonstrates that there is no climate related risk caused by fossil fuels and CO<sub>2</sub> and no climate emergency.

Further, nowhere in the more than 500 pages of the proposed rule is there any reliable scientific evidence that there exists a climate related risk. None. It refers to the International Panel on Climate Change (“IPCC”), the Task Force on Climate-Related Financial Disclosures (“TCFD”) and other outside groups, but never provides any reliable scientific evidence that supports the rule. The science is just assumed. Therefore, there is no reliable scientific basis for the proposed SEC rule.

Further, contrary to what is commonly reported, CO<sub>2</sub> is essential to life on earth. Without CO<sub>2</sub>, there would be no photosynthesis, and thus no plant food and not enough oxygen to breathe.

Moreover, without fossil fuels there will be no low-cost energy worldwide and less CO<sub>2</sub> for photosynthesis making food. Eliminating fossil fuels and reducing CO<sub>2</sub> emissions will be disastrous for the poor, people worldwide, future generations and the country.

Finally, the cost of the proposed rule is enormous and would have no public benefit. It would increase the reporting burden to companies \$6.4 billion, which is 64% more than the \$3.9 billion all SEC reporting requirements have cost companies from its beginning in 1934. *Id.*, 87 Fed. Reg., p. 21461.

Thus, the rule must not be adopted or, if adopted, ruled invalid by the courts.

Here’s the science why.

### **I. RELIABLE SCIENTIFIC THEORIES COME FROM VALIDATING THEORETICAL PREDICTIONS WITH OBSERVATIONS, NOT CONSENSUS, PEER REVIEW, GOVERNMENT OPINION OR MANIPULATED DATA**

Scientific knowledge is determined by scientific method. Prof. Richard Feynman, a Nobel Laureate in Physics, provided an incisive definition of 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.

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 the theories that don’t work. This has been the scientific method for more than three hundred years.

However, scientific knowledge is not determined by:

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.”

Government Opinion. Nobel physicist Richard Feynman put it clearly:

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

The importance of scientific principles that government does not determine science was chillingly underscored when Stalin made Trofim Lysenko the czar of Russian biology. 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. To highlight the dangers of government-dictated science, government-dictated science is referred to here at times as “Lysenko science.”

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 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 a joke. It is pal review, not peer review. The present situation violates the ancient principle “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 problems with confirmation bias.

Manipulated and Omitted Unfavorable Observations. Since theories are tested with observations, fabricating and omitting unfavorable facts to make a theory work is an egregious violation of scientific method.

Richard Feynman stated this fundamental principal of 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

U.S. Supreme Court on Science. The U.S. Supreme Court has adopted essentially the same view of science, starting in 1993 with its landmark *Daubert* decision:

“[I]n order to qualify as ‘scientific knowledge,’ an inference or assertion must be derived by the scientific method,” “any and all scientific testimony or evidence admitted [must be] ...reliable,” “tested,” and “supported by appropriate validation.” *Daubert v. Merrell Pharmaceutical, Inc.*, 509 U.S. 579 (1993) (emphasis added).

Scientific evidence must be reliable, tested and validated -- or not be used.

As to peer review, the Supreme Court similarly explained that peer review can be helpful but "does not necessarily correlate with reliability" because "in some instances well-grounded but innovative theories will not have been published." *Daubert, supra*, p. 593.

Thus, scientific knowledge is determined by scientific method, testing theory with

observations, not by consensus, government opinion, peer review or manipulated data.

These fundamental principles of science and scientific method are applied to the SEC proposed rule, next.

## **II. SCIENCE DEMONSTRATES THERE IS NO CLIMATE-RELATED RISK CAUSED BY FOSSIL FUELS AND CO<sub>2</sub>, AND THEREFORE NO RELIABLE SCIENTIFIC EVIDENCE SUPPORTING THE PROPOSED RULE**

### **A. There is No Urgency to Act Now and Thus There is No Need for the Proposed Rule**

Our informed scientific opinion is that doubling CO<sub>2</sub> concentrations will cause about 1 C or less of warming. But assuming that doubling CO<sub>2</sub> levels from today's 415 ppm to 830 ppm will raise temperatures by a "dangerous" 2° C (about 4° F), which is unsupported by science, it would take a century or more for that to happen at the levels of CO<sub>2</sub> emissions today.

Thus, assuming for sake of argument there is a climate risk caused by fossil fuels and CO<sub>2</sub> (there is not), there is no urgency to adopt the proposed rule.

### **B. Today's 415 ppm CO<sub>2</sub> Level is Near a Record Low, Not Dangerously High, and Thus Provides No Reliable Scientific Evidence to Support the Proposed Rule**

"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<sub>2</sub> emissions by 2050.<sup>1</sup>

One classic example of cherry picking and omitting observations that contradict a theory is the repeated reporting that recent CO<sub>2</sub> levels, now 415 ppm, and its rise from 280 ppm at the beginning of the Industrial Age, are dangerously high and unprecedented in tens of thousands and even 20 million years.

For example, the EPA's Endangerment Findings warned ominously, "[C]urrent atmospheric greenhouse gas concentrations are now at elevated and essentially unprecedented levels" and that carbon dioxide and methane at higher levels than they have been for "at least the last 650,000 years."<sup>2</sup>

The Supreme Court in its landmark *Massachusetts v. EPA* stated that the CO<sub>2</sub> level that reached 382 ppm in 2006 was higher than "at any point over the last 20 million years." 549 U. S. 504, 507 n. 10 (2007).

But in geological time, tens of thousands of years and even 20 million years is just a moment in time.

Why are the hundreds of millions of years of data on CO<sub>2</sub> and temperature always omitted?

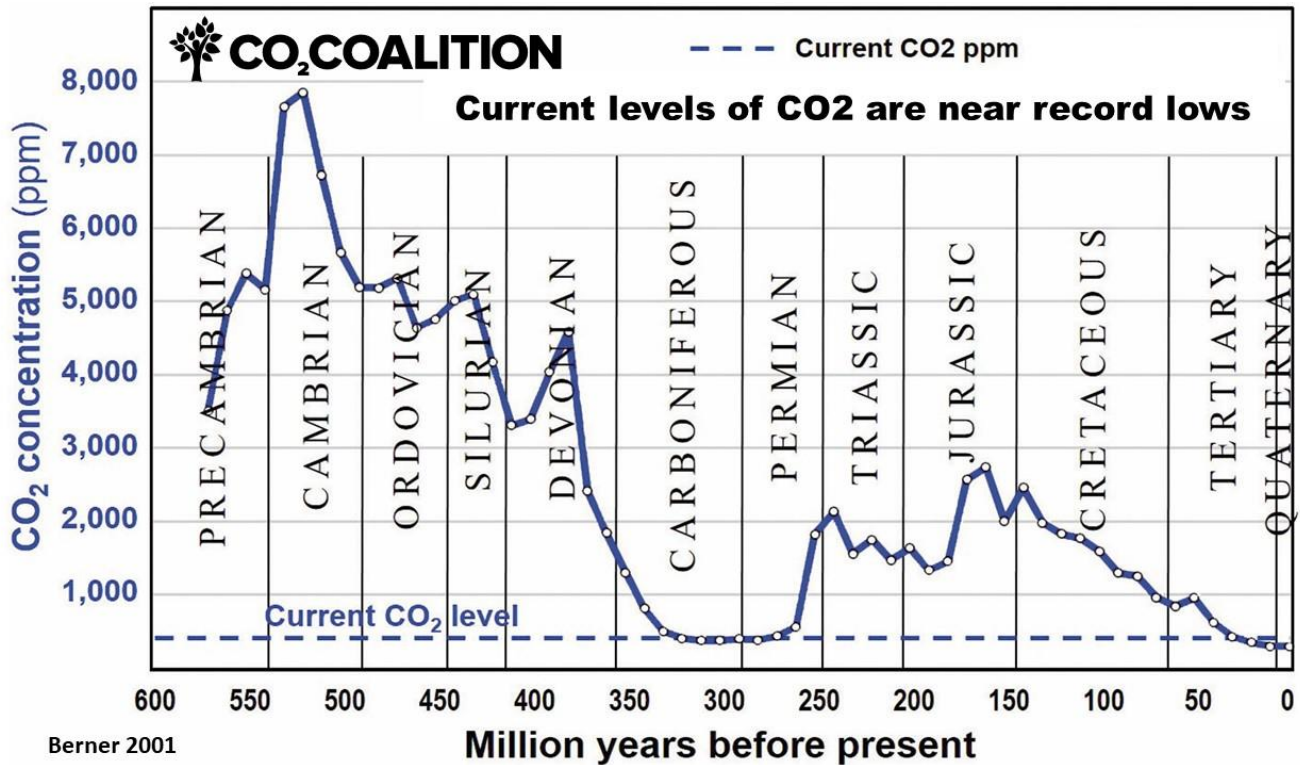
This hundreds of millions of years of geological data disproves the theory that CO<sub>2</sub> is a major determinant of Earth's temperature, that atmospheric CO<sub>2</sub> concentrations are the "control

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<sup>1</sup> 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.

<sup>2</sup> EPA, "Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act," 74 Fed. Reg. 66496 (Dec. 15, 2009) ("Endangerment Findings"), p. 66511 (emphasis added).

knob” for Earth’s temperature and that there will be catastrophic global warming unless the use of fossil fuels is reduced to “net zero” soon, is contradicted by this data and therefore is scientifically invalid, shown in the commonly cited chart below:<sup>3</sup>



The omitted data shows that that today’s 415 ppm CO<sub>2</sub> level is near a record low, not a record high, and that the 135 ppm increase over the past two centuries is trivially small compared to changes in the geological history of life on Earth.

The chart also makes clear:

- CO<sub>2</sub> levels were over 1,000 ppm for hundreds of millions of years
- CO<sub>2</sub> levels ranged from a high of over 7,000 ppm -- almost 20 times higher than today’s 415 ppm, to a low of 200 ppm, close to today’s low 415 ppm
- CO<sub>2</sub> has been declining for 180 million years from about 2,800 ppm to today’s low 415 ppm
- Today’s 415 ppm is not far above the minimal level when plants die of CO<sub>2</sub> starvation, around 150 ppm, and therefore all human and other life would die for lack of food.

Applying scientific method, omitting unfavorable data that contradict a theory to make it work is an egregious violation of scientific method, unfortunately commonly used by those arguing there is a climate emergency.

Here the omitted observations falsify the theory that there is a climate related risk caused by fossil fuels and CO<sub>2</sub> that will lead to catastrophic global warming unless fossil fuels are

<sup>3</sup> Gregory Wrightstown, *Inconvenient Facts* (2017), p. 16; CO<sub>2</sub> Coalition, [CO<sub>2</sub>\\_07.jpg \(1280×720\) \(co2coalition.org\)](#)

reduced to “net zero.” The theory is “wrong” under Feynman’s definition of scientific method and thus is invalid and unreliable science.

These observations also confirm there is no climate related risk caused by fossil fuels and CO<sub>2</sub>, and thus demonstrate there is no scientific basis for the proposed rule.

What about temperatures?

**C. 600 Million Years of CO<sub>2</sub> and Temperature Data Contradict the Theory that High Levels of CO<sub>2</sub> Will Cause Catastrophic Global Warming, Thus Confirming There is No Reliable Scientific Evidence Supporting the Proposed Rule**

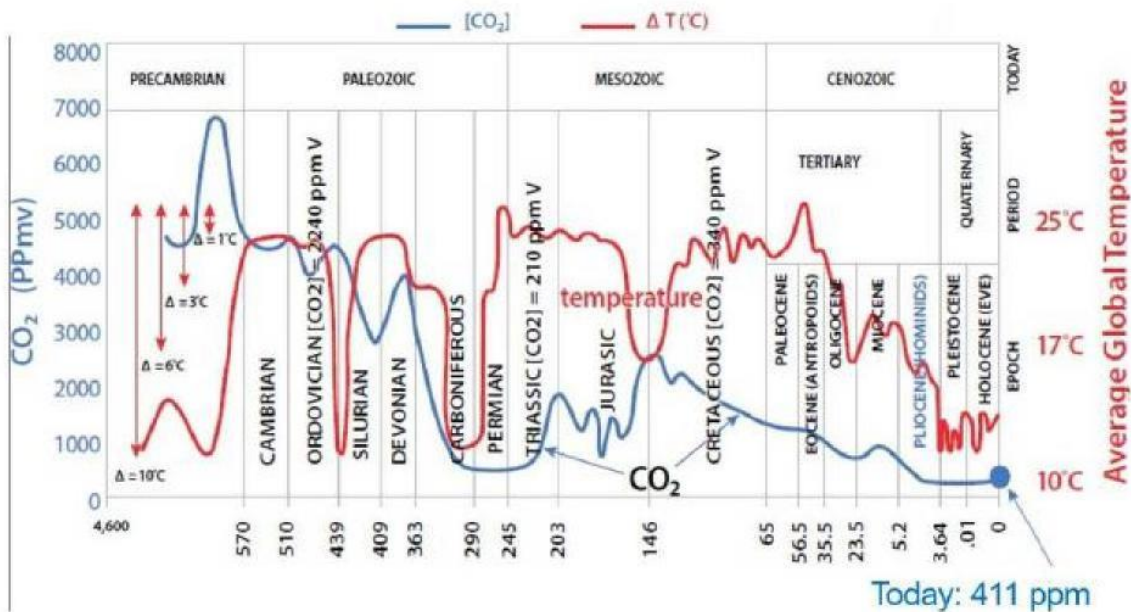
The chart below shows estimates 600 million years of CO<sub>2</sub> concentrations and temperatures.

The blue line shows CO<sub>2</sub> levels.

The red line shows temperature.

CO & Temperature long term view - 600 million years of climate change

Geological Timescale: Concentration of CO<sub>2</sub> and Temperature fluctuations



1- Analysis of the Temperature Oscillations in Geological Eras by Dr. C. R. Scotese © 2002. 2. Ruddiman, W.F. 2001. *Earth's Climate: past and future* W.H. Freeman & Sons. New York, NY. 3 - Mark Pegani *et al.* *Marked Decline in Atmospheric Carbon Dioxide Concentrations During the Paleocene*. Science; Vol. 309, No. 5734; pp. 600-603. 22 July 2005. Corrected on 07 July 2008 (CO<sub>2</sub>: Ordovician Period).

Reconstructed atmospheric carbon dioxide concentrations (Berner, 2001) & global mean surface temperature (Scotese, 1999) over the last 550 million years

The chart<sup>4</sup> shows:

- CO<sub>2</sub> concentrations and temperature were uncorrelated over the past 600 million years.

<sup>4</sup> Nahle, "Geologic Global Climate Changes," *Biology Cabinet J.* (March 2007), Gregory Wrightstone revision.



- For hundreds of millions of years, temperatures were low when CO<sub>2</sub> levels were high, and temperatures were high when CO<sub>2</sub> levels were low.
- When CO<sub>2</sub> was record high of about 7,000 ppm, temperatures were at a record low
- temperatures were the highest they have ever been about 60 million years ago, but CO<sub>2</sub> levels were low.
- temperatures have been higher than today over most of the past 600 million years, and life flourished
- CO<sub>2</sub> levels have been relatively low for the last 300 million years, and have been sharply declining for the last 180 million years from 2,800 ppm today's low 415 pm.

Thus Paleoclimate data going back 600 million years to the present show an inverse relation between CO<sub>2</sub> and climate temperatures most of the time, and little correlation between them, implying that the effects of CO<sub>2</sub> are, in fact, marginal. Although the data are based on various proxies, with the attendant uncertainties, they are good enough to demolish the argument that atmospheric CO<sub>2</sub> concentrations control Earth's climate. They do not.

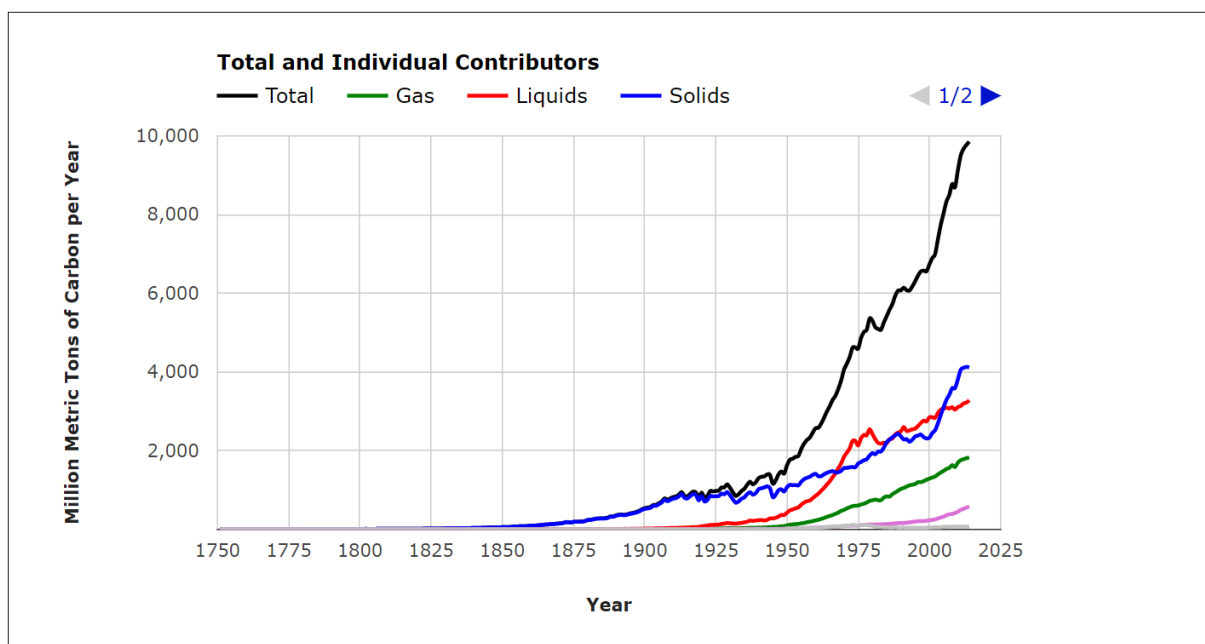
Applying scientific method, this data shows there is no climate-related risk caused by CO<sub>2</sub> and fossil fuels and that the theory of catastrophic global warming from high CO<sub>2</sub> levels is wrong. The theory does not agree with the observations. Scientifically it must be rejected. This is another reason there is no scientific basis for the proposed rule.

**D. Two Recent Warming Periods Show Increased CO<sub>2</sub> Doesn't Drive Major Temperature Increases, Thus Providing No Reliable Scientific Evidence to Support the Proposed Rule**

Curiously, the IPCC and many others focus on the Industrial Age around 1750 as the starting point to analyze fossil fuel and human emissions of CO<sub>2</sub> to the climate. The facts are that fossil fuel emissions were trivial then, and for 200 years until about 1940.

The facts are half of fossil fuel CO<sub>2</sub> and other carbon emissions since 1750 have occurred

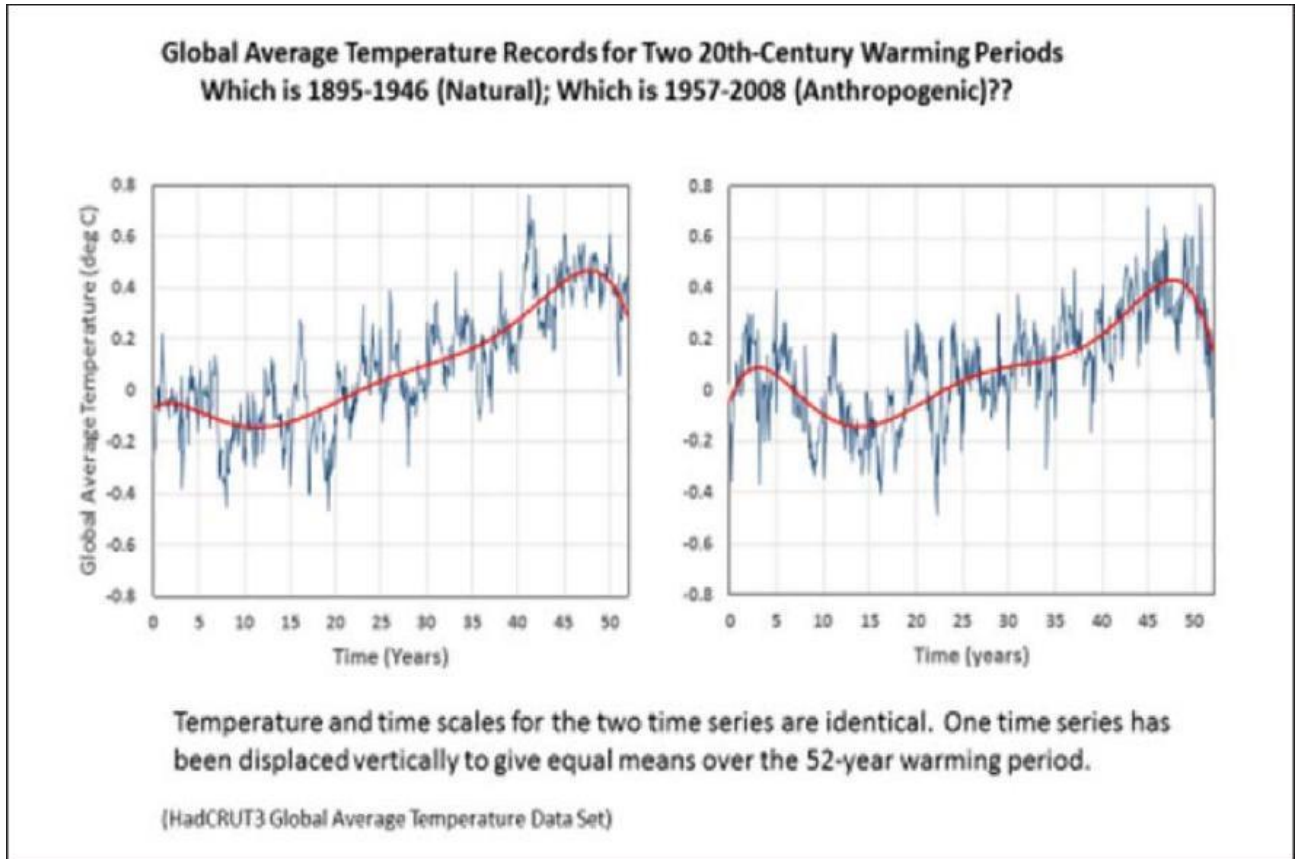
Carbon Emission Estimates



since the late 1980s, shown below:<sup>5</sup>

I (Prof. Lindzen) show two recent warming periods, one 1895-1946 on the left and the second 1957-2008 on the right.<sup>6</sup>

Both look nearly the same.



However, increased CO<sub>2</sub> could not be responsible for the warming on the left between 1895-1946 because there was so little fossil fuel and other human CO<sub>2</sub> emissions during that time, as the chart above shows. Fossil fuel emissions were trivial then.

Accordingly, using scientific method, this data is another contradiction of the theory that higher fossil fuel CO<sub>2</sub> emissions will create catastrophic global warming.

It's yet further proof that there is no climate related risk caused by fossil fuels and CO<sub>2</sub>, and thus further demonstrates is no reliable scientific evidence supporting the proposed rule.

**E. The IPCC CMIP and Other Models Fail to Reliably Predict Temperatures, Thus Confirming There is No Reliable Scientific Evidence Supporting the Proposed Rule**

As noted, nowhere in the 500+ pages of the proposed rule is there any explanation of the scientific basis of the rule. Instead it states, for example:

“Several commenters referred to various reports by the Intergovernmental Panel on Climate Change (“IPCC”) to demonstrate that there is scientific **consensus** that climate

<sup>5</sup> Boden, T.A., G. Marland, and R.J. Andres. 2017. Global, Regional, and National Fossil-Fuel CO<sub>2</sub> Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy.

<sup>6</sup> Lindzen, “On Climate Sensitivity,” *CO<sub>2</sub> Coalition* (Dec. 2019), p. 13.

change is the result of global warming caused by human-induced emissions of greenhouse gases and poses significant global risks.” 87 Fed. Reg., p. 21339 (emphasis added).

As noted, consensus has no value as reliable scientific evidence

Scenario analysis is one of the ways suggested to comply with the proposed SEC rule:

“We note that there are a number of publicly-available climate-related scenarios that could form the basis of a registrant’s scenario analysis....If a registrant uses scenario analysis to assess the resilience of its business strategy to climate-related risks, investors may benefit from the use of scientifically based, widely accepted scenarios, such as those developed by the IPCC, International Energy Agency (“IEA”), or Network of Central Banks and Supervisors for Greening the Financial System (“NGFS”), and that “The TCFD [Task Force on Climate-Related Financial Disclosures] has summarized a number of publicly available scenario analysis models.” 87 Fed. Reg., p. 21357 (footnotes omitted).

It is not practical to discuss all these references, so this comment is focused on the IPCC because it is the single most cited source of the theory that dangerous global warming is caused by human emissions of fossil fuels, CO<sub>2</sub> and other greenhouse gases. The IPCC is also, the dominant source of the models used in scenario predictions of dangerous climate warming.

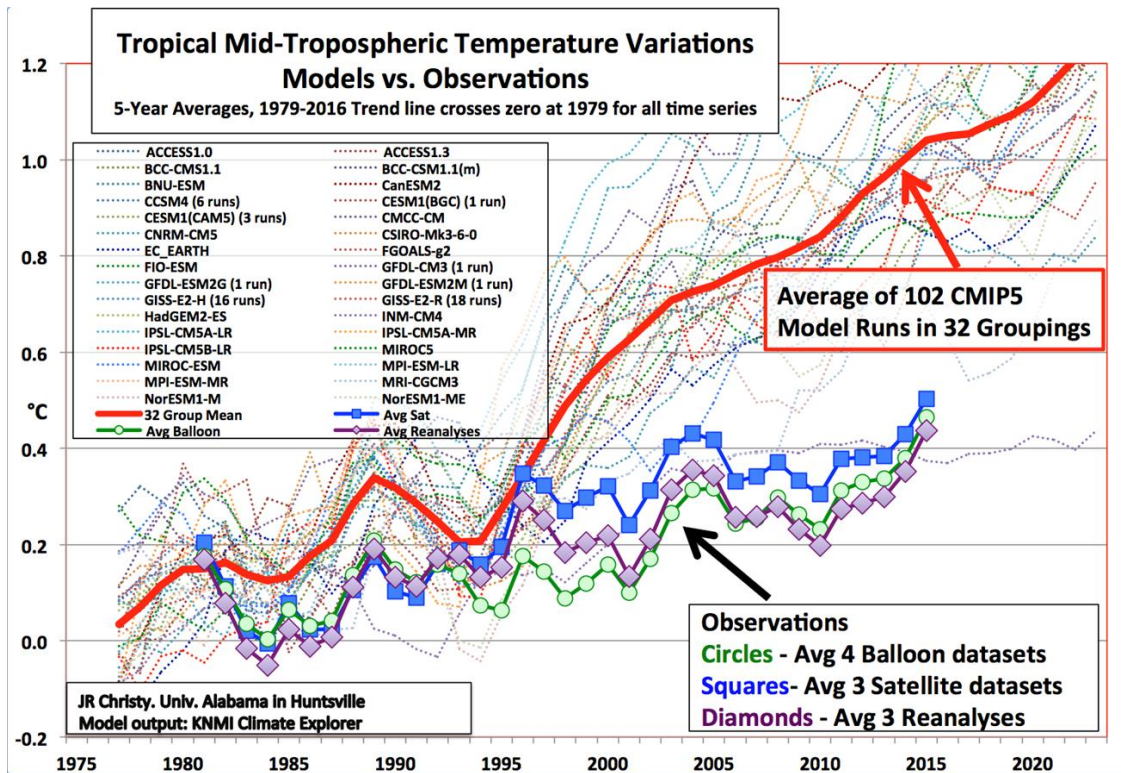
However, the IPCC CMIP models (Coupled Model Intercomparison Project) do not reliably predict temperatures and therefore should be rejected under basic scientific method, demonstrated next.

CMIP5. John Christy, PhD, Professor of Atmospheric Science at the University of Alabama, applied the scientific method to CMIP5 102 predictions of temperatures 1979-2016 by models from 32 institutions.

He explained he used “the traditional scientific method in which a claim (hypothesis) is made and is tested against independent information to see if the claim can be sustained,” and produced the following chart:<sup>7</sup>

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<sup>7</sup> John Christy, House Comm. Science, Space and Technology (March 29, 2017), pp. 3, 5



At the bottom, the blue, purple and green lines show the actual reality temperature observations against which the models’ predictions were tested.

The dotted lines are 102 temperature “simulations” (predictions) made by the models from 32 institutions for the period 1979-2016.

The red line is the consensus of the models, their average.

The graph clearly shows 101 of the 102 predictions by the models (dotted lines) and their consensus average (red line) fail miserably to predict reality.<sup>8</sup> Focusing on the consensus red line, he concluded:

“When the ‘scientific method’ is applied to the output from climate models of the IPCC AR5, specifically the bulk atmospheric temperature trends since 1979 (a key variable with a strong and obvious theoretical response to increasing GHGs in this period), I demonstrate that the consensus of the models [red line] fails the test to match the real-world observations by a significant margin. As such, the average of the models is considered to be untruthful in representing the recent decades of climate variation and change, and thus would be inappropriate for use in predicting future changes in the climate or related policy decisions.” Id., p. 13 (emphasis added).

Thus, the models that produced the 101 predictions fail the Feynman test under scientific method. They do not “work,” and therefore provide no reliable scientific evidence for the proposed rule.

CMIP6. Steven Koonin, Phd., a Cal-Tech physicist, professor at New York University and author of *Unsettled* (2021), concluded:

“One stunning problem is that ... the later generation of [CMIP] models are actually

<sup>8</sup> The one model that closely predicted the temperatures actually observed is a Russian model and is the only model that should be used in science. However, the IPCC did not use it but used the models that it should have rejected.

more uncertain than the earlier one[s].”

“The CMIP6 models that inform the IPCC’s upcoming AR6 [Climate Change reports] don’t perform any better than those of CMIP5.” *Id.* pp. 87, 90 (emphasis added).

He elaborated CMIP6’s failure using the scientific method in detail:

- “An analysis of 267 simulations run by 29 different CMIP6 models created by 19 modeling groups around the world shows that they do a very poor job [1] describing warming since 1950 and ... [2] underestimate the rate of warming in the early twentieth century.” *Id.* p. 90 (emphasis added).
- “Comparisons among the [29] models [show] ... model results differed dramatically both from each other and from observations ... [and] disagree wildly with each other.” *Id.* p. 90 (emphasis added).
- “One particularly jarring failure is that the simulated global average surface temperature ... varies among models ... three times greater than the observed value of the twentieth century warming they’re purporting to describe and explain.” *Id.* p. 87 (emphasis added).
- As to the early twentieth century warming when CO<sub>2</sub> levels only increased from 300 to 310 ppm, “strong warming [was] observed from 1910 to 1940. On average, the models give a warming rate over that period of about half what was actually observed. That the models can’t reproduce the past is the big red flag -- it erodes confidence in their projections of future climate.” *Id.* pp. 88, 95 (emphasis added).

Thus the CMIP6 model also fails the fundamental test under scientific method: they do not work and thus do not provide any reliable scientific evidence for the proposed rule.

Other Models. Prof. Koonin’s book devoted an entire chapter to “Many Muddled Models,” not just the CMIP models.

He asked, “how good are our climate models? And how much confidence should we have in what they say about future climates?” He concluded all the models are “demonstrably unfit for the purpose,” elaborating:

“The uncertainties in modeling of both climate change and the consequences of future greenhouse gas emissions make it impossible today to provide reliable, quantitative statements about relative risks and consequences and benefits of rising greenhouse gases to the Earth system as a whole, let alone to specific regions of the planet.” *Unsettled*, pp. 24, 96.

In conclusion, the IPCC CMIP models that are widely used, and are the basis for the IPCC climate risk assessments and scenarios referred to in the proposed rule, fail the fundamental test of scientific method. They do not work.

Thus, contrary to common reporting, they provide no reliable scientific evidence there is any climate-related risk caused by fossil fuels and CO<sub>2</sub>. They also provide no reliable scientific evidence for the proposed rule.

#### **F. The IPCC is Government Controlled and Only Issues Government Dictated Findings, and Thus Can Provide No Reliable Scientific Evidence for the Proposed Rule**

Unknown to most, two IPCC rules require that IPCC governments control what it reports as “scientific” findings on CO<sub>2</sub>, 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”), which controls what is published in full reports.

The picture below tells all.



*IPCC Summary for Policymakers writing meeting*

This 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:

**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 participating IPCC member countries**, in consultation with the scientists responsible for drafting the report.”<sup>9</sup>

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

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 CO<sub>2</sub> and fossil fuels. Any drafts the independent scientists write are rewritten as necessary to be consistent with the SPM.

**IPCC Reports Rule No. 2: Government SPMs Override Any Inconsistent Conclusions Scientists Write for IPCC Reports**

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<sup>9</sup> Sections 4.4-4.6 of Appendix A to the Principles Governing IPCC Work, the Procedures for the Preparation, Review, Acceptance, Adoption, Approval and Publication of IPCC Reports. [https://archive.ipcc.ch/news\\_and\\_events/docs/factsheets/FS\\_ipcc\\_approve.pdf](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).

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.” Frederick Seitz, “A Major Deception on Climate Warming,” *Wall Street Journal* (June 12, 1996).

However, the government written SPM proclaimed the exact opposite:

“The balance of evidence suggests a discernible human influence on global climate.” *1995 Science Report* SPM, p. 4.

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 SPM’s opposite language was inserted in the published version of Chapter 8 in the *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 scientific evidence, unless independently verified by scientific method.

Stop for a moment. Just imagine what have happened if the IPCC accurately reported the science. The scientists concluded there was no science that attributed all or most of the climate warming observed to manmade causes.

There would be no *Massachusetts v. EPA*, Green New Deal,” Net Zero” regulation, efforts to eliminate fossil fuels, huge subsidies of renewable energy and electric cars. For whatever reason, the IPCC as a government-controlled organization did not and has never followed the science if the science contradicts the theory of catastrophic global warming caused by fossil fuels and other human emissions.

In conclusion, none of the IPCC SPMs, models, scenarios and other findings asserting that dangerous climate warming is caused by human CO<sub>2</sub> and GHG emissions and fossil fuels are reliable scientific evidence, they are merely the opinions of IPCC governments.

Thus the IPCC SPMs, models, scenarios and other findings provide no reliable scientific evidence there is any climate related risk caused by fossil fuels, nor do they provide any reliable scientific evidence to support the proposed rule.

**G. The Endangerment Findings and National Climate Assessments Rely on IPCC Findings and Thus Provide No Reliable Scientific Evidence to Support the Proposed Rule**

The EPA Endangerment Findings and Technical Support Document (TSD)<sup>10</sup> and the National Climate Assessments (NCAs) by the U. S. Global Climate Research Program (USGCRP)<sup>11</sup> rely on IPCC models and opinions that are government controlled “science” and thus have no value as reliable scientific evidence.

As to the NCAs of the USGCRP, “the USGCRP Web site states that: ‘When governments accept the IPCC reports and approve their Summary for Policymakers, they acknowledge the legitimacy of their scientific content.’” Id. (footnote omitted).

However, legitimacy of scientific content is not determined by government, Richard Feynman emphasized, as noted: “No government has the right to decide on the truth of scientific principles.” Legitimacy of scientific content is determined by scientific method.

The most recent *NCA4 Science* report chose to rely on IPCC government controlled “scientific” findings 240 times. As a result, their science is contaminated by the IPCC’s government-dictated opinions and thus the NCAs have no value as reliable scientific evidence.

As a result, none the NCAs provide reliable scientific evidence that there is any climate related risk caused by fossil fuels and CO<sub>2</sub>, nor can they be used to support the proposed rule.

As to the Endangerment Findings, it expressly states in the section entitled “The Science on Which the Decisions Are Based,” that its Administrator relied on the IPCC and USGCRP assessments as two of the three “primary scientific and technical basis of her endangerment decision:”<sup>12</sup>

“[The] Administrator is relying on the major assessments of the USGCRP, IPCC, and NRC as the primary scientific and technical basis of her endangerment decision.”

The Technical Support Document of the Endangerment Findings emphasized that the IPCC controlling document, the Summary for Policymakers, was “approved line by line by” IPCC governments, not scientists:

“Each [IPCC] Summary for Policymakers is approved line-by-line, and the underlying chapters then accepted, by government delegations in formal plenary sessions.” TSD, p. 4.

Thus relying on IPCC and NCA assessments as science contaminates the EPA Endangerment Findings and its TSD. Specifically, the EPA Endangerment Findings and TSD rely on IPCC government-dictated findings many times:

- 433 times in the Technical Support Document

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<sup>10</sup> Endangerment Findings and EF TSD, *supra*.

<sup>11</sup> NCAs are required by the Global Change Research Act of 1990, and are prepared by numerous Federal agencies and departments, the U.S. Global Research Program (“USGRP”), U.S. Climate Change Science Program (“USCCSP”), the White House Office of Science and Technology Policy (“OSTP”) and Office of Management and Budget (“OMB”). The most recent NCA is U.S. Climate Change Science Program, *Fourth National Climate Assessment, Vol. I Climate Science Special Report (2017) (“NCA4 Science”) & Vol. II: Impacts, Risks, and Adaptation in the United States (2018)*.

<sup>12</sup> Endangerment Findings, *supra*, 74 Fed. Reg., p. 66511.



- 49 times directly in the Endangerment Findings
- 52 times indirectly in the Endangerment Findings.

As a result, the Endangerment Findings, its TSD and the National Client Assessments chose to be controlled by government opinion rather than scientific method.

Accordingly, the Endangerment Findings, its Technical Support Document and the NCAs are merely government opinions, and provide no reliable scientific evidence there is any climate related risk caused by fossil fuels and CO<sub>2</sub>. Nor do they provide any reliable scientific evidence to support the SEC's proposed rule.

#### **H. The Social Cost of Carbon TSD Estimates are Scientifically Invalid and Thus Provide No Reliable Scientific Evidence to Support the Proposed Rule**

On February 26<sup>th</sup>, 2021, the Interagency Working Group (IWG) published "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990" ("SCC TSD Estimates"). The SCC TSD Estimates are scientifically invalid for three alternative reasons.

First, the IWG estimated the social cost of carbon by combining 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<sub>2</sub> and excluded data on the enormous social benefits of CO<sub>2</sub> (detailed in Part III below).<sup>13</sup> This is another example omitting unfavorable data that is an egregious violation of scientific method. It is like promoting the theory the world is flat by only considering observations as far as the eye can see, excluding all the evidence the world is round. For this reason alone, the SCC TSD Estimates are fatally flawed science.

Second, the SCC TSD Estimates expressly state it relied on peer review and consensus, not scientific method, to determine its estimates:

"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**." SCC TSD Estimates, p. 36 (emphasis added).

As explained, peer review and consensus do not determine scientific knowledge, scientific method does. Accordingly, for this reason alone the SCC TSD Estimates are scientifically invalid.

Third, the SCC TSD Estimates states key numbers used in its estimates were based on IPCC government-dictated models from the IPCC's Fourth Assessment Synthesis Report in 2007 (IPCC AR4), and that four "recent scientific assessments by the IPCC" and two others "confirm and strengthen the science" used in the model runs. SCC TSD Estimates, p.32.

The five IPCC government-dictated publications relied upon 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

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<sup>13</sup> Dayaratna, McKittrick & Michaels, "Climate Sensitivity, Agricultural Productivity and the Social Cost of Carbon in FUND," *Environmental Economics & Policy Studies* (2020), pp. 443-48

Working Groups I, II and III to the Fifth Assessment Report

- 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-dictated publications contaminates the science in the SCC TSD Estimates and makes them scientifically invalid.

Therefore, for these three reasons, separately and together, the SCC TSD Estimates are scientifically invalid and provide no reliable scientific evidence there is any climate-related risk from fossil fuels and CO<sub>2</sub>. They also provide no reliable scientific evidence for the SEC proposed rule.

**I. “Net Zero” Worldwide Emissions Would Have a Trivial Impact on Temperatures, Thus Confirming There is No Reliable Scientific Evidence Supporting the Proposed Rule**

The surprising reality is that full implementation of the “net zero” emission goals of the Biden regulations, the Green New Deal legislation, the Paris Agreement and others would have a trivial impact on the climate according to the EPA’s own model. All would reduce global temperatures by less than 1° C by 2100.

Benjamin Zycher and Patrick Michaels provide more detail, based on a climate model developed with funding from the Environmental Protection Agency.<sup>14</sup> “The predicted effects of the various proposals put forth may surprise many readers. Even if we were to incorporate assumptions that exaggerate the impact of reduced greenhouse-gas emissions, full implementation of the “net-zero” emissions goals of--

- “the Biden administration would reduce global temperatures by 0.17 degrees Celsius by 2100.
- “Green New Deal ... would have about the same effect.
- “The Paris agreement, if implemented immediately and enforced strictly, would have a similar impact of about 0.17 degrees Celsius.
- “50% emissions cut by China would yield an impact of 0.18 degrees Celsius.
- “A net reduction to zero greenhouse-gas emissions by all 37 member states of the Organization for Economic Cooperation and Development would increase that figure to about 0.35 degrees Celsius.
- “Immediate global emissions cut of 75% would yield an impact of 0.54 degrees Celsius.

This means reducing the current 40 Gigaton CO<sub>2</sub> annual emissions worldwide and the 6 Gigaton annual U.S. CO<sub>2</sub> emissions to “net zero” would cause only tiny changes of the heat radiation to space, and therefore only tiny changes of Earth’s surface temperature. But these tiny changes would come at enormous cost financially and to the economies of the world. Worst of all, “net zero” CO<sub>2</sub> emissions would cause a huge reduction in the amount of food available

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<sup>14</sup> Zycher, *The Case for Climate-Change Realism*, at 107-09; Zycher and Michaels Prepared Statement on S. 2754, “American Innovation and Manufacturing Act of 2019,” Sen. Comm. Environment and Public Works (April 2020).

worldwide.

This also means there is no climate related risk from the continued use of fossil fuels and increasing CO<sub>2</sub>. And provides no reliable scientific evidence for the proposed rule.

**J. Climate Science is Awash with Manipulated Data, Which Provides No Reliable Scientific Evidence to Support the Proposed Rule**

As noted at the outset by Prof. Lindzen, “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 CO<sub>2</sub>.

One of us (Lindzen) in the article “Straight Talk About Climate Change” *Acad. Quest.* (2017), details how an “accumulation of false and/or misleading claims” is what really underlies the so-called “‘overwhelming evidence’ of forthcoming catastrophe.” Lindzen states that he is “surprised that anyone who could get away with such sophistry and downright dishonesty,” covering:

- the hottest years on record
- 97% of scientists agree
- extreme weather
- sea level rise
- Arctic sea rise
- polar bears
- ocean acidification
- death of coral reefs
- global warming as the cause of everything

For example, Wallace and others elaborate on how over the last several decades, NASA and NOAA have been fabricating temperature data to argue that that rising CO<sub>2</sub> levels have led to the hottest years on record.<sup>15</sup>

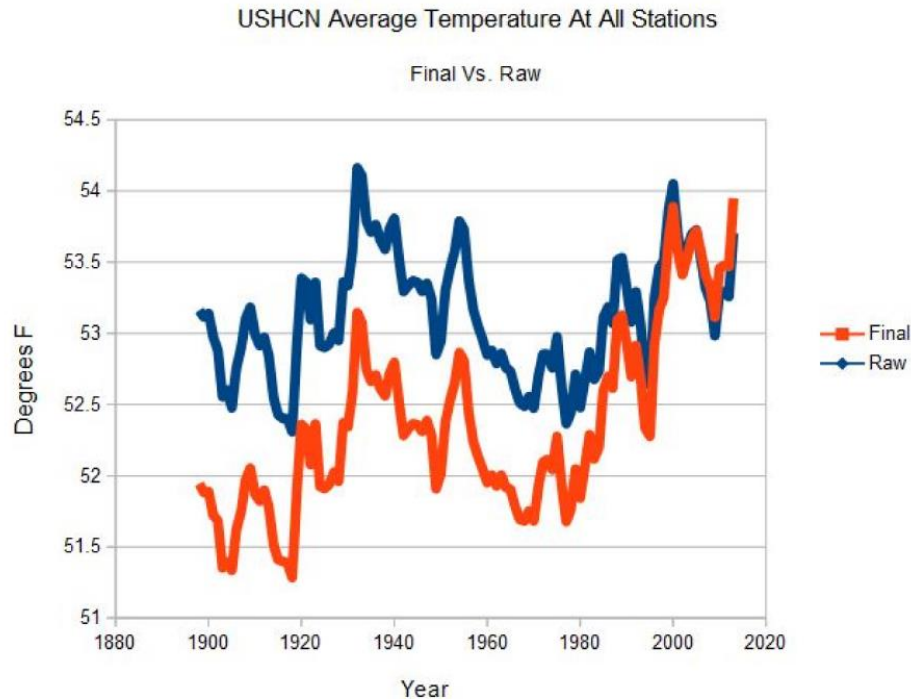
Typical NASA and NOAA alarmist temperature reports state:

- “2015 is Earth's warmest year by widest margin ... since record keeping began in 1880.” NOAA Global Summary Information December 2015 (Jan. 2016)
- “2019 was 2d hottest year on record for Earth say NOAA, NASA, just behind 2016.” NOAA Press Release (Jan. 15, 2020).

The chart below graphically illustrates the difference between credible temperature data, in blue, and NOAA and NASA fabrication of the temperature data, in red:

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<sup>15</sup> Wallace *at al.*, “On the Validity of NOAA, NASA and Hadley CRU Global Average Surface Temperature Data and the Validity of EPA’s CO<sub>2</sub> Endangerment Finding” (June 2017), p. 30.



Thus, the NASA/NAOO data that argues we are experiencing the hottest temperatures in recorded history is false and manipulated, another egregious violation of scientific method.

Accordingly, none of the manipulated data can be used scientifically to prove there is a climate related risk from fossil fuels and CO<sub>2</sub>, nor provide any no reliable scientific evidence to support the proposed rule.

**K. NAS’ Valuing Climate Damages is Based on Peer Review and Consensus, Not Scientific Method, and Thus Provides No Reliable Scientific Evidence to Support the Proposed Rule**

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

For whatever reason, the book expressly stated that it was not following scientific method, but instead stated that 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<sub>2</sub> 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 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, this book does not provide any reliable scientific evidence to support the

proposed rule.

**L. Climate Science Publishing Is Dominated by One-Sided, Paid-For Studies with No Disclosure, and Thus Provides No Reliable Scientific Evidence to Support the Proposed Rule Without Full Disclosure of Funding**

There has been enormous one-sided funding for research that reinforced the message of imminent doom from the use of fossil fuels and increasing CO<sub>2</sub> but very little funding of contrary research. Dr. Harold Lewis, a distinguished physics professor, bluntly described this reality:

“The global warming scam, with the (literally) trillions of dollars driving it ... has corrupted so many scientists ... It is the greatest and most successful pseudoscientific fraud I have seen in my long life as a physicist.” (October 6, 2010 resignation letter to the American Physical Society).

Trillions of dollars had been spent on one-sided research 12 years ago, and much more since.

The GAO reported that between 1993 and 2017, the Federal government has spent \$154 billion on clean energy, international assistance and climate science. GAO, *Climate Science: Analysis of Reported Federal Funding* (April 2018).

From our personal experience over decades, it is very difficult to obtain funding either from U.S. government sources or from private foundations for research that does not presuppose impending environmental doom.

When I (Prof. Happer) was the Director of Energy Research of the Department of Energy in the early 1990s, I was amazed that the great bulk of federal funds for environmental studies from the DOE, NASA, EPA and other federal agencies flowed into research programs that reinforced the message of imminent doom, humanity and planet Earth devastated by global warming, pestilence, famine, and flood. None of this was true then or now, but the shrill warnings have become more and more apocalyptic.

To date, one-sided papers have rarely disclosed funding sources, which include substantial funding from China and Russia. See, e.g., Rupert Durawall, *Green Tyranny* (details Russian and other foreign funding of the “climate industrial climate complex”) & Patricia Adams, *The Red and The Green: China’s Useful Idiots*, Global Warming Policy Foundation (2020).

Government and private foundation funded research should be particularly scrutinized as potentially biasing the results toward alarmism. The websites of most government agencies and private foundations clearly imply that the agency or foundation is working hard to counter “the climate crisis,” with the clear implication that proposed research that does not promise to support this narrative would be unlikely to receive funding.

Accordingly, all climate publications should require funding disclosure before they are used as science to support the proposed rule.

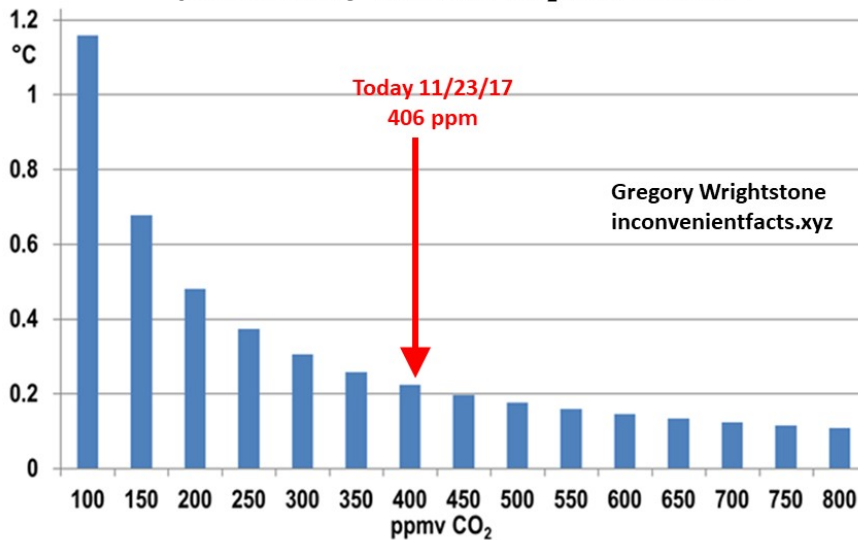
**M. The Logarithmic Forcing from CO<sub>2</sub> Means that Its Contributions to Global Warming is Heavily Saturated, Instantaneously Doubling CO<sub>2</sub> Concentrations from 400 ppm to 800 ppm, a 100% Increase, Would Only Diminish the Thermal Radiation to Space by About 1.1%, Thus Confirming There is No Reliable Scientific Evidence Supporting the Proposed Rule**

Both of us have special expertise in radiation transfer, the prime mover of the greenhouse effect in Earth’s atmosphere. It is important to understand the radiation physics of what the effect is of adding CO<sub>2</sub> at current atmospheric concentrations.

CO<sub>2</sub> becomes a less effective greenhouse gas at higher concentrations because of what is

often called “saturation.” Each additional 100 ppm increase of CO<sub>2</sub> in the atmosphere causes a smaller and smaller change in “radiative forcing,” or in temperature, since there are very good reasons to assume that temperature changes are proportional to changes in radiative forcing. The saturation is shown in the chart below.<sup>16</sup>

**Figure I-3: Less global warming for each additional 50 parts-per-million-by-volume of CO<sub>2</sub> concentration**



(Graph calculated using IPCC’s formula  $\Delta T_0 = \frac{5.35}{3.2} \ln \frac{C}{C_0}$ ;

AR3, Ch. 6.1. Courtesy Monckton 2017)

This means that from now on our emissions from burning fossil fuels could have little impact on global warming. There is no climate emergency. No threat at all. We could emit as much CO<sub>2</sub> as we like, with little warming effect.

Doubling CO<sub>2</sub> concentrations, from 400 ppm to 800 ppm, a 100% increase, would cause tiny changes of the heat radiation to space, and therefore tiny changes of Earth’s surface temperature, on the order of 1° C (about 2° F) of surface warming for every doubling of CO<sub>2</sub> concentrations.

Saturation also explains why temperatures were not catastrophically high over the hundreds of millions of years when CO<sub>2</sub> levels were 10-20 times higher than they are today, shown in the chart above.

Further, saturation also provides another reason why reducing the use of fossil fuels to “net zero” by 2050 would have a trivial impact on climate, contradicting the theory there is a climate related risk from fossil fuel and CO<sub>2</sub> emissions.

Adding more CO<sub>2</sub> to the atmosphere slightly decreases the flux of long-wave infrared radiation to space. The magnitude of this decrease is called the “forcing increment,” dF, and it is measured in Watts per square meter (W/m<sup>2</sup>). The details are shown in the graph below.<sup>17</sup>

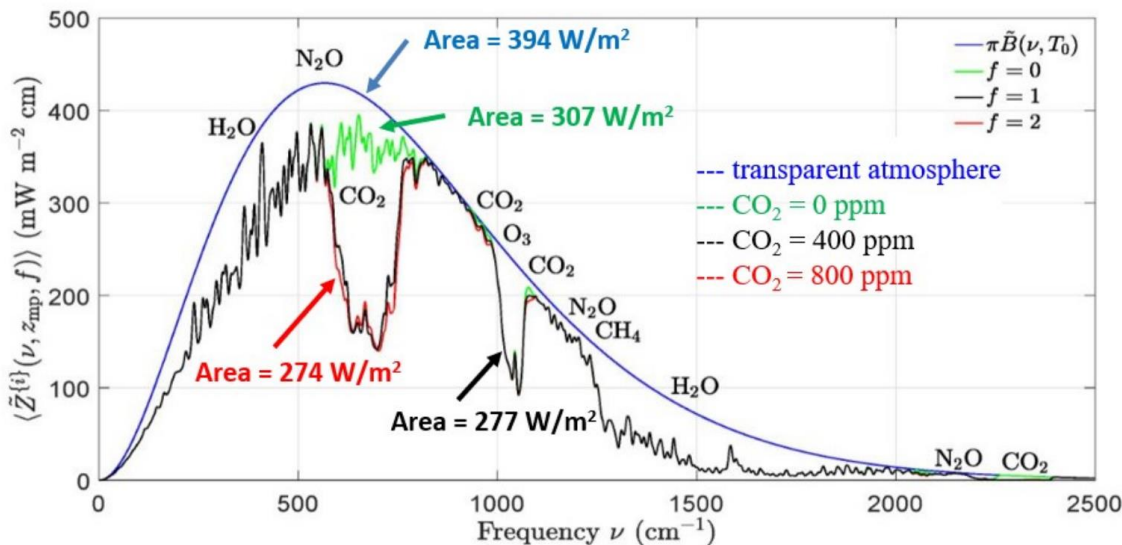
The smooth, deep blue curve shows the spectral intensity of heat energy the Earth would radiate to space if our atmosphere had no greenhouse gases or clouds. It is one of the most

<sup>16</sup> Gregory Wrightstone, *Inconvenient Facts*, p. 7.

<sup>17</sup> Happer & Wyngarden, “Dependence of Earth’s Thermal Radiation on Five Most Abundant Greenhouse Gases” (June 8, 2020), [2006.03098.pdf \(arxiv.org\)](https://arxiv.org/abs/2006.03098)

famous curves in physics. The formula for the curve was discovered by Max Planck, whose discovery of quantum mechanics began with the blue curve.

The area under the blue curve is about  $394 \text{ W/m}^2$ . It is the total flux if the Earth would radiate to space if the surface were at a temperature of  $60^\circ \text{ F}$  and there were no greenhouse gases to retard the escape of radiation. Without greenhouse gases, the total heat loss of  $394 \text{ W/m}^2$  through a transparent atmosphere would soon cool the Earth's surface to  $16^\circ \text{ F}$ , well below freezing. Most life would end at these low temperatures. We should be grateful for greenhouse warming of the Earth.



Below Planck's blue curve is a jagged black curve. It shows how much less the Earth radiates infrared radiation to space with the current concentration of greenhouse gases, water vapor,  $\text{H}_2\text{O}$ , nitrous oxide  $\text{N}_2\text{O}$ , carbon dioxide,  $\text{CO}_2$ , ozone,  $\text{O}_3$ , and methane  $\text{CH}_4$ . Because of the greenhouse gases, the Earth radiates  $277 \text{ W/m}^2$  to space, the area under the jagged black curve, and 70% ( $277/394$ ) of what it would radiate without greenhouse gases.

The red curve is the radiation emitted to space if  $\text{CO}_2$  concentrations were to be doubled from 400 ppm to 800 ppm. As can be seen, the difference is hardly noticeable, a decrease of radiation to space of about  $3 \text{ W/m}^2$ , which decreases the radiation to space from  $277 \text{ W/m}^2$  to  $274 \text{ W/m}^2$ , a decrease of 1.1% ( $3/277$ ). to  $280 \text{ W/m}^2$ . So, a 100% increase of  $\text{CO}_2$  concentration.

On average, the heat carried to space by infrared radiation is equal to the heat deposited on Earth by absorbed sunlight. Thus, if the heating rate of sunlight were to stay the same after an increase of greenhouse gases, heat energy would be added to the Earth and its temperature would increase.

This would be analogous to putting a lid on a pan of water, kept lukewarm by low heat on a stove burner. The lid would retard the convective heat loss and cause the water to get warmer. Eventually the pan with the lid would warm enough to lose heat at the same rate as the pan without the lid, and the temperature would stop rising.

Earth would respond to the 1.1% loss of radiation to space much like the pan of water. Earth's radiation flux  $F$  to space is very nearly that of a black body with an absolute temperature  $T$  of Earth's surface. This flux is given by the Stefan-Boltzmann law as  $F = \sigma T^4$ . Here  $\sigma$  is the Stefan-Boltzmann constant. From elementary calculus, we recall that an increment  $dT$  of the absolute temperature will cause an increment  $dF$  of the flux given by  $dF = 4\sigma T^3 dT$ . Dividing the left and right sides of these simple equations by each other we find  $dF/F = 4dT/T$ , or vice versa,  $dT/T = 1/4 dF/F$ . Thus, to increase the flux by 1.1% and bring solar heating back into balance with radiative cooling, a

temperature increase of  $dT/T$ , of  $\frac{1}{4} 1.1\% = 0.28\%$ . is needed. Since the absolute temperature of the Earth is approximately  $T = 300 \text{ K}$ , ( $60^\circ \text{ F}$ ), the required temperature increment is  $dT = 0.0028 \times 300 \text{ K} = 0.84 \text{ K} = 0.84 \text{ C}^\circ$ . This estimate,  $0.84 \text{ C}^\circ$ , is four times smaller than the  $3^\circ \text{ C}$  "most likely" warming claimed by the IPCC for a doubling of  $\text{CO}_2$ .

IPCC's much larger temperature increase from doubling  $\text{CO}_2$  is due to huge hypothetical positive feedbacks from changes in water vapor and clouds in the atmosphere. We note that large positive feedbacks are unusual in nature. Most feedbacks are negative, and this observation is even dignified with the name LeChatelier's Principle, which is often stated as:

"When any system at equilibrium for a long period of time is subjected to a change in [concentration](#), [temperature](#), [volume](#), or [pressure](#), (1) the system changes to a new equilibrium, and (2) this change partly counteracts the applied change."

The large positive feedbacks assumed by the IPCC violate Le Chatelier's Principle. They are not at all consistent with the geological history of Earth's temperature and  $\text{CO}_2$  concentrations.

Thus, basic physics shows that doubling  $\text{CO}_2$  would result in a temperature increase of less than  $1^\circ \text{ C}$ . Accordingly, there is no climate related risk caused by fossil fuels and  $\text{CO}_2$ , and another reason why there is no scientific basis for the proposed SEC rule.

Accordingly, there is no reliable scientific evidence that supports the SEC's proposed rule. But there are disastrous consequences if the rule is adopted, detailed next

### **III. IF THE RULE IS ADOPTED THERE WOULD BE DISASTROUS CONSEQUENCES FOR THE POOR, PEOPLE WORLDWIDE, FUTURE GENERATIONS AND THE UNITED STATES BECAUSE IT WOULD REDUCE $\text{CO}_2$ AND THE USE OF FOSSIL FUELS**

There is overwhelming scientific evidence that fossil fuels and  $\text{CO}_2$  provide enormous social benefits or low-income people, people worldwide, future generations and United States. True science also demonstrates that the SEC Disclosure rule, if adopted, will not benefit the climate but will be disastrous for the economy of the United States and the world. Lower income people would be particularly hard hit, especially in less developed countries.

Contrary to what is usually reported,  $\text{CO}_2$ , fossil fuels and greenhouse gases threaten life on the planet, they in fact are essential to life on Earth. Without them, there would be no human or other life on earth, elaborated next.

#### **A. $\text{CO}_2$ is Essential to Our Food, and Thus to Life on Earth.**

We owe our existence to green plants that, through photosynthesis, convert  $\text{CO}_2$  and water,  $\text{H}_2\text{O}$ , to carbohydrates with the aid of sunlight, and release oxygen. Land plants get the carbon they need from the  $\text{CO}_2$  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  $\text{CO}_2$  concentrations than present values. As far as green plants are concerned,  $\text{CO}_2$  is part of their daily bread—like water, sunlight, nitrogen, phosphorus, potassium and other essential elements.

Without  $\text{CO}_2$ , there would be no photosynthesis, no food and no human or other life.

What happens with a doubling of  $\text{CO}_2$ ? Many experiments and studies confirm that when  $\text{CO}_2$  is doubled, agricultural yields are increased significantly, especially in arid regions where more  $\text{CO}_2$  increases the resistance of plants to droughts. Greenhouse operators routinely pay to double or triple the concentrations of  $\text{CO}_2$  over their plants. The



improved yield and quality of fruits and flowers more than pay for the cost of more CO<sub>2</sub>, with only small and beneficial warming.

A dramatic example of the response of green plants to increases of atmospheric CO<sub>2</sub> is shown below: Dr. Sherwood Idso grew Eldarica (Afghan) pine trees with increasing amounts of CO<sub>2</sub> in experiments about 10 years ago, starting with an ambient concentration of CO<sub>2</sub> of 385 ppm. He showed what happens over the 10 years when CO<sub>2</sub> is increased by 150, 300 and 450 ppm, for total CO<sub>2</sub> concentrations of 385, 535, 685 and 835 ppm:<sup>18</sup>



More CO<sub>2</sub> has made a significant contribution to the increased crop yields of the past 50 years, as well. The benefits to plants of more CO<sub>2</sub> are documented in hundreds of scientific studies.

### **B. Photosynthesis from Atmospheric CO<sub>2</sub> Sustains Most Live on Earth.**

Nearly all of the food we eat comes ultimately from photosynthesis on the land or in the oceans. The oxygen we breathe was produced by photosynthesis over the geological history of the Earth. In the process of photosynthesis, energy from sunlight forces molecules of water, H<sub>2</sub>O, and molecules of carbon dioxide and CO<sub>2</sub> to combine to make sugars and other organic molecules. A molecule of oxygen, O<sub>2</sub>, is released to the atmosphere for every molecule of CO<sub>2</sub> converted to sugar. An interesting scientific aside is that the O<sub>2</sub> comes from the water molecules, H<sub>2</sub>O, used in photosynthesis, not from CO<sub>2</sub>.

Without CO<sub>2</sub>, there would be no photosynthesis, plants would die and the animals that eat them would starve to death, and most higher life forms would become extinct. The peculiar biological communities at deep sea vents and various chemotropic bacteria in sediments below Earth's surface would be all that remains of the once flourishing web of life that was sustained

<sup>18</sup> CO<sub>2</sub> Coalition, [CO<sub>2</sub> 3.jpg \(1280×720\) \(co2coalition.org\)](http://co2coalition.org)

by atmospheric CO<sub>2</sub>, water and sunlight.

Most green plants evolved at CO<sub>2</sub> levels of several thousand parts per million (ppm), many times higher than now. Plants grow better and produce better flowers and fruit at higher levels. Commercial greenhouse operators recognize this when they artificially increase CO<sub>2</sub> concentrations inside their greenhouses to over 1,000 ppm.

All green plants grow faster with more atmospheric CO<sub>2</sub>, including the CO<sub>2</sub> released by the combustion of fossil fuels, which is almost identical to the CO<sub>2</sub> respired by human beings and other living creatures.

### **C. Greenhouse Gases Prevent Us from Freezing to Death**

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 our verdant planet. Without them, we'd freeze to death.

To quote John Tyndall, the Anglo-Irish physicist who discovered greenhouse gases in the 1850's:

"Aqueous vapor is a blanket, more necessary to the vegetable life of England than clothing is to man. Remove for a single summer-night the aqueous vapor from the air which overspreads this country, and you would assuredly destroy every plant capable of being destroyed by a freezing temperature. The warmth of our fields and gardens would pour itself unrequited into space, and the sun would rise upon an island held fast in the iron grip of frost."

Tyndall identified "aqueous vapor" (water vapor) as the most important greenhouse gas. Water vapor, and clouds which condense from it, are the dominant greenhouse agents of Earth's atmosphere.

Carbon dioxide, CO<sub>2</sub>, is also a greenhouse gas, and does cause a small amount of warming of our planet. But it is far less effective than water vapor and clouds.

Without the greenhouse warming of CO<sub>2</sub> and its more potent partners, water vapor and clouds, the earth would be too cold to sustain its current abundance of life. We would freeze.

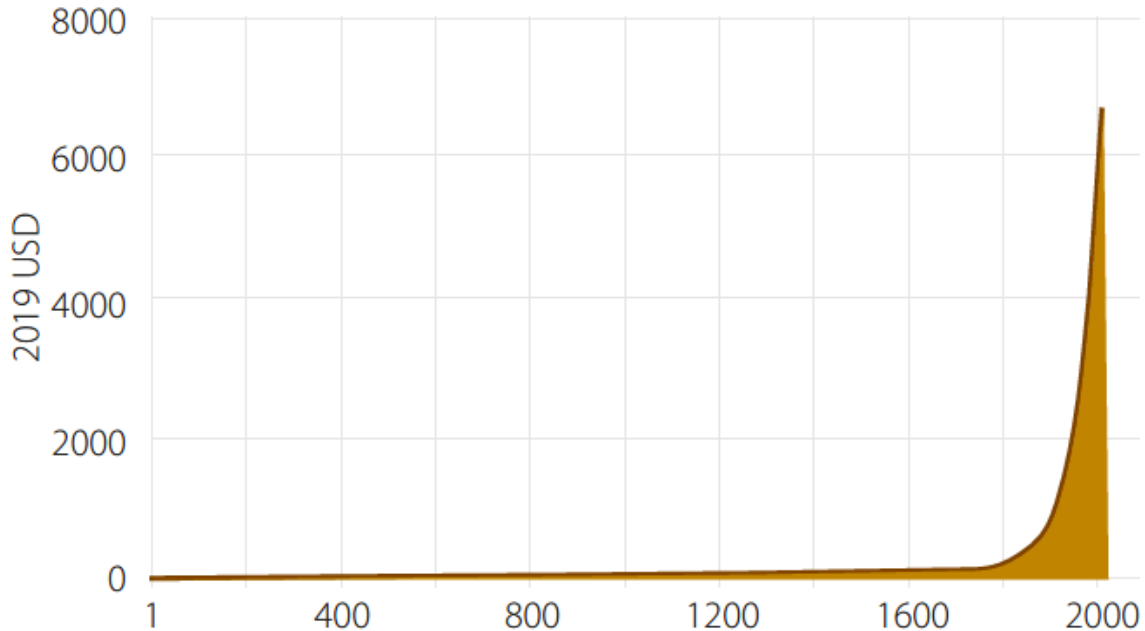
### **D. Enormous Social Benefits of Fossil Fuels**

Contrary to the incessant attack on fossil fuels, affordable, abundant fossil fuels have given ordinary people the sort of freedom, 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:<sup>19</sup>

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<sup>19</sup> Rupert Darwall, *Climate Noose: Business, Net Zero and the IPCC's Anticapitalism* (Global Warming Policy Foundation), p. 21.



In the mid-1800s, CO<sub>2</sub> levels were at a very low level, about 280 ppm. The great news is that CO<sub>2</sub> emissions from nature and fossil fuels has resulted in CO<sub>2</sub> levels rising from this low level to about 415 ppm today.

As a result, crop yields have increased by more than 15% over the past century. Better crop varieties, better use of fertilizer, better water management, etc., have all contributed. But the fact remains that a substantial part of the increase is due to the increase in CO<sub>2</sub> from about 300 ppm in 1850 to about 415 ppm from fossil fuels.

Mathematically, the growth rate of plants is approximately proportional to the square root of the CO<sub>2</sub> concentration. Thus, the increase in CO<sub>2</sub> concentration from about 280 ppm (300 ppm rounded) to 415 ppm over the past century increased growth rates by a factor of about  $\sqrt{4/3} = 1.15$ , or 15%.

As to temperature, CO<sub>2</sub> is a greenhouse gas and adding CO<sub>2</sub> to the atmosphere by burning coal, oil, and natural gas as a matter of radiation physics can only modestly increase the surface temperature of the earth. Specifically, physics proves that doubling the CO<sub>2</sub> concentration from our current 415 ppm to 830 ppm will directly cause about 1° C in warming.

In summary, the social benefits for people and life all over the world are enormous:

- since CO<sub>2</sub> is a plant fertilizer, agricultural and forestry yields have risen substantially over the last hundred years.
- economies have grown substantially, so that many people have prospered, and poverty has been reduced.
- electricity has become more affordable and available to many more people worldwide.
- and there has been a small but beneficial warming of the planet, about 2° Fahrenheit. This warming has been caused by a combination of natural causes and CO<sub>2</sub> increasing from its low level in 1850 and other greenhouse gases.

See also Goklany, *Carbon Dioxide: The Good News* (2015) & Happer, “The Truth About Greenhouse Gases,” CO2 Coalition (June 2011).

#### **IV. CONCLUSION**

Thus, in our opinion, science demonstrates that there is no climate emergency and no climate related risk caused by fossil fuels and CO<sub>2</sub>. Therefore, there is no reliable scientific evidence that supports the SEC proposed rule.

Further, contrary to what is commonly reported, CO<sub>2</sub> is essential to life on earth. Without CO<sub>2</sub>, there would be no photosynthesis, and thus no plant food and not enough oxygen to breathe.

Moreover, without fossil fuels there will be no reliable, low-cost energy worldwide and less CO<sub>2</sub> for photosynthesis making food. Eliminating fossil fuels and reducing CO<sub>2</sub> emissions will be disastrous for the United States and the rest of the world, especially for lower-income people.