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## Comment submitted by Orla E. Collier, Benesch Friedlander Coplan & Aronoff LLP on behalf of Murray Energy Corporation

The is a Comment on the **Environmental Protection Agency** (EPA) Proposed Rule: [Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Reopening of the Comment Period](#)

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### Comment

Please see attached Comments of Murray Energy Corporation. Appendix A through Appendix D will be sent under separate cover. Thank you.

### Attachments (1)



#### Comment

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**BEFORE  
THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

<b>REPEAL OF CARBON POLLUTION</b>	)	
<b>EMISSION GUIDELINES FOR</b>	)	<b>DOCKET ID NO.</b>
<b>EXISTING STATIONARY SOURCES:</b>	)	<b>EPA-HQ-OAR-2017-0355</b>
<b>ELECTRIC UTILITY GENERATING UNITS</b>	)	

**COMMENTS OF  
MURRAY ENERGY CORPORATION**

**I. INTRODUCTION**

Murray Energy Corporation (“Murray Energy”) enthusiastically applauds President Donald J. Trump’s Energy Independence Executive Order 13783, issued March 28, 2017 (“Executive Order”), which directed the United States Environmental Protection Agency (the “U.S. EPA”) to “suspend, revise, or rescind” the Obama Administration’s so-called and illegal Clean Power Plan (“CPP”) and, further, affirms the “national interest to promote clean and safe development of our Nation’s vast energy resources, while at the same time avoiding regulatory burdens that unnecessarily encumber energy production, constrain economic growth, and prevent job creation”. Executive Order 13783, Section 1(a). Specifically, the Executive Order directs all executive departments and agencies, including the U.S. EPA, to “immediately review existing regulations that potentially burden the development or use of domestically produced energy resources and appropriately suspend, revise, or rescind those that unduly burden the development of domestic energy resources beyond the degree necessary to protect the public interest or otherwise comply with the law.” *Id.* Section 1(c). Indeed, the Executive Order specifically directs the U.S. EPA to review and initiate reconsideration proceedings to “suspend, revise, or rescind” the Obama CPP, “as appropriate and consistent with law.” *Id.* Section 4(a)-(c). We strongly support the full and complete repeal of the Obama CPP.



We have been examining these issues for many years, as Murray Energy was the very first party to file a lawsuit challenging the Obama CPP in the case before the federal D.C. Circuit styled *Murray Energy v. U.S. Environmental Protection Agency*, D.C. Circuit Case No. 14-1112. After two (2) years of expensive litigation, Murray Energy was joined by twenty-nine (29) states. The cases were consolidated in the case styled *West Virginia v. U.S. Environmental Protection Agency*, D.C. Circuit Case No. 15-1363. On February 9, 2016, the U.S. Supreme Court stayed implementation of the CPP, pending further judicial review. This was the first time in American history that the U.S. Supreme Court has intervened to stay, or temporarily block, an agency's regulation before a lower court heard legal challenges to it. Accordingly, we were extremely pleased that President Trump issued Executive Order 13783, as it saved us many years of litigation, in which we would have ultimately prevailed, and it helped to protect the jobs and family livelihoods of our coal miners, and low-cost, reliable electricity for all Americans.

On October 16, 2017, the U.S. EPA, pursuant to Executive Order 13783, issued its proposed action (the "CPP Repeal Rule") to repeal the Obama CPP and rescind the documents in the CPP docket titled "Legal Memorandum For Proposed Carbon Pollution Emissions Guidelines for Existing Electric Utility Generating Units" (in the docket for the proposed rule) and "Legal Memorandum for Accompanying Clean Power Plan for Certain Issues," (a supplementary document in the docket for the final rule) (collectively, the "Legal Memorandum"). See Docket Id No. EPA-HQ-OAR-2017-0355; 82 Fed. Reg. 48035.

In this action, the U.S. EPA noted that the EPA promulgated the CPP under section 111 of the Clean Air Act (the "CAA"), 42 U.S.C. 7411. The U.S. EPA asserted that section 111(b) authorizes the EPA to issue nationally applicable new source performance standards limiting air pollution from "new sources" in source categories that cause or contribute to air pollution that

may reasonably be anticipated to endanger public health or welfare. In 2015, U.S. EPA issued such a rule for CO<sub>2</sub> emissions from certain new fossil fuel-fired power plants in light of the U.S. EPA's assessment "that [greenhouse gases] endanger public health, now and in the future". See *Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Generating Units*, 80 Fed. Reg. 64510, 64518 (October 23, 2015; *see also* *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act*, 74 Fed. Reg. 66496 (December 15, 2009) (the "2009 Endangerment Finding"). 82 Fed. Reg. at 48037.

The U.S. EPA, in this action, does not base its proposed repeal of the CPP on rescission of the 2009 Endangerment Finding but on consideration of the statutory text, context and legislative history of CAA section 111. 82 Fed. Reg. at 48043.

Murray Energy enthusiastically supports the U.S. EPA's proposed actions. The U.S. EPA's proposed actions are correct for several fundamental reasons. **First**, the CAA does not authorize the CPP's wholesale transformation of the U.S. electricity grid. *Utility Air Regulatory Group v. EPA*, 134 S. Ct. 2427 (2014). Thus, the agency's proposal is in line with President Donald J. Trump's directives in Executive Order 13783 to review regulations that burden the development of domestic resources such as coal and ensure the environmental regulations comply with law. *See* Executive Order 13783 at Section 2. **Second**, the CPP is categorically foreclosed by the CAA's exclusion for regulating facilities under section 111(d) that are already regulated under section 112. **Third**, the CAA is a program of cooperative federalism, which expressly provides the States—not the U.S. EPA—with the right under section 111(d) to "establish" and "apply" performance standards to existing power plants and to "take into consideration, among other factors, the remaining useful life of the existing source to which [a]

standard [of performance] applies.” 42 U.S.C. § 7411(d)(1). The U.S. Constitution preserves the sovereignty of the States by barring the federal government from compelling them to implement federal policies. The CPP violates this sovereignty by mandating that the States implement U.S. EPA’s decarbonization of the U.S. power system and violates the exclusive jurisdiction of the Federal Energy Regulatory Commission (FERC) under the Federal Power Act. *Finally*, the CAA only provides the U.S. EPA with authority to regulate under section 111 after the agency has made two findings—section 111’s “endangerment” and “significant contribution” findings. But the U.S. EPA has not, and cannot, make such findings to support the CPP as a section 111(d) regulation.

For the same reasons, as well as the fact that they do not accurately reflect the Agency’s current legal positions, the Legal Memoranda should be repealed, not just to the extent they conflict, but in their entirety. These memoranda are inaccurate and do not reflect a proper interpretation of the issues that they describe. There is also no way to clearly distinguish those issues that would remain if they are repealed only to the extent they contradict the Agency’s Proposed Rule.

Finally, EPA requests comment on the impact its Proposed Rule will have in several key policy areas, including whether further problems may exist with the “speak clearly” doctrine, FERC jurisdiction, and traditional state authority to regulate electric power, if EPA adopts the Proposed Rule. Murray Energy supports EPA’s focus on preserving the traditional role of the states and FERC in regulating the electric power sector and in not overstepping its jurisdictional bounds under either the Clean Air Act or the Federal Power Act. While the Proposed Rule takes significant steps toward alleviating specific identified violations of Constitutional, statutory, and regulatory policy, however, adopting the Proposed Rule does not cure all defects with the Clean

Power Plan and would not, on its own, resolve all conflicts a replacement rule would face with these same issues.<sup>1</sup>

## **II. MURRAY ENERGY'S VITAL INTEREST IN THIS ACTION**

For more than eight (8) years, Murray Energy has warned of the regulatory rampage that was being illegally waged by the Obama Administration and its supporters against the U.S. coal industry, and particularly of the destruction wrought by the Clean Power Plan. In President Trump, we finally have a President who has vowed to preserve coal jobs and low-cost, reliable and fuel-secure electricity for all Americans, including retirees on fixed incomes, single mothers, and manufacturers who depend on low cost electricity to produce their products. This is why the American people elected President Trump. By issuing Executive Order 13783, President Trump has followed through on his promises, and, by repealing the Obama Clean Power Plan, the U.S. EPA, under the direction of Administrator Pruitt, will take one more step towards fulfilling the promises made to the American people.

Murray Energy has a vital interest in the repeal of the Obama Clean Power Plan. Murray Energy was established in 1988 when Mr. Robert E. Murray mortgaged virtually everything he owned and purchased a single coal mine in Southern Ohio. Thirty years later, Murray Energy is the largest underground coal mining company in the U.S. Moreover, Murray Energy is the largest employer of coal workers in the U.S. in the underground mining industry, with over 5,600 employees. Murray Energy and its subsidiary companies currently operate fifteen (15) coal

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<sup>1</sup> On December 28, 2017, the U.S. EPA issued its Advance Notice of Proposed Rulemaking (ANPRM) seeking public comment in its consideration of proposed emission guidelines to limit greenhouse gas (GHG) emissions from existing electric generating units (EGUs) (the proposed "CPP Replacement Rule"). Docket Id. No. EPA-HQ-OAR-2017-0545; 82 Fed. Reg. 61507. Murray Energy has filed comments in Docket Id. No. EPA-HQ-OAR-2017-0545 opposing any consideration of a new CPP rule absent a clear Congressional grant of authority and based in any degree, on the illegal and technically flawed 2009 Endangerment Finding.

mines, consisting of eleven (11) underground longwall mining systems and forty-six (46) continuous mining units in Ohio, Illinois, Kentucky, Utah, and West Virginia. In addition, Murray Energy operates two surface mines in Colombia. Murray Energy produces approximately 75 million tons of bituminous coal each year. It supplies coal to many of the largest coal-fired electric utility generating facilities in the United States.

Murray Energy is also engaged in related business operations and activities, including owning and operating four mining equipment manufacturing and rebuild facilities along with a number of river, truck and rail terminals, and twenty-five river towboats and over 500 coal barges on the inland waterway system. Many of Murray Energy's mining complexes are strategically located near its customers' electric generating stations, and all have excellent, low cost transportation infrastructures to Murray Energy's markets. The vast majority of the coal produced from Murray Energy's mines in the U.S. is used for the generation of electricity. Murray Energy is dependent on the continuing viability and operation of coal-fired generation in the U.S.. Unless fully repealed, the Obama Clean Power Plan would force many of these coal-fired power plants to close, destroying the jobs and livelihoods for thousands of coal mining families and related industries.

Given the current threats to coal-fired generation, Murray Energy, along with other coal producers and related industries, and numerous generating companies and electric utilities, is threatened with bankruptcy and significant economic harm if coal capacity is forced out of the market by unreasonable and unsupportable regulations. Prior to the election of President Obama, fifty-two percent (52%) of America's electricity was generated from coal, and this rate was much higher in the Midwest. The percentage of coal-fired generation declined under the Obama Administration to thirty percent (30%). Under the Obama Administration, over 531 coal-fired

generating plants, or 59,000 megawatts of generating capacity through 2016, were closed prematurely, many as a result of new and potential regulations that were put into place illegally, without proper cost analysis, and without proven environmental benefits. Further, an additional 12,700 megawatts of coal fired-generation will be closed by the end of 2020, bringing coal's share of electricity to as low as twenty-seven percent (27%). These closures are the functional equivalent of entirely eliminating the combined electricity supplies of Ohio, Pennsylvania, Indiana, and West Virginia. In the PJM Interconnection, LLC ("PJM") footprint alone, which covers all or part of thirteen (13) states and sixty-five (65) million people, 11,000 megawatts of coal-fired electricity generation has been closed over the past four (4) years. In addition, 20,056 megawatts of this baseload capacity in PJM is contemplated for closure.

This devastation has had far-reaching consequences. By early 2016, the total value of the American coal industry had declined from \$68.8 billion five years before to \$4.08 billion, a ninety-four percent (94%) reduction in value. A total of fifty-two (52) coal companies were in bankruptcy proceedings with only four (4) major companies remaining financially solvent. Local rural communities in coal producing regions, and in areas that depend on coal-fired power plants, are losing jobs and millions of dollars in local tax support due to the closure of coal-fired generation plants. This devastates the residents and the employees supporting local businesses, governments, and school districts. Now is the time to end this catastrophic destruction wrought by the Obama Administration's "War On Coal".

Fortunately, President Trump's Executive Order of March 31, 2017 is already having a positive impact in coal communities. Indeed, this action alone stopped fifty-six (56) more coal-fired plant closures, totaling 53,000 megawatts of generation, and the layoff of 25,000 more coal miners on top of the 63,000 families already laid off under the Obama Administration. Far more



must be done, however, for our communities to recover from the devastation of the past eight (8) years.

**III. CONTINUED OPERATION OF  
AMERICA'S COAL-FIRED ELECTRICITY  
GENERATION FLEET IS ABSOLUTELY  
VITAL TO ENSURING RELIABLE, EFFICIENT  
AND COST-EFFECTIVE SUPPLIES OF  
ELECTRICITY TO THE NATION.**

President Trump's Executive Order 13783 is far reaching, directing all executive departments and agencies to "immediately review existing regulations that potentially burden the development or use of domestically produced energy resources and appropriately suspend, revise, or rescind those that unduly burden the development of domestic energy resources beyond the degree necessary to protect the public interest or otherwise comply with the law." Executive Order 13783, Section 1(c).

America enjoys an abundant resource of proven coal reserves. Coal is a critical component of America's energy resources and continued operation of America's coal-fired electricity generation fleet is absolutely vital to ensuring reliable, efficient and cost-effective supplies of electricity to the nation.

For over a century, coal-fired generation has been the safe, reliable, low-cost, and fuel-secure source of electricity in America, providing the baseload generation, as well as the capacity, reserve, and ancillary services that are absolutely necessary to maintain the integrity and reliability of our Nation's power grids. The historical fleet of coal-fired generating units, particularly in the Midwest, has served the economy well, providing as much as eighty to ninety percent (80 - 90%) of in-state generation in many states over the years. Coal-fired generation has also served the commercial, manufacturing and industrial sectors of this Country, providing

low-cost, reliable, high capacity and peak demand services that are absolutely necessary for American manufacturers to operate and to compete in the global marketplace.

Over the years, coal-fired generation has been less susceptible than other sources to both short-term and long-term fuel price variation and supply. Coal-fired generation has been the constant through the years of the Arab oil embargo, the natural gas shortages of the 1970's and 1980's, the ensuing volatility in natural gas prices thereafter, nuclear power regulatory challenges, and extreme weather conditions, most recently the 2014 Polar Vortex and 2018 Bomb Cyclones.

There is no better illustration of the need to protect baseload generation than the so-called "Bomb Cyclone," which immersed the eastern United States in extremely cold, windy conditions from December 27, 2017 through January 8, 2018. Notwithstanding that this cold snap occurred primarily over the holidays, at least two (2) million Americans lost their power, and, tragically, twenty-two (22) people lost their lives. Without the electricity provided by our coal-fired and nuclear power plants, the devastation of this very short twelve (12) day Bomb Cyclone would have been far worse.

The United States Department of Energy's National Energy Technology Laboratory recently issued a report ("Government Study") analyzing the reliability and resiliency of different sources of electricity generation during the Bomb Cyclone. The Government Study confirmed what many of us have already known, that coal was the single most reliable and resilient form of electricity production during that critical time. Coal and nuclear power provided eighty-nine percent (89%) of the electricity during this Bomb Cyclone. During this time coal-fired generation averaged an output level of 46,038 megawatts, over fifty percent (50%) greater than the average of 29,849 megawatts. Indeed, if it were not for the electricity generated by our Nation's coal-fired

power plants, with ample capacity and on-site fuel availability, the grids would have experienced a massive nine (9) to eighteen (18) gigawatts of shortfall, leading to system collapse.

During this cold snap, coal far outperformed all other fuel sources, particularly natural gas and renewables. At least 37,000 megawatts of supposedly available natural gas-powered electricity was entirely unavailable due to the priority for home heating use and frozen natural gas pipelines. Where natural gas was available, prices peaked at over \$95 per million BTU in the PJM, and over \$175 per million BTU in New York City, which is sixty (60) times the normal cost. Also, during this time, the cost of electric power from natural gas-fired plants peaked at over \$500 per megawatt hour, compared to a predominant rate of about \$28 per megawatt hour. The ISO New England regional transmission organization has confirmed that their region is at major risk of fuel insecurity, due to New England's dependence on natural gas and the retirement of coal and nuclear generating capacity.

Similarly, windmills and solar panels contributed virtually nothing to our Country's electricity needs at that dire time, as cloud cover and wind speeds caused these resources to be unable to dispatch. The Government Study concluded that wind energy was down twelve-percent (12%) across the eastern United States. When considered together, wind and solar electricity generation declined nineteen percent (19%) in Midcontinent Independent System Operator ("MISO"), twenty-nine percent (29%) in Southwest Power Pool ("SPP") and thirty-two percent (32%) in Electric Reliability Council of Texas ("ERCOT"). Fortunately, coal-fired electricity was able to step up and to fill the void for seventy-four percent (74%) of this incremental lost generation.

The Government Study valued the resilience provided by coal at \$3.5 billion in the PJM alone, which equates to \$288 million per day. PJM's President and CEO, Mr. Andrew Ott, recently stated that 1,410 megawatts of nuclear capacity and 3,688 megawatts of coal-fired capacity that operated during the recent cold snap in the eastern United States are scheduled to be deactivated within the next five (5) years.

These problems from the recent cold snap were not an isolated incident. During the so-called "Polar Vortex" of early 2014, PJM came within 500 megawatts of a major system disruption on a demand of 140,000 megawatts. A total of 9,300 megawatts of supposedly available natural gas-fired generation was not available due to gas supply disruptions to the generators. Further, the cost of producing electricity in the Midwest and Mid-Atlantic area rose above \$1,000 per megawatt-hour for the first time in American history.

During this time, an Ohio-based electric power company was ordered by the State's Public Utility Commission to be connected to 3,800 megawatts of wind and solar power. Only fifteen (15) megawatts of the 3,800 megawatts were available during the crisis. What the utility relied on during the cold snap was 8,170 megawatts of coal-fired generation. As all 8,170 megawatts have been closed, what will happen next time?

The recent Bomb Cyclone and 2014 Polar Vortex demonstrate that our electric power grids are not as reliable as the independent power grid operators, some electric utilities, and the Federal Energy Regulatory Commission ("FERC") claim. Indeed, we have a power grid reliability and resiliency crisis in much of America. But, will a system collapse occur before they recognize and do something about it?

During the 2018 Bomb Cyclones, the consequence of lack of fuel diversity was seen in New England ISO (NE ISO) pricing. Comparing the first half of January 2018 to the first half of January 2017, natural gas prices (Algonquin hub) were up from an average of \$5.60 per MMBtu in 2017 to \$22.78 per MMBtu in 2018, a 307 percent increase. Power prices (Mass Hub) were up from an average of \$41.80 per megawatt-hour to \$147.74 per megawatt-hour, a 253 percent increase. Also relevant was the over 7000 percent increase in use of oil for power generation as a result of supply constraints on natural gas due to the lack of storage and pipeline capacity. Dual fuel gas and oil plants had to switch to oil to meet load. Pricing was also up in PJM West, which had an average energy price of \$119.53 per megawatt-hour in the first half of January 2018. The average energy price and price increases were higher in NE ISO than PJM West because the coal generation in PJM increased by about 10 percent in the first half of January 2018 which significantly reduced the increased generation required from oil. There is no question that had it not been for the coal capacity in PJM, MISO and elsewhere the power prices would have been significantly higher.

Renewable energy sources are not a viable or credible alternative to baseload coal-fired generation. Wind and solar generation sources are intermittent and unreliable and therefore cannot be relied upon to meet peak or base load demand. Without the price support provided by the Wind Production Tax Credit, wind generation will be a high cost resource. Natural gas-fired generation is not the answer either, as gas pricing is volatile and gas supply is unreliable given limited gas storage capacity, pipeline limitations and a requirement to meet residential and commercial customer requirements ahead of power generation. The high power prices during the 2018 Bomb Cyclones in certain regions were due to gas to oil switching in many of the dual fuel units due to insufficient gas delivery capability.

The Obama CPP drastically distorts the electricity grid by forcing power plants effectively to dispatch based upon carbon emissions rather than cost. As a result, lower cost coal generation will be impaired at the expense of higher cost generation from natural gas and renewables. The cost impacts will be magnified to the extent low cost coal plants are forced to retire, leaving only high cost generation available to meet demand.

A recent study performed by the leading global economic consulting firm, IHS-Markit concludes that, on a going forward basis (excluding sunk costs), the costs of continuing to operate many recently-retired coal-fired plants is significantly lower than the long-term marginal cost of building new generation.<sup>2</sup> In some instances, on a properly-calculated apples-to-apples basis, the cost of electricity generated by a newly-constructed power plant may be approximately twice that of a baseload coal or nuclear plant that has recently retired.<sup>3</sup>

The fact that utilities would be required to close coal power plants that generate electricity much more cost effectively than alternative new generation to meet the CPP requirements is a fatal flaw of the Obama CPP. Furthermore, baseload coal and nuclear plants typically operate at high capacity factors, have stable operating costs in part because fuel can be purchased under long-term contracts with fixed pricing. As such, coal plants are valuable assets which limit exposure to price spikes, keep electricity costs at reasonable levels and historically have been the backbone of the operation of the grid. From an economic standpoint, it seldom should make sense to shut down these generating units, especially since, once shut down, these generating units are permanently lost. Yet that is precisely what is occurring today.<sup>4</sup>

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<sup>2</sup> IHS Markit, *Ensuring Resilient and Efficient Electricity Generation: The Value of the current diverse US power supply portfolio*, at p. 8 (Sept. 2017) (hereinafter, "IHS Study").

<sup>3</sup> IHS Study at 36.

<sup>4</sup> Many of the companies that historically have been leaders in electric generation, such as AEP, Duke, NRG and Calpine, have announced that, except for generating units supported by long-term Purchase Power Agreements, they will no longer build new merchant generation and, in several instances, are liquidating their entire merchant generation portfolio. This is reducing the number of experienced players interested in continuing to own and operate generation.



A related problem that will worsen with further retirements of baseload coal and nuclear will be the increased frequency, severity, and duration of price spikes that will arise with increased dependence upon natural gas. In particular, during the past several years the ability of grid operators to shift back and forth between natural gas-fired generation and coal-fired generation has played an increasingly critical role in managing price volatility. When gas prices rise, coal generation increases; when gas prices fall, coal generation declines. With additional coal plant retirements, however, the ability to reduce gas use by increasing use of coal-fired capacity declines, reducing the amount of available fuel switching by a startling 11 BCF/day in the past six years.<sup>5</sup> As a result, natural gas price increases are expected as coal generation is not available to cap gas demand and price.

Further, the reduced potential for fuel switching is not the only change that is occurring that could cause adverse volatility and price spikes. LNG exports from the U.S. began in earnest in 2016 with the completion of the Sabine Pass facility which reached 2 billion cubic feet per day (BCFD) by year end. Another six plus BCFD of LNG capacity is under construction and 13.5 BCFD of LNG capacity is in advanced development.<sup>6</sup> As exports of LNG grow, natural gas pricing is expected to increasingly be affected by the global price, thereby increasing volatility and making it even more important to keep existing coal-fired units online in order to maximize the availability of fuel switching.

IHS calculates that retirement to the existing coal and nuclear generation capacity would result in an increase of retail power prices by about 25 percent and net consumer costs by about

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In addition, negative energy prices primarily as a result of wind production tax credits are becoming increasingly prevalent, with crushing impacts on every type of base load.

<sup>5</sup> ABB. Actual and Projected Coal Capacity Retirements in the United States, 2011-2020, Ventyx Database, October 18, 2017.

<sup>6</sup> EVA, Quarterly LNG Outlook, December 2017.

\$98 billion per year.<sup>7</sup> Therefore, failure to maintain the resource diversity by prematurely retiring nuclear (and coal) baseload units could, extrapolating over the next 20 years, increase electricity costs by as much as \$2 trillion. These effects are magnified further as soaring electricity costs ripple through the broad economy, with large adverse impacts over the three year period on U.S. GDP (a loss of 0.8%), on real disposable income (a drop of about \$845 per household in 2016 dollars), and jobs (a loss of 1 million).<sup>8</sup>

#### **IV. COMMENTS IN RESPONSE TO PROPOSED ACTION**

##### **A. The CPP Exceeds The Authority Granted to U.S. EPA Under Section 111 of the CAA.**

The Obama CPP requires States to adopt standards of performance that cannot be met by fossil fuel-fired generation sources under current state-of-the-art technology. Thus, the purpose of the CPP's standards of performance is to require fossil fuel-fired generation sources to transfer their generation to non-fossil fuel generation facilities. However, that illegally-compelled generation shifting is precluded by the unambiguous language and clear structure of section 111 of the CAA.

In this proposed action to repeal the CPP, the U.S. EPA correctly concludes that a proper construction of section 111(a)(1) of the CAA is limited to emission restriction measures that can be *applied to or at* an individual stationary source and does not authorize generation shifting to alternate sources.

After reconsidering the statutory text, context, and legislative history, and in consideration of the EPA's historical practice in its other existing CAA section 111 regulations, the Agency proposes to return to a reading of CAA section 111(a)(1) (and its constituent term, "best system of emission reduction") as being limited to emission restrictions that can be *applied to or at* an individual stationary source. That is, such measures must be based on a physical or

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<sup>7</sup> IHS Study at 5, 37-38.

<sup>8</sup> HIS Study at 5, 39.

operational change to a building, structure, facility, or installation at that source, rather than measures that the source's owner or operator *can implement on behalf of* the source, at another location. 82 Fed. Reg. at 48039.

The U.S. EPA properly concludes that this interpretation accords with section 111, aligns with Congressional intent, aligns with prior agency interpretations of section 111, avoids illogical results and avoids conflict with the State's sovereign rights. 82 Fed. Reg. at 48039. The U.S. EPA also properly concludes that this interpretation requires immediate repeal of the Clean Power Plan. *Id.* at 48038.

Under section 111(d) of the CAA, U.S. EPA's role is to establish a procedure for States to submit plans establishing standards of performance *for any existing source*. CAA section 111(d)(1). State plans, in turn, must apply a standard of performance to any *particular source*. *Id.* The CAA defines a "stationary source" as "any building, structure, facility, or installation which emits or may emit any air pollutant." CAA § 111(a)(3). Thus, section 111(d) permits U.S. EPA to require the States to establish performance standards only for the facility whose emissions are being controlled. Requiring an owner or operator of a fossil fuel-fired source to construct, or to subsidize generation at other facilities, as the CPP does, is not a standard *for* that existing source at all.

Further, U.S. EPA's previous application of the "standards of performance" to multiple, combined sources at the level of an entire "source category" as opposed to the individual sources at "single source" level, also directly contravenes the express requirements of CAA section 111. Section 111 clearly provides for EPA to "list" source categories and then, where section 111(d) applies, requires the States to set "standards of performance *for any existing source*" within a source category. By applying emission performance standards to require the shifting of generation from existing fossil-fuel fired sources (one source category) to renewable generation

facilities (a *different* source category), the U.S. EPA went well-beyond even its professed single “source category” application of performance standards. In actuality, U.S. EPA is applying the CAA performance standards across *multiple* sources in *multiple* source categories. There is absolutely no basis for this application of the performance standards to multiple source categories under existing law. U.S. EPA may not “embellish” the statutory definition of “stationary source” by “rewrite[ing] the definition of a stationary source.” *ASARCO Inc. v. EPA*, 578 F.2d 319, 324, 326 n.24 (D.C. Cir. 1978).

The U.S. EPA correctly concludes in this action that section 111(d) requires that standards must be set for individual sources.

The EPA’s proposed interpretation is also guided by CAA section 111(d)’s direction that standards be established “for any existing source,” (emphasis added) and not for other sources or entities. See also 42 U.S.E. 7401(a)(3) (finding that “air pollution control at its source is the primary responsibility of State and local governments”) (emphasis added). Further, the “for any existing source” phasing in CAA section 111(d) mirrors the “for new sources” phasing in the first sentence of section 111(b)(1)(B). In other words, as applied to both new source standards and existing source standards promulgated under CAA section 111, if standards must be set for individual sources, it is reasonable to expect that such standards would be predicated as measures that can be applied to or at those same individual sources. 82 Fed. Reg. at 48039.

Finally, U.S. EPA also unlawfully redefines a CAA-defined “source” to “include . . . the ‘owner or operator’ of any building . . . for which a standard of performance is applicable.” 80 Fed. Reg. at 64,762. Again, section 111 performance standards apply to a “source,” not to the “owners and operator” of that statutorily-defined source. CAA § 111(a)(3). A “source” is *not* defined to include the “owner or operator” of the “building, structure, facility, or installation.” Indeed, section 111(a)(5) separately defines the term “owner or operator” to mean “any *person* who owns, leases, operates, controls, or supervises a stationary *source*”. Had Congress intended

to include a facility's owner or operator within the term "source," it would not have separately defined these diverse and mutually-exclusive terms.

Again, the U.S. EPA in the proposed action to repeal the Obama CPP correctly concludes that emissions limits apply to the *source*, not to the owner or operator of the source.

. . . Here, contrary to the conclusions in the CPP, the EPA is proposing to interpret the phrase "through the application of the best system of emission reduction" as requiring that the BSER be something that can be applied to or at the source and not something that the source's owner or operator can implement on behalf of the source at another location. Interpreting the statute as carrying this additional limiting principle ensures conformity with the statutory context and congressional intent. 82 Fed. Reg. at 48039.

Under section 111(d), U.S. EPA must show that Congress clearly authorized the agency to restructure power markets. The CPP's attempt to reconfigure the sources of generation for the power grid is precisely the sort of significant and transformative assertion of authority that, under the Supreme Court's decisions, requires "clear congressional authorization." *Util. Air Regulatory Grp. V. EPA*, 134 S. Ct. 2427, 2444 (2014) ("UARG"). The clear congressional statement rule applies with particular force here where U.S. EPA has "no expertise" in the subject matter so as to justify *Chevron* deference to its unprecedented assumption of authority under the CPP. "[G]rid reliability is not a subject of the Clean Air Act and is not the province of EPA." *Del. Dep't of Nat. Res. & Env'tl. Control v. EPA*, 785 F.3d 1, 18 (D.C. Cir. 2015). Congress did not delegate to U.S. EPA the authority to reconfigure the entire grid to lower overall emissions while maintaining reliable and low-cost generation.

The "clear congressional statement" requirement is fatal to the CPP. There is no plausible claim that Congress in section 111(d) authorized U.S. EPA to set emission performance rates on the basis that the owners of existing fossil fuel-fired sources would be required to meet

the rates by transferring generation to lower-emitting generation to displace their own generation.

In sum, the unambiguous CAA section 111 requirement that standards of performance must be set “*for*” and be “*applicable . . . to*” individual sources forecloses U.S. EPA’s claim to authority to enforce CPP compliance by reordering electric generation from one source to another source within a State’s grid. CAA sections 111(d)(1), 111(a)(2) (emphasis added). “Generation shifting” does not entail setting standards that are “for” or “applicable” to operations within individual, regulated sources. Rather, it involves replacing or reducing the generation of individual regulated sources in *a particular* generation category with the generation of entirely different kinds of facilities in *a different* generation category. That unilateral redistribution of electric generation is plainly beyond what CAA section 111 permits. Murray Energy therefore fully supports the U.S. EPA’s proposal to repeal the CPP.

The reasons set forth in this action, however, are not the only grounds on which the CPP violates section 111. The CPP also violates section 111 in that it mandates that a regulated source cease producing electricity, rather than addressing how the regulated source is to reduce emissions while continuing to produce electricity at that existing source. A CAA “standard of performance” is a measure by which to regulate the operation of a source, not an order to cease the operation of a source. A CAA “standard of performance” must reflect reductions from an “emission limitation,” which in turn must “limit . . . the quantity, rate, or concentration of emissions of air pollutants *on a continuous [i.e., operating] basis.*” CAA section 302(k) (emphasis added). As Congress made clear, the terms “standard of performance” and “emission limitation” are defined to preclude performance rates based on “intermittent controls,” such as cutting or shifting production to other facilities. *Id.* sections 111(a)(1), 302(k). The CPP is thus



directly contrary to the CAA's central premise that a "standard of performance" apply to a generation source and should be repealed for this reason as well.

In addition, as U.S. EPA notes, the CPP established standards that were more stringent for existing sources than for new or newly-modified sources, either under BACT or EPA's 111(b) standards. *See* 82 Fed. Reg. at 48041; *Id.* at 48041, n.16. EPA cites these errors in legal interpretation as grounds for reversing the agency's prior position that imposition of requirements beyond the source itself, such as requiring generation shifting, cannot be the basis for an existing source performance standard. *See Id.* at 48042. This is correct, but not the only necessary conclusion from EPA's analysis. These conclusions are also independent grounds for repeal of the CPP. An existing source performance standard that is more stringent than the standards applicable to new sources is arbitrary and capricious, regardless of whether it includes regulation beyond the source itself or requires generation shifting.

**B. The CAA Section 112 Exclusion Unambiguously Prohibits the CPP.**

The CAA section 112 Exclusion prohibits U.S. EPA from employing section 111(d) to regulate a source category that is already regulated under section 112. And because it is undisputed that fossil fuel-fired generating units are already regulated under section 112, *see* 77 Fed. Reg. 9304 (Feb. 16, 2012), the section 112 Exclusion prohibits any attempt by the U.S. EPA to invoke section 111(d) to re-regulate those same plants.

The section 112 Exclusion's prohibition against employing section 111 to regulate "any air pollutant" emitted from a "source category . . . regulated under section [1]12" has a straightforward and unambiguous meaning. If a source category is "governed by [a] rule" under section 112, U.S. EPA may not require the States to set a standard of performance for sources in that category under section 111(d). As the Supreme Court has said, "EPA may not employ

[section 111(d)] if existing stationary sources of the pollutant in question are regulated under . . . § [1]12.” *Am. Elec. Power Co. v. Connecticut*, 131 S. Ct. 2527, 2537 n.7 (2011) (“AEP”).

This literal reading of the section 112 Exclusion is, as U.S. EPA itself has explained, consistent with the statutory and legislative history of the CAA’s 1990 Amendments. Before 1990, section 112 covered an extremely narrow category of life-threatening pollutants. *See* S. Rep. No. 91-1196, at 20 (1970). In 1990, Congress expanded the reach of the section 112 program, significantly broadening the definition of pollutants under section 112 to include those “which present, or may present . . . a threat of adverse human health effects . . . or adverse environmental effects,” CAA § 112(b)(2). As U.S. EPA has said in the past, the House of Representatives (where the current text of the section 112 Exclusion originated) responded to this fundamental expansion in section 112 by “chang[ing] the focus of [the Exclusion and] seeking to preclude regulation of those pollutants that are emitted from a particular source category that is actually regulated under section 112.” 70 Fed. Reg. at 16,031. That is, the House determined that existing sources, which have significant capital investments and sunk costs, should not be burdened by *both* the expanded section 112 program and performance standards under section 111(d). *Id.* at 16,031-32.

Because the U.S. EPA has already regulated fossil fuel-fired EGUs under CAA section 112, the section 112 Exclusion barred promulgation of the CPP and prohibits any replacement rule. As part of its final CPP repeal, U.S. EPA should rest its rule upon this ground in addition to the defensible and common-sense logic already set out in the proposal and the other grounds set forth in these comments. While the proposal clearly sets forth sufficient grounds for repealing the CPP, the U.S. EPA must include this additional (and broader) ground for repeal because the section 112 Exclusion supports that the CPP promulgation fell outside of United States policy

that “environmental regulations comply with the law.” Executive Order 13783, at Section 1(e). In order to fully comply with the executive order, the U.S. EPA needs to address the illegal interpretation of the CAA (in violation of the section 112 Exclusion) that the Obama Administration advanced in its blind march to adopt the CPP.

**C. The Proposed CPP Repeal Rule Does Not Address All Concerns Over the Scope of EPA’s Authority to Imposed Existing Source Performance Standards for GHGs at Electric Generating Units.**

In the present action, the U.S. EPA specifically invited comment as to whether the Proposed CPP Repeal Rule, by substantially diminishing the potential economic and political consequences of any future regulation of CO<sub>2</sub> emissions from existing fossil fuel-fired EGUs, has the advantage of not implicating the “clear statement” rule, in that it would avoid potentially transformative economic policy, and political significance in the absence of a clear congressional statement of intent to confer such authority on the Agency. 82 Fed. Reg. at 48042.

While the Proposed CPP Repeal Rule fixes several errors on the jurisdictional justification U.S. EPA used to promulgate the CPP, these fixes do not address all problems with the CPP. For example, the Proposed Rule does not address EPA’s erroneous conclusion that it has authority to regulate GHGs under section 111 of the CAA. Further complications arose in the CPP from EPA’s erroneous attempt to regulate natural gas and coal fired EGUs under the same standards. Any future rulemaking of EGUs under section 111 must not only avoid generation shifting and the imposition of requirements beyond the source itself to avoid violation of the “clear statement” rule. It must avoid extending EPA’s jurisdiction beyond that established by Congress. This includes avoiding undue influence on the nation’s generation mix and energy markets, even in forms that come through standards applicable at the source level.

**D. The CPP Unlawfully Abrogates Authority Granted to the States by the Clean Air Act and FERC under the Federal Power Act.**

In the proposed action, the U.S. EPA has specifically invited comment as to whether the CPP exceeded the proper role and authority of the Agency by regulating aspects of the nation's energy sector that are within the proper jurisdiction of the States and FERC. 82 Fed. Reg. at 48042. The CPP exceeded EPA's authority in both of these regards.

As addressed above, section 111(d) grants the authority to establish standards of performance for existing sources to the States—not to U.S. EPA. CAA § 111(d)(1). Under section 111(b), U.S. EPA is empowered to adopt “regulations ... establishing *Federal* standards of performance for new sources.” (emphasis added). In contrast, under section 111(d), U.S. EPA's authority is limited to adopting a “procedure” under which “*each State* shall submit to [EPA] a plan which ... establishes standards of performance for any existing source,” and to “prescrib[ing] a plan for a State in cases where the State fails to submit a satisfactory plan.” *Id.* § 111(d)(1), (2) (emphasis added). As U.S. EPA admits, the CPP forbids the States to impose emission standards that are less stringent than EPA has mandated through the national performance rates. 80 Fed. Reg. at 64,870. By establishing a minimum requirement for emission standards that are to imposed by the States and then leaving only the work of implementation for the States, EPA has unlawfully rewritten the statutory text in which Congress expressly gave only to the States the authority to “*establish[]* standards of performance.” CAA § 111(d)(1) (emphasis added).

“[T]he regulation of utilities is one of the most important of the functions traditionally associated with the police power of the States,” *Ark. Elec. Coop. Corp. v. Ark. Pub. Serv. Comm'n*, 461 U.S. 375, 377 (1983), which the Supreme Court has specifically recognized should not be “superseded” “unless that was the clear and manifest purpose of Congress.” *Pac. Gas &*

*Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n*, 461 U.S. 190, 206 (1983)

(“PG&E”). Under the Federal Power Act, “the States retain their traditional responsibility in the field of regulating electrical utilities for determining questions of need, reliability, cost, and other related state concerns.” *Id.* at 205. Other aspects, including electric utilities engaged in interstate commerce, including wholesale sales, transmission of electric energy in interstate commerce, and reliability that fall outside regulation by the States, lies within the jurisdiction of FERC. 16 U.S.C. §§ 824-824w.

To meet the CPP’s arbitrary emission reduction standards, States will be compelled to enact legislation and regulations restructuring their power generation and distribution systems, decommissioning coal-fired plants, and granting regulatory and siting approval to new, renewable energy projects. Even if the CPP’s demand that States take these actions were constitutional, EPA may not make these “decision[s] of the most fundamental sort” for the States without clear authorization from Congress. *Gregory v. Ashcroft*, 501 U.S. 452, 460 (1991).

“Although the Constitution grants broad powers to Congress, our federalism requires that Congress treat the States in a manner consistent with their status as residuary sovereigns and joint participants in the governance of the Nation.” *Alden v. Maine*, 527 U.S. 706, 748 (1999). Among the powers that the Constitution denies to the federal government is the power to “use the States as implements of regulation”—in other words, to commandeer them to carry out federal law. *New York v. United States*, 505 U.S. 144, 161 (1992).

The CPP violates this anti-commandeering principle by forcing the States and state officials to exercise their sovereign powers to revamp their utility sectors to comply with EPA’s unilateral dictates. Under the CPP, the state actors will be the ones to account for the CPP’s impact on electric reliability, 40 CFR § 60.5745(a)(7), through such means as “[public utility

commission] orders,” 80 Fed. Reg. at 64,848, and “state measures” that make unregulated renewable energy generators “responsible for compliance and liable for violations” if they do not fill the gap, 40 CFR § 60.5780(a)(5)(iii). Even under a federal implementation plan, state agencies will have to be involved in decommissioning coal-fired plants, addressing replacement capacity, addressing transmission and integration issues, and undertaking all manner of related regulatory proceedings. *See* 80 Fed. Reg. at 64,678. In fact, EPA’s proposed federal plan expressly relies on state authorities to address reliability issues caused by the CPP. 80 Fed. Reg. at 64,981.

Just as the federal government may not commandeer the States to carry out federal policy, it also may not coerce them to the same end by denying them “a legitimate choice whether to accept the federal conditions.” *Nat’l Fed. of Indep. Bus. v. Sebelius*, 132 S. Ct. 2566, 2602 (2012) (Roberts, C.J.) (plurality opinion); *see also id.* at 2659 (Scalia, Kennedy, Thomas, and Alito, JJ., dissenting). The CPP violates this anti-coercion doctrine by threatening to disrupt the electric systems of the States that do not carry out federal policy. If a State declines to implement the CPP, EPA will impose a federal plan that does so. 40 CFR § 60.5720. But because the CPP’s aggressive emission rates cannot be achieved by operating fossil fuel-fired sources under existing technology,, the States will have to force fossil fuel-fired sources to transfer generation to other sources; the only alternative will be for fossil fuel-fired sources to shut-down, which will result in electricity shortfalls and the associated consequences for state services and operations, public health and safety, and the economy. The CPP places the States in an untenable position.

The entire point of the CPP is to force the States to compel fossil fuel-fired sources to transfer generation to renewable sources. The States would not compel such transfer of



generation absent the CPP's coercion. EPA has no authority under the CAA to engage in such coercion. Moreover, EPA's attempts to control interstate electricity transmission and regulate to the detriment of grid reliability invade the exclusive jurisdiction of FERC.

**E. The U.S. EPA Should Immediately Review and Rescind the 2009 Endangerment Finding and Legal Memoranda.**

**1. The U.S. EPA Continues to Lack Authority to Regulate CO<sub>2</sub> Under Section 111 Because It Has Not Made (And Cannot Make) the Statutorily-Required Endangerment and Significant Contribution Findings.**

Regulation of a stationary source category under CAA section 111 must be predicated upon the agency's finding that: (1) emissions of the regulated air pollutant "may reasonably be anticipated to endanger public health or welfare"; and (2) the continued emission of the air pollutant "contributes significantly" to that endangerment. 42 U.S.C. § 7411(b)(1)(A).<sup>9</sup> Without both of these findings, the category of stationary sources cannot be subject to new source regulations for emissions of that pollutant or, consequently, subject to existing source emission regulations for that pollutant. Nevertheless, the Obama Administration attempted to implement the CPP—a regulation of a new pollutant (CO<sub>2</sub>) from a new source category (fossil fuel-fired electricity generating units or EGUs)—without attempting to make either the required endangerment finding or the required significant contribution finding. Fortunately, the stay by the Supreme Court prevented formal implementation. It nonetheless triggered numerous power plant retirements in expectation of its implementation.

The CPP was the center piece of the Obama's Administration's "War on Coal" even though it did not and could not put together an endangerment finding (much less a significant

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<sup>9</sup> While both the endangerment finding and the significant contribution finding language comes from CAA section 111(b), this language is clearly linked to the listing of categories of stationary sources, which is the requisite for regulation under both section 111(b) and section 111(d). Thus, Murray Energy refers to these required findings as the section 111 findings.

contribution finding) that correlated CO<sub>2</sub> emissions from fossil fuel-fired EGUs with recognizable dangers to domestic public health and welfare. The present action is the appropriate mechanism by which the U.S. EPA should now correct the Obama Administration's error.

Proponents of the CPP might point out that the Obama Administration did manage to make an endangerment finding under CAA section 202(a)(1) as respects transportation sources. See 74 Fed. Reg. 66,496 (Dec. 15, 2009). But that endangerment finding is irrelevant to this rulemaking because it does not satisfy the requisite findings for section 111 regulation for EGUs. First, section 111 requires a specific finding that the proposed source category subject to regulation “contributes *significantly*” to the endangerment. 42 U.S.C. § 7411(b)(1) (emphasis added). The endangerment finding alone is not sufficient to regulate under CAA section 111, and an endangerment finding under CAA section 202(a)(1) does not include a significant contribution finding; it merely requires that the agency finds that air pollution from motor vehicles “cause or contribute to,” the endangerment. See 42 U.S.C. § 7521(a)(1). Thus, even if the section 202(a)(1) endangerment otherwise supported section 111 regulation—which, as provided below, it does not—the U.S. EPA would need to make an additional significant contribution finding in order to promulgate section 111 regulations. The U.S. EPA did not make, still has not made, and cannot factually support a significant contribution finding for CO<sub>2</sub> emissions from fossil fuel-fired EGUs. Thus, the statutory prerequisite to promulgate the CPP was never met.

A second reason that the section 202(a)(1) endangerment finding did not satisfy the statutory prerequisite for promulgating the CPP is because section 111 requires a finding that the regulated pollutant from *the specific source category sought to be regulated* “may reasonably be

anticipated to endanger public health.” 42 U.S.C. § 7411(b)(1)(A). The section 202(a)(1) endangerment finding did not address CO<sub>2</sub> from fossil fuel-fired EGUs. By the U.S. EPA’s own wording, during section 202(a)(1) finding, the agency merely set out “to determine if emissions of the well-mixed greenhouse gases *from CAA section 202(a) source categories* contribute to the air pollution that endangers public health and welfare.” 74 Fed. Reg. at 66,499 (emphasis added). The U.S. EPA did not determine in that finding whether any emissions from fossil fuel-fired EGUs contributes significantly to air pollution reasonably anticipated to endanger public health or welfare. This is an important distinction that leaves the section 202(a)(1) endangerment finding irrelevant to the agency’s authority to promulgate section 111 regulations. The agency simply did not possess authority for section 111 regulation based on the section 202(a)(1) endangerment finding.

In finalizing the CPP repeal in Docket ID No. EPA-HQ-OAR-2017-0355 and in the present action, the U.S. EPA now has before it a simple task of determining that the lack of a section 111 endangerment finding renders the CPP contrary to “the policy of the United States that necessary and appropriate environmental regulations comply with the law.” *See* Executive Order 13783, at § 1(e).

## **2. EPA’s Legal Memoranda Should Also Be Rescinded In Their Entirety.**

The Legal Memoranda comprise over 200 pages of erroneous legal analysis used by EPA to support the CPP’s improper jurisdictional overreach and minimize the legal and technical hurdles posed by the Clean Air Act, years of case law, and the numerous petitions and comments or parties who sought to limit the agency to its jurisdictionally proper role. EPA has correctly identified several key flaws in the Legal Memoranda related to their defense of an interpretation of the Clean Air Act that is inconsistent with its plain text, the structure and purpose of the Act,

Congressional intent, and the Agency's prior regulatory actions. These are not the only flaws in the Legal Memoranda, however. These same memoranda support the violation of the section 112 exclusion supported by the CPP, the interference with State and FERC jurisdiction over the power sector, as achieved by the CPP, and the regulation of GHGs and fossil-fuel fired EGU's in the absence of a proper endangerment finding. The Legal Memoranda are not based on sound legal analysis and do not reflect the current views of the Administration. They should, therefore, be rescinded in their entirety.

To the extent the Agency believes any portion of the Legal Memoranda accurately reflect the Agency's current position, the Agency should restate those positions in a separate legal memorandum. This is the only way to make clear what positions have been rescinded and what positions are supported by the Agency. To do otherwise will cause confusion as to which conclusions remain in effect, which have been specifically rescinded, and which can no longer be considered viable because they depended in whole or in part on logic, policy, or reasoning reflected in those portions that have been rescinded.

**3. Even If The 2009 Endangerment Finding Could Serve As The Requisite For Section 111 Regulation of EGUs, The Finding Is Severely Biased, Not Supported By Sound Scientific Evidence And Highly Speculative.**

Even if the section 202(a)(1) endangerment finding could serve as the requisite for section 111 regulation, repeal of the CPP should still be based on the factual and procedural shortcomings of that finding. A clear procedural flaw of the finding is that the proposed finding was never submitted to the Science Advisory Board for peer review as statutorily required. This flaw has been fully drawn out by the Texas Public Policy Foundation in its reconsideration petition (Appendix A herein) filed on behalf of seven petitioners. Murray Energy, as part of these Comments, fully adopts the reasoning therein by reference and inclusion in Appendix A.

The agency's failure to make its own judgment is another procedural flaw of the section 202(a)(1) endangerment finding. The CAA requires that U.S. EPA exercise its own judgment in promulgating the endangerment finding.<sup>10</sup> This necessarily entails that the agency create a record and then, in its own judgment, articulate whether danger to public health and welfare is anticipated. As part of the section 202(a)(1) endangerment finding, the agency did not exercise its own judgment. Instead, it simply adopted as its own determination the findings by a select number of other organizations, most notably the finding of the U.N. Intergovernmental Panel on Climate Change (IPCC). *See, e.g.,* Technical Support Document, *Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act*, Doc. No. EPA-HQ-OAR-2009-0171-0137, at 6. In promulgating the endangerment finding, the U.S. EPA all but admitted that it had not exercised its own judgment. *See* 74 Fed. Reg. at 66,511 (“[T]he Administrator is placing primary and significant weight on these assessment reports in making her decision on endangerment.”). The problems with the U.S. EPA's adoption of the findings of others as opposed to exercising its own judgment has been well-documented, *see generally* the State of Texas Petition for Reconsideration<sup>11</sup>, and the U.S. EPA Administrator himself has acknowledged<sup>12</sup> this procedural shortcoming of the finding.

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<sup>10</sup> This is true for endangerment findings required under section 111 or section 202(a)(1). *See* 42 U.S.C. § 7411(b)(1) (“The Administrator . . . shall include a category of sources in such a list [of categories of stationary sources] *if in his judgment* it causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare.” (emphasis added)); *id.* § 7521(a)(1) (“The Administrator shall by regulation prescribe . . . standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.” (emphasis added)).

<sup>11</sup> This petition can be viewed at:

[https://www.epa.gov/sites/production/files/2016-08/documents/petition\\_for\\_reconsideration\\_state\\_of\\_texas.pdf](https://www.epa.gov/sites/production/files/2016-08/documents/petition_for_reconsideration_state_of_texas.pdf).

<sup>12</sup> In an interview with Time Magazine, Administrator Pruitt stated that in promulgating the 202(a)(1) endangerment finding, the U.S. EPA “took work product of the U.N. Intergovernmental Panel on Climate Change and adopted it, and transferred it to this agency.” The full interview can be found at: <http://time.com/4998279/company-man-in-washington/>.

To be sure, the IPCC report could have been part of the record that the agency had decided to consider in exercising its own judgment. But the statute requires the agency itself, with its unique expertise, to exercise its own judgment and come to its own conclusions. In this case, borrowing conclusions from the IPCC report is particularly problematic, because the U.S. EPA should have made a determination as to whether domestic sources endangered domestic public health or welfare. This is not the task that the U.N. Intergovernmental Panel carried out, and the intent of Congress in enacting the CAA was circumvented when the U.S. EPA substituted conclusions from a non-U.S. entity for its own.

Finally, the section 202(a)(1) endangerment finding rested on significant factual errors. The assumptions the agency relied upon in finalizing that finding are increasingly being proven to be factually inaccurate. For example, we now have very credible data demonstrating that the models utilized by the U.S. EPA simply are not accurately predicting how CO<sub>2</sub> emissions affect the atmosphere. This undercuts the entire factual basis for the endangerment finding. And it is becoming progressively clearer that regulating CO<sub>2</sub> in the United States will have no discernable effect on the atmosphere or our climate, much less that such regulation would address endangerment of public health or welfare. These factual bases are described with legal and scientific detail in the documents attached to these Comments as Appendix B (U.S. House Committee on Science, Space & Technology Testimony of Professor of Atmospheric Science John R. Christy of the University of Alabama, March 29, 2017) and Appendix C (the Competitive Law Institute's Petition to the U.S. EPA, including additional testimony by Prof. Christy). These Comments hereby incorporate, by reference and by inclusion in the appendices, the legal and factual bases set out in those documents. The tenuous factual support for the 202(a)(1) endangerment finding provides even further evidence that the agency should support



its CPP Repeal on the additional ground that no fact-based endangerment finding has been promulgated to provide the authority for the CPP.

Attached as Appendix D and incorporated herein by reference is the recent report prepared by Dr. Roy W. Spencer – “Analysis of the Scientific Underpinnings Of The EPA Endangerment Finding and Clean Power Plan” (February 13, 2018). Dr. Spencer is a Principal Research Scientist at the University of Alabama in Huntsville where he directs a variety of climate research projects. Dr. Spencer received his Ph.D. in Meteorology from the University of Wisconsin in 1981, and was formerly a Senior Scientist for Climate Studies at NASA’s Marshall Space Flight Center. Dr. Spencer is the U.S. Science Team Leader for the AMSR-E instrument flying on NASA’s Aqua satellite, which monitors global sea ice conditions, sea surface temperatures, precipitation, and other climate variables. Together with Dr. John Christy, Dr. Spencer is co-developer of the original satellite method for precise monitoring of global temperatures from Earth-orbiting satellites, for which he was awarded NASA’s Medal for Exceptional Scientific Achievement, and the American Meteorological Society’s Special Award. Dr. Spencer has testified in both houses of the U.S. Congress several times on global warming-related subjects. His climate-related publications have emphasized the measurement of precipitation and temperature from space, as well as methods for using satellites to diagnosis climate feedbacks for the purpose of estimating climate sensitivity, hurricane intensity, and extratropical storm strength. (Appendix D, p. 3).

Based on his detailed analysis of the 2009 Endangerment Finding, Dr. Spencer concludes that the scientific “claims” asserted by the U.S. EPA in its Endangerment Finding are severely biased, and not supported by a significant body of peer reviewed and published evidence. Some of the claims verge on pure speculation, others are exaggerated, and overall a large body of

published scientific work was simply ignored. Additionally, newly published information since the 2009 Endangerment Finding also suggest a reassessment is in order. The 2009 Endangerment Finding should be reconsidered in light of new evidence and the procedural and factual shortfalls of the 2009 Endangerment Finding. No new CPP rule should be promulgated absent this review of all available scientific evidence. (*Id.*, pp. 4, 52-53).

Initially, Dr. Spencer confirms the concerns addressed above that the U.S. EPA improperly relied on the UN Intergovernmental Panel on Climate Change (IPCC) rather than on independent peer-reviewed evidence. The IPCC is composed of bureaucrats from the world's nations who used like-minded scientists to support the IPCC's goal of reducing CO<sub>2</sub> emissions. Scientists who did not share that goal were excluded from the process. The IPCC ignored alternative, natural explanations of climate change and the role of natural, internally-driven climate cycles. (*Id.*, pp. 5-6).

In his Analysis, Dr. Spencer addresses the fundamental concepts of energy balance in temperature change and the two different classes of energy imbalance which can cause climate change. He addresses each of the principal scientific "claims" asserted by the U.S. EPA in its 2009 Endangerment Finding and criticizes a number of the fundamental claims asserted in each of four (4) classes, including observed trends and effects in GHGs and supposedly "modeled" projections of future climate changes. (*Id.*, pp. 7-8).

Dr. Spencer first addresses the important concept of "energy balance" which is fundamental to understanding climate change due to any cause. There are two general classes of energy balance in the environment – radiative and non-radiative. An example of radiative energy balance is the balance between absorbed sunlight and thermally-emitted infrared (heat) radiation which is how the climate system naturally emits energy and cools itself to outer space.



In contrast, an example of non-radiative energy balance is the El Nino and La Nina phenomena, where the average rates of energy transport between the atmosphere and ocean are temporarily altered and involve natural changes in the transports of heat between the atmosphere and ocean. Significantly, the IPCC improperly emphasizes radiative energy balance while largely ignoring non-radiative energy balance. The IPCC improperly focuses on “external” radiative forcing, including anthropogenic forcing, while ignoring non-radiative forced energy imbalance, that is the natural changes in ocean vertical circulation. (*Id.*, pp. 9-13). Dr. Spencer concludes:

This issue is important because, as we shall see, the energy imbalance associated with climate change is exceeding small (around 1%) and not computable from physical first principles, not observable from even our best surface and satellite measurement systems, and capable of occurring through natural processes alone, thus causing natural climate change. (*Id.*, p. 10; emphasis added).

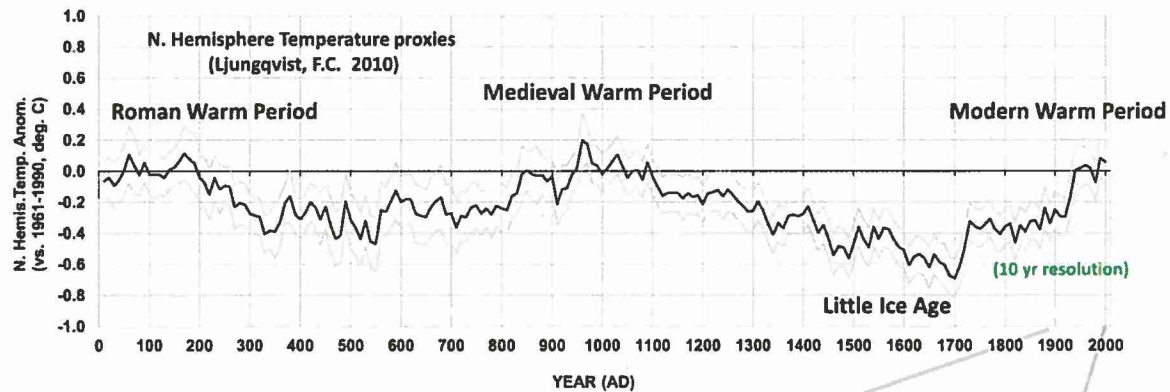
Concerning the U.S. EPA’s claims of observed trends in CO<sub>2</sub> concentrations in the atmosphere, Dr. Spencer concludes, even if true, CO<sub>2</sub> still represents only 0.04% of the earth’s atmosphere. This tiny component, on the other hand, is nevertheless necessary for life to exist on Earth, since photosynthesis on both land and in the ocean is necessary for the food chain. Furthermore, no matter how much CO<sub>2</sub> humanity produces, an average of 50% of it is removed by nature each year. (*Id.*, pp. 15-16).

Dr. Spencer takes particular issue with every one of the U.S. EPA’s claims concerning observed effects associated with global elevated concentrations of GHGs. (*Id.*, pp. 17-36). In summary terms, there is no scientific basis for U.S. EPA to assert that climate change is more due to GHG emissions than to natural cycles in the climate system.

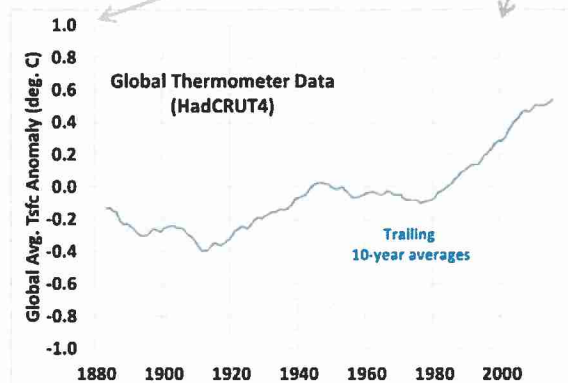
**First**, Dr. Spencer observes that compared to the approximate 240 W/m<sup>2</sup> average rates of energy flows, the U.S. EPA asserted 0.6 to 2.4 W/m<sup>2</sup> imbalance amounts to 0.25% to 1% of

average flows. But even a 1% global radiative balance cannot be reproduced by climate models from physical first principles alone, so the supposed GHG-imposed imbalance is below what climate models can resolve from physical first principles. Instead, models must be “tuned” to produce an assumed energy balance (i.e. assumed no natural climate change) and their tuning parameters are not well constrained. Nor can an anthropogenic energy imbalance be measured from our best satellite energy budget instruments. And even if one would accurately measure the Earth’s radiative energy imbalance, there is no way to determine how much is due to anthropogenic versus natural forcings. (*Id.*, pp. 17-18).

**Second**, any global warming since the mid-20<sup>th</sup> century, is fully consistent with the emergence from the Little Ice Age occurring from approximately 1400 AD to 1700 AD and not inconsistent with past warming cycles in the Roman Warm Period from approximately 0 AD to 200 AD or the Medieval Warm Period from approximately 850 AD to 1100 AD. (*Id.*, p. 19-20). The chart below indicates global warming is consistent with prior climate change cycles.



**It is Not Obvious  
That Recent Warming  
Is Outside the Range  
Of Natural Temperature  
Variations of the Last  
2,000 Years**



**Third**, there is no solid basis to attribute recent warming to anthropogenic GHG concentrations. As Dr. Spencer concludes:

There is no way to know just how much of recent warming was due to the observed increase at atmospheric CO<sub>2</sub>. The primary IPCC climate model simulations regarding natural forcing alone were with changes in total solar irradiance, stratospheric ozone depletion, and volcanoes. Clearly, this is insufficient; there are many more potential sources of natural climate change. For example, indirect solar effects on global cloudiness; natural, and especially unforced, (non-radiative) fluctuations in the climate system which can also change the global energy balance. So, once again we are presented in the claim with a statement of faith, an argument from ignorance. (*Id.*, pp. 21-22).

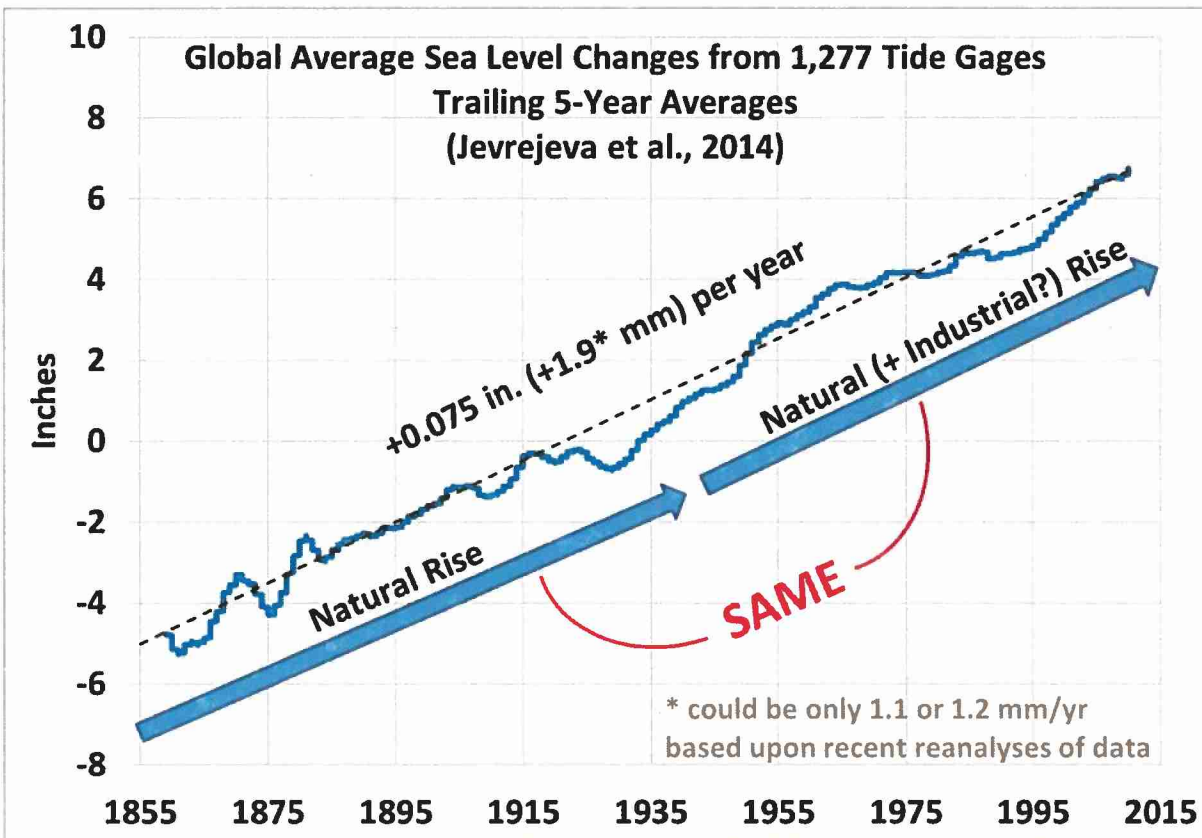
**Fourth**, the U.S. EPA failed to distinguish between GHG concentration effects and Urban Heat Island effect. Dr. Spencer concludes:

While the U.S. has likely warmed in recent decades, there is now evidence that as much as half of the warming could be spurious, due to the Urban Heat Island (UHI, e.g. Oke, 1995) effect. When only the most pristine stations in the U.S. are analyzed – that is, those with the least amount of manmade structures and spurious heat sources encroaching upon the thermometer sites – the rate of warming is considerably reduced compared to official NOAA estimates (Watts et al., 2015). This also raises questions about warming trends reported in other land areas of the globe as well.

Furthermore, unstated in the claim is that most of the concern for human activities and agriculture would be warming during the summer months (June – July – August), not winter. As can be seen in official NOAA data, warming during the summer in the U.S. has been weaker than in the annual average temperatures, with a warming trend of only +0.11 deg. F/decade (+0.06 deg. C/decade): (*Id.*, p. 22).

**Fifth**, contrary to the U.S. EPA claim, there is no demonstrative correlation between sea level changes and GHG emission. Dr. Spencer concludes:

There are a number of points which must be made regarding sea level rise. The first is that, based upon global tide gage data produced by Jevrejava et al. (2014), sea level has been rising since well before human-caused GHG emissions could be blamed (data from <http://www.psmsl.org/products/reconstructions/gslGPChange2014.txt>):



Thus, *the claim deceptively excludes the possibility that recent sea level rise is mostly natural.*

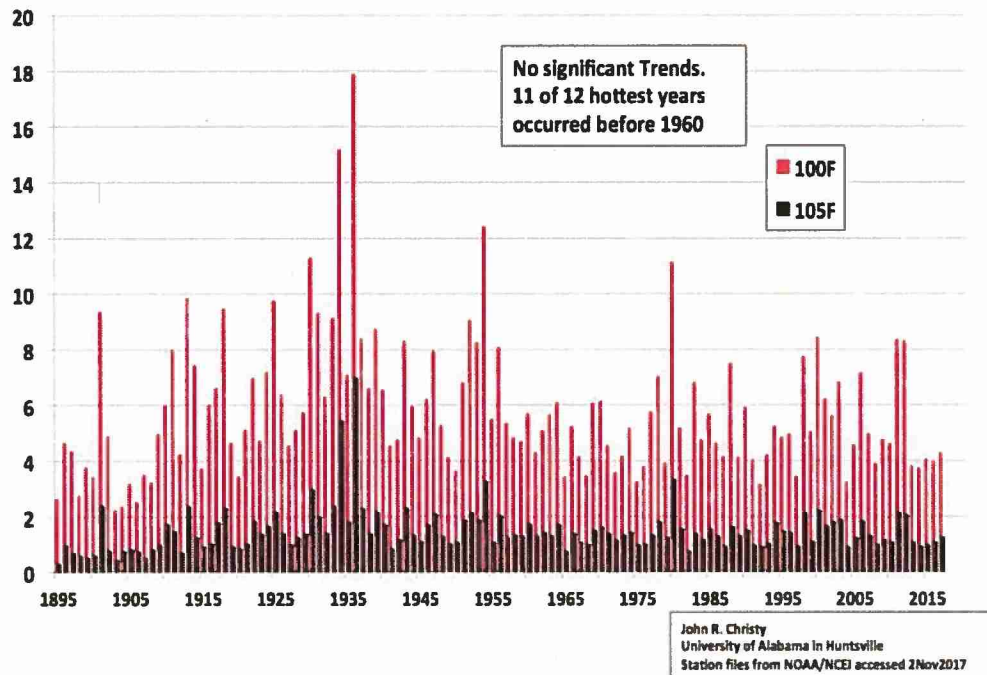
Importantly, there has been no obvious acceleration of sea level rise during the period of greatest greenhouse gas emissions (generally after the 1940s), as might be expected. In other words, as far as we know, sea level has been rising as we have been coming out of the Little Ice Age. (*Id.*; p. 26).

**Finally**, the U.S. EPA's claim that there have been widespread changes in extreme temperatures in the last fifty years is a gross exaggeration. Dr. Spencer concludes:

At a minimum, the claim is a gross exaggeration. Regarding the U.S., the main concern would be excessive heat (since less excessive cold would be a welcome thing). For 1,114 USHCN stations in the United States, here are the average numbers of days each year that a station exceeded 100 deg. F and 105 deg. F temperatures, from 1895 through 2017, as tabulated from official NOAA data by John Christy (UAH):



**Average per station (1114 USHCN Stations) 1895-2017**  
**Number of days daily Maximum temperature above 100°F and 105°F**



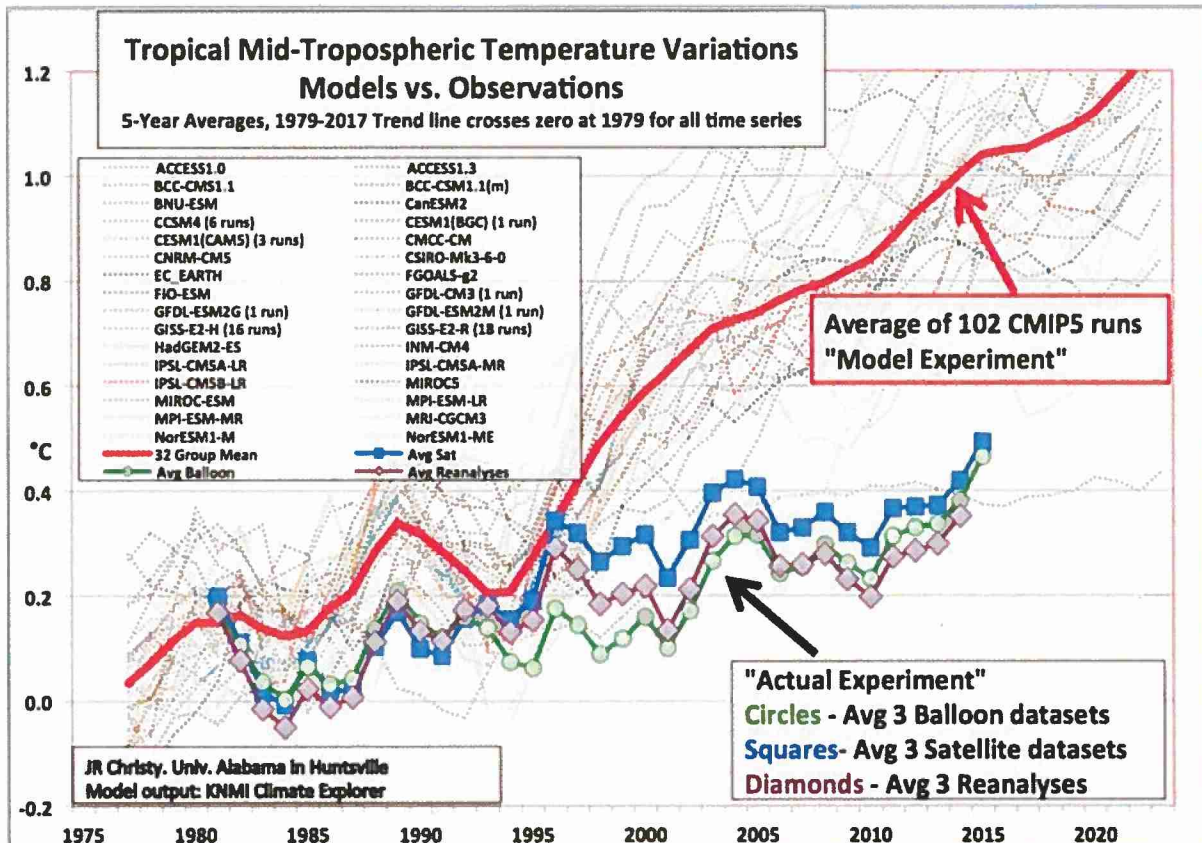
As can be seen, there is no obvious trends in very hot days, which would be the main concern. In fact, 11 of the 12 years with the largest number of very hot days occurred before 1960.

As previously explained, I have concern that all land-based thermometer data have spurious warming effects from manmade structures replacing natural vegetation, and active heat sources, leading to an Urban Heat Island (UHI) effect. It is not clear how well this has been adjusted for, and there is evidence that in the U.S. warming in recent decades has been exaggerated by as much as a factor of 2 (Watts et al., 2010). (*Id.*, p. 31).

Concerning the last two classes of U.S. EPA claims made in the 2009 Endangerment Finding – projections of future climate change and effects – these claims are not based on observational evidence but rather are based purely on projections of future climate change states based on climate modeling. Based on recent information, this modeling has proved biased, exaggerated and faulty. (*Id.*, at pp. 37-52). Dr. Spencer concludes:

There is now a great deal of published evidence that the amount of future warming projected by the models will be too large. The claim, rephrased, is that warming in the 21<sup>st</sup> Century will accelerate, that is, the rate of warming will be greater than in the 20<sup>th</sup> Century.

But, to date, the models have produced approximately twice the amount of atmospheric warming as has been observed since 1979, which is when we have had our first capability to monitoring the tropospheric temperature over virtually the entire Earth:



Out of 102 IPCC model experiments (upon which the EPA's Endangerment Finding depends), only one model came close to the observations (whether satellites, weather balloons, or global reanalysis datasets), with almost all others warming significantly more than the observations. This is an apples-to-apples comparison, with the model (and all observations) vertical temperature structures averaged in the same way that the satellite senses the atmosphere. Each time series is placed vertically on the graph so that their linear trends intersect at "0" in 1979, which is the most meaningful way to compare these various measures in a climate change context.

How can the models' future projections for the rest of the 21<sup>st</sup> Century be trusted, when they have failed to reproduce what has already occurred? (*Id.*, pp. 37-38).

Based on the Analysis, Dr. Spencer concludes:

In conclusion, given:

(1) the lack of clear evidence that recent climate system changes, to the extent they exist, are outside the realm of natural variability;

(2) evidence that increasing levels of atmospheric CO<sub>2</sub> benefit global photosynthesis and crop productivity;

(3) the inability of climate models to reproduce the recent weak levels of atmospheric warming since 1979;

(4) the inability of climate models to approach energy balance without *ad hoc* tunings;

(5) the current lack of understanding of key physical processes necessary to predict climate changes with models (e.g. cloud feedbacks, changes in precipitation efficiency); and

(6) the demonstrably biased, alarmist, and misleading ways in which the science claims underpinning the Endangerment Finding were made in the Technical Support Document, I conclude that there is sufficient reason for the EPA to revisit the Endangerment Finding, and to not replace the Clean Power Plan until such a time that a much more balanced analysis of all of the available scientific evidence, including the potential benefits of more atmospheric CO<sub>2</sub> and modest warming, is undertaken. (*Id.*, pp. 52-53).

#### IV. CONCLUSION

Murray Energy applauds President Trump's Executive Order 13783 and enthusiastically supports the U.S. EPA's proposed repeal of the Obama CPP in Docket Id No. EPA-HQ-OAR-2017-0355. The 2009 Endangerment Finding (and the Legal Memoranda) should be abrogated in their entirety. There is no basis in the CAA to reorder generation sources or compel compliance measures that cannot be achieved on a reasonable and cost effective basis. The States should retain maximum flexibility to establish and apply performance standards and to



take into consideration such factors as the existing generation portfolio, remaining useful life (“RUL”) of existing facilities and achievable and cost effective controls to preserve the State’s coal-fired generation resources and protect against premature retirement of valuable energy production facilities.

Even though the U.S. EPA has identified a clear reason to repeal the CPP in its CPP Repeal Action, Murray Energy contends that the U.S. EPA must correct these additional errors and repeal the CPP on broader grounds for two significant reasons. First, President Trump’s Executive Order is clear that important policy of U.S. dictates that environmental regulations “comply with the law.” The agency will not have addressed the Executive Order’s directive to “review all existing regulations, orders, guidance documents, policies, and other similar agency actions” for compliance with the law if it allows clear agency errors to stand. Unlawful decisions to regulate fossil fuel-fired generating units under CAA section 111(d) despite existing regulations under CAA section 112 and despite a failure to make the statutorily-required requisite findings simply cannot stand in light of the President’s Executive Order.

Second, these additional errors do not only require repeal of the existing rule, they also dictate that new regulations of CO<sub>2</sub> emissions at fossil fuel-fired EGUs under CAA section 111(d) cannot be legally promulgated. Now is the time for the U.S. EPA to correct clear jurisdictional errors that would negate the efforts to engage in future fruitless rulemaking efforts.

While we recognize that the U.S. EPA is properly considering repeal of the Obama Clean Power Plan, we respectfully remind the U.S. EPA that much more needs to be done to follow through on promises made for coal-fired generation, coal production, and coal mining jobs. The actions which are within U.S. EPA’s power to accomplish must include:

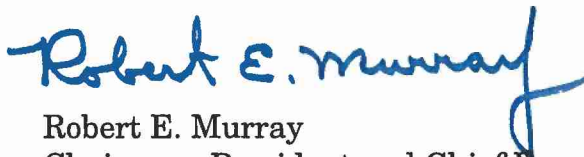
1. Repealing EPA’s “Endangerment Finding” for greenhouse gases under Section 202(a) of the Clean Air Act;

2. Repealing EPA's New Source Performance Standards for Greenhouse Gas Emission for coal-fired electric utility generating units and updating the New Source Performance Standard for coal to be based upon High Efficiency Low Emitting (HELE) plant technology retrofit with back-end pollution control equipment;
3. Repealing or revising New Source Review that eliminate applicability related to investments to improve plant efficiency.
4. Eliminating the "Effluent Limitations Guidelines and Coal Combustion Residuals Rules" which threaten to close numerous coal-fired power plants;
5. Requiring compliance with Section 321(a) of the Clean Air Act to fully consider the job loss and shifts of employment caused by its regulations;
6. Updating the Supreme Court-ordered cost justification related to the Mercury and Air Transport Rule to determine whether the mandated chlorine reductions are economically justified or should be removed;
7. Overturning the recently enacted "Cross-State Air Pollution Update Rule"; and recently-promulgated ozone regulations; and
8. Ending the electric utility "Maximum Achievable Control Technology" standards.

On behalf of Murray Energy, and its ownership, management, and employees, we respectfully submit these comments.

Sincerely,

MURRAY ENERGY CORPORATION



Robert E. Murray  
Chairman, President and Chief Executive Officer  
46226 National Road  
St. Clairsville, Ohio 43950



## Comment submitted by Orla E. Collier, Benesch Friedlander Coplan & Aronoff LLP on behalf of Murray Energy Corporation (Appendix A)

The is a Comment on the **Environmental Protection Agency (EPA)** Proposed Rule: **Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Reopening of the Comment Period**

For related information, [Open Docket Folder](#)

ID: EPA-HQ-OAR-2017-0355-20980

Tracking Number: 1k2-92se-5bns



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### Comment

Please see attached Appendix A to Murray Energy Corporation comments. Appendix B through D will be sent under separate cover. Thank you.

### Attachments (1)



Appendix A

View Attachment:



### Document Information

Date Posted:

May 11, 2018

RIN:

Not Assigned

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# APPENDIX A



**BEFORE THE ADMINISTRATOR OF THE  
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**Liberty Packing Company LLC,  
Nuckles Oil Co., Inc. dba Merit Oil Company,  
Norman R. "Skip" Brown,  
Dalton Trucking Company, Inc.,  
Loggers Association of Northern California,  
Construction Industry Air Quality Coalition, and  
Robinson Industries, Inc.**

**PETITIONERS**

**PETITION TO RECONSIDER ENDANGERMENT AND CAUSE  
OR CONTRIBUTE FINDINGS FOR GREENHOUSE GASES  
UNDER SECTION 202(a) OF THE CLEAN AIR ACT, 74 FED. REG. 66,496  
(DEC. 15, 2009) DOCKET NO. EPA-HQ-OAR-2009-0171; FRL-9091-8;  
RIN 2060-ZA14 ("ENDANGERMENT FINDING")**



## INTRODUCTION

Pursuant to the Right to Petition Government Clause of the First Amendment of the United States Constitution,<sup>1</sup> the Administrative Procedure Act,<sup>2</sup> the Clean Air Act,<sup>3</sup> and the United States Environmental Protection Agency's ("EPA's") implementing regulations, Petitioners file this petition with EPA's Administrator and, for the reasons set forth herein, respectfully request the Administrator to reconsider EPA's Endangerment Finding, 74 Fed. Reg. 66,496 (Dec. 15, 2009), made pursuant to Section 202(a) of the Clean Air Act.

## INTEREST OF PETITIONERS

Petitioner Liberty Packing Company LLC ("Liberty") is a bulk processor of tomato products. Located in California, Liberty relies on natural gas boilers for production of its tomato products. Burning natural gas creates carbon dioxide as a byproduct. Carbon dioxide is a greenhouse gas that is subject to the Endangerment Finding.

Petitioner Nuckles Oil Co., Inc. dba Merit Oil Company ("Merit Oil") is a family business that has operated in California for three generations. Merit Oil stores, transports, and wholesales a variety of petroleum products, including gasoline, diesel fuels, solvents, and kerosene, and

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<sup>1</sup> "Congress shall make no law . . . abridging . . . the right of the people . . . to petition Government for a redress of grievances." U.S. Const. amend. I. The right to petition for redress of grievances is among the most precious of liberties safeguarded by the Bill of Rights. *United Mine Workers of America, Dist. 12 v. Illinois State Bar Association*, 389 U.S. 217, 222 (1967). It shares the "preferred place" accorded in our system of government to the First Amendment freedoms and has a sanctity and sanction not permitting dubious intrusions. *Thomas v. Collins*, 323 U.S. 516, 530 (1945). "Any attempt to restrict those First Amendment liberties must be justified by clear public interest, threatened not doubtful or remotely, but by clear and present danger." *Id.* The Supreme Court has recognized that the right to petition is logically implicit in, and fundamental to, the very idea of a republican form of government. *United States v. Cruikshank*, 92 U.S. (2 Otto) 542, 552 (1875).

<sup>2</sup> 5 U.S.C. Section 553(e).

<sup>3</sup> 42 U.S.C. Section 7401, *et seq.* (sometimes referred to here as the "CAA").

operates a number of delivery trucks. Merit Oil's operations emit greenhouse gases subject to the Endangerment Finding.

Petitioner Norman R. "Skip" Brown is an individual residing in California who has been the owner of a family roadbuilding business, Delta Construction Company, which will be required to go out of business in part because of regulations governing carbon dioxide emissions, which are the subjects of the Endangerment Finding.

Petitioner Dalton Trucking Company, Inc. is a California corporation that provides specialized transportation and off-loading services in connection with which it operates numerous heavy-duty trucks that emit greenhouse gases, which are the subjects of the Endangerment Finding.

Petitioner Loggers Association of Northern California ("LANC") is a nonprofit California trade association representing the interests of its members involved in the logging industry in Northern California.

Petitioner Construction Industry Air Quality Coalition ("CIAQC") is a nonprofit California trade association representing the interests of other California nonprofit trade associations and their members whose air emissions are regulated by California state, regional, and local regulations, as well as federal regulations.

Petitioner Robinson Enterprises, Inc. ("Robinson") is a third-generation family-owned California corporation engaged in harvesting and transportation of forest products, petroleum products, and transportation of various commodities. It has suffered unnecessary financial hardship as a result of various burdensome regulatory requirements.

### **EXECUTIVE SUMMARY**

EPA's Greenhouse Gas Endangerment Finding is the cornerstone of EPA's effort to regulate greenhouse gases under the Clean Air Act. Carbon dioxide is the most prevalent

greenhouse gas. Because carbon dioxide is everywhere and in everything, the Endangerment Finding provides EPA with a springboard for regulating virtually every aspect of our nation's economic life. At the same time, it is the product of serious legal, scientific, evidentiary, and procedural errors. Those errors reflect the past Administration's rush to judgment, which was spurred by political expediency.

This Petition focuses on a glaring statutory violation, namely, EPA made the Endangerment Finding without seeking peer review from the Science Advisory Board, a blue-ribbon panel of experts established by Congress to ensure that EPA regulations are based on accurate data and credible scientific analyses. In enacting the peer review requirement, Congress was concerned that EPA not impose unnecessary restrictions on economic and personal freedom by unintelligently pursuing its regulatory goals. By ignoring the peer review requirement, EPA violated 42 U.S.C. § 4365(c)(1). That fundamental error stemmed from a desire to impress the community of nations by being among the first to regulate greenhouse gas emissions timed to coincide with the 2009 Copenhagen international climate conference.

In making the Endangerment Finding, EPA made no showing that the finding or any of its related greenhouse gas rules will remove any dangers to human health or welfare. Indeed, EPA disclaimed any obligation to define its ultimate regulatory objectives or its chosen means of achieving them and even refused to articulate how the Endangerment Finding could lead to successfully combating the climate change problems that EPA postulated. Furthermore, EPA claimed it was 90-99% certain that human-caused climate change threatened public health and welfare, *see* 74 Fed. Reg. at 66,518 & n.22, while failing to state what constitutes a safe climate, acceptable global temperature ranges, how levels of greenhouse gases in the atmosphere (whether natural or man-made) may affect those ranges, or even whether its regulatory actions would



ameliorate any risk. Because of these substantial gaps in its analysis, no one could accurately judge whether EPA achieved any discernable public benefit or congressionally authorized goal when it made the Endangerment Finding. As set forth in the attached declaration by a long-standing member of the Science Advisory Board, these analytical gaps would have been identified and communicated by the Board to EPA had EPA submitted the Endangerment Finding for statutorily-mandated peer review.

Moreover, Section 202(a)(1) of the Clean Air Act, under which the Endangerment Finding was made, requires the Administrator to exercise independent judgment to determine how a regulatory response to a perceived risk will reduce or eliminate that risk. The prior Administration left the gathering, sifting, and analyzing of the evidence, as well as the risk assessment, almost entirely to international non-governmental organizations, which have no authority under the Clean Air Act. The conclusions borrowed from those organizations rest primarily on theoretical computer modeling projections, which themselves are based on untested assumptions. Indeed, EPA acknowledged that the assumptions upon which it relied are subject to substantial uncertainty. Accordingly, the Agency's professed high confidence in its Endangerment Finding is unsupported, and its almost complete reliance on the work of non-governmental organizations was, put plainly, an abdication of its responsibilities under the Clean Air Act. As set forth in the attached expert declaration, these problems also would have been addressed by the Science Advisory Board had EPA submitted the proposed Endangerment Finding to the Board, as required by law.

The adverse economic impacts of the Endangerment Finding and the cascade of greenhouse gas regulations that it continues to generate are well documented. Virtually all sectors of the nation's economy are affected, including but not limited to mining, manufacturing, transportation, construction, and agriculture, as well as energy production, transmission, and use,

resulting in lost jobs affecting millions of American workers and their families.

Now, the new EPA Administration has the opportunity to correct the illegal process that culminated in the Endangerment Finding. Indeed, EPA has both the authority and the responsibility to reconsider the Endangerment Finding in light of the previous Administration's errors. Foremost among those errors is EPA's utter failure to submit the relevant documentation to the Science Advisory Board for peer review. It matters not that a court has reviewed the Endangerment Finding, because EPA is fully empowered to reconsider the finding at any time, as long as it articulates sufficient reasons for so doing. This Petition provides a surfeit of such reasons.

As set forth in more detail below, the Endangerment Finding should be reconsidered, and the Administrator should reopen the regulatory process so that the Science Advisory Board may be given the opportunity to conduct peer review, as required by 42 U.S.C. § 4365(c)(1).

### **STATEMENT OF LAW**

Congress directed the EPA Administrator to establish the Science Advisory Board (sometimes referred to here as "SAB" or the "Board") to function as a peer review panel of experts to ensure that EPA's actions are scientifically and technically sound and defensible, 42 U.S.C. § 4365(a). The operative language of the SAB statute provides that EPA "shall" make its regulatory proposals available to the Science Advisory Board for peer review. 42 U.S.C. § 4365(c)(1). The SAB submittal requirement applies to all regulatory proposals made by EPA under the statutes it administers, including the Clean Air Act, and the submittal requirement is nondiscretionary. *Am. Petroleum Inst. v. Costle*, 665 F.2d 1176, 1188 (D.C. Cir. 1981) ("APF") ("The language of the statute indicates that making a [regulatory proposal] available to the SAB for comment is mandatory."). Upon receipt of the material, the SAB may provide "advice and comments on the

adequacy of the scientific and technical basis of the proposed criteria document, standard, limitation, or regulation, together with any pertinent information in the Board's possession." 42 U.S.C. § 4365(c)(2).

The plain meaning of the mandatory SAB submittal requirement is confirmed by its purpose, which is to provide the Science Advisory Board an opportunity to make available "its advice and comments [to EPA] on the adequacy of the scientific and technical basis of the [regulatory proposals]." 42 U.S.C. § 4365(c)(2). SAB's mission is to provide "expert and independent advice to the [EPA] on the scientific and technical issues facing the Agency" and to assist EPA "in identifying emerging environmental problems." 40 C.F.R. § 1.25(c). See Joe G. Conley, *Conflict of Interest and the EPA's Science Advisory Board*, 86 Tex. L. Rev. 165, 168 (2007) ("Congress established the EPA's Science Advisory Board in 1978 to provide independent scientific and technical advice to the EPA."). A key element of the SAB's mission is to render advice to EPA "on a wide range of environmental issues and the integrity of the EPA's research." *Meyerhoff v. United States EPA*, 958 F.2d 1498, 1499 (9th Cir. 1992).

Because the SAB submittal requirement is nondiscretionary, an EPA regulatory action subject to the submittal requirement that has not been submitted to the Board for peer review is "not in accordance with law." See 5 U.S.C. § 706(2)(A); *API*, 665 F.2d at 1184. See also, e.g., *Sprint Corp. v. Fed. Comm'n Comm'n*, 315 F.3d 369 (D.C. Cir. 2003); *Sugar Cane Growers Co-op of Florida v. Veneman*, 289 F.3d 89 (D.C. Cir. 2002); *Federal Power Commission v. Transcontinental Gas Pipe Line Corp.*, 423 U.S. 326, 331 (1976).

### **STATEMENT OF FACTS**

The prior EPA Administration commenced its activities in 2009 with a firm conviction that human greenhouse gas emissions are causing significant and harmful global climate change. In



one of her first official acts, then-EPA Administrator Lisa Jackson issued a memorandum to all EPA staff announcing the top five priorities that would receive her “personal attention.” The first of those priorities was “[r]educing greenhouse gas emissions.” See *Memorandum from Lisa P. Jackson to “All EPA Employees,”* dated January 23, 2009, reproduced as **Exhibit A**.

Just three months later, EPA released the proposed Endangerment Finding, which was based upon two premises. First, EPA stated that air emissions of six substances — CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, and SF<sub>6</sub> — endanger public health and welfare. Second, EPA asserted that those six substances together constitute a single “air pollutant” emitted by new automobiles that contributes to harmful “air pollution,” even though automobiles actually do not emit two of the six (PFCs and SF<sub>6</sub>) and emit two others (CH<sub>4</sub> and N<sub>2</sub>O) only in minute amounts. In fact, carbon dioxide (CO<sub>2</sub>), a ubiquitous natural substance essential to life on Earth, was the primary target of the Endangerment Finding. See 74 Fed. Reg. 18,886-88 (Apr. 24, 2009). EPA provided only a 60-day comment period for the proposed Endangerment Finding, even though it was apparent the finding would create one of the most far-reaching regulatory programs in history, spurring numerous requests to extend the comment period, all of which EPA denied. See 74 Fed. Reg. at 66,503. Notably, the SAB submittal requirement was raised during the public comment period on the proposed Endangerment Finding, but ignored by EPA. See *Coalition Comments on EPA’s Proposed Finding of Endangerment from Anthropogenic Greenhouse Gases to Public Health and Welfare*, reproduced in relevant part in **Exhibit B**, p.10 n 4. (“EPA also failed to make available to the Science Advisory Board for review and comment the Endangerment Finding”).

On May 19, 2009, less than one month after publishing the proposed rule and well before the comment period closed, the Obama Administration announced that, “for the first time in history,” the United States “set in motion a new national policy aimed at both increasing fuel

economy and reducing greenhouse gas pollution from all new cars and trucks.” This “groundbreaking policy” was based on an “unprecedented collaboration” among federal agencies, automakers, environmental advocacy groups, organized labor, and the State of California to issue motor vehicle greenhouse gas regulations. *See President Obama Announces National Fuel Efficiency Policy*, reproduced as **Exhibit C**. EPA knew and understood that such an arrangement could not be implemented unless EPA were to promulgate the Endangerment Finding in the form in which it was proposed, and which would function as the springboard for the implementation of the “groundbreaking policy.” *See Proposed Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Fuel Economy Standards*, 74 Fed. Reg. 49454, 49464 (Sept. 28, 2009) (“If EPA makes the . . . endangerment finding . . . then section 202 authorizes EPA to issue [greenhouse gas] standards applicable to [cars and trucks].”).

EPA announced its final Endangerment Finding on December 7, 2009. *See* 74 Fed. Reg. 66,496 (Dec. 15, 2009), just nine months after the publication of the proposed finding. Conveniently, that was the opening day of a highly publicized international conference on climate change held in Copenhagen, Denmark, attended by EPA’s Administrator. *See Copenhagen Climate Change Conference – December 2009, United Nations Framework Convention on Climate Change*, [http://unfccc.int/meetings/cop\\_15/items/5257.php](http://unfccc.int/meetings/cop_15/items/5257.php). EPA’s final rule was substantially unchanged from EPA’s proposal. 74 Fed. Reg. at 66,497-99, 66,516-17, 66,540-41.

This irregular and illegal process had consequences. In EPA’s own words, the Endangerment Finding causes “costs to sources and administrative burdens to permitting authorities . . . so severe that they [create] ‘absurd results.’” 75 Fed. Reg. at 31,516-17. EPA also stated that whether the Endangerment Finding, or any foreseeable regulatory actions based on the finding, might or even could mitigate any projected climate effects was irrelevant. 74 Fed. Reg.

at 66,507-08.

Importantly, EPA acknowledged in a prior technical document published in connection with its Advance Notice of Proposed Rulemaking for light duty vehicles (the “Car Rule”) that greenhouse gas emissions applicable to such vehicles would produce a reduction of, at most, approximately 0.01 degree Celsius in mean global temperature. *See Light Vehicle Technical Support Document*, Docket U.S. EPA-HQ-OAR-2008-0318-0084. When asked about this statement during the comment period on the Endangerment Finding, EPA declined to reevaluate its technical conclusion regarding temperature but simply “disagree[d]” that temperature effects were relevant to the Endangerment Finding, even though the Car Rule was the immediate impetus for the Endangerment Finding. *See EPA’s Response to Public Comments: Volume 10: Cause or Contribute Finding, Response to Comment 10-14*, reproduced as **Exhibit D** at 11-13.

EPA made the Endangerment Finding without benefit of input from the Science Advisory Board. Instead, EPA relied almost exclusively on “assessment literature” generated by third parties that had summarized their own views of global climate change science. According to EPA, the Administrator “relied heavily” on the assessments of the United States Global Change Research Program (“USGCRP”), the Intergovernmental Panel on Climate Change, (“IPCC,”) and the National Research Council (“NRC”) as the “*primary* scientific and technical basis of her endangerment decision.” 74 Fed. Reg. at 66,510 (emphasis added). In response to comments calling on EPA to make “its own assessment of all of the underlying studies and information,” EPA refused, on the ground that it “ha[d] no reason to believe” the reports of the three non-governmental organizations were inaccurate. *Id.* at 66,511.

Significantly, the prior EPA Administrator was apparently comfortable relying substantially on the work of *one* of the non-governmental groups, IPCC, to answer what is perhaps



the most critical issue in regulating greenhouse gas emissions — the extent to which climate change arises from anthropogenic greenhouse gas emissions, as opposed to natural forces. *See Principles Governing IPCC Work* at ¶ 1-9, reproduced as **Exhibit E** (discussing the purposes, missions, and goals of the IPCC). In so doing, EPA acknowledged that, despite republishing and relying on IPCC’s claim of 90-99% certainty, there are “varying degrees of uncertainty across many of these scientific issues.” *See* 74 Fed. Reg. 66,506.

Notwithstanding these uncertainties, EPA issued the Endangerment Finding based on computer model predictions of man-made, severe climate change impacts, and concluded that, because of its Endangerment Finding, it was legally obligated to promulgate a separate rule to restrict greenhouse gas emissions from certain new motor vehicles. Car Rule, 75 Fed. Reg. 25,324, 35,398 (May 7, 2010).

EPA further concluded that its regulation of motor vehicle greenhouse gas emissions automatically triggered, beginning on January 2, 2011, regulation of stationary-source greenhouse gas emissions under the Clean Air Act’s Prevention of Significant Deterioration (“PSD”) program and Title V programs. *See Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule*, 75 Fed. Reg. 31,514, 31,519-22 (Jun. 3, 2010) (rule rewriting, or “tailoring,” the Clean Air Act’s emissions thresholds for stationary sources of greenhouse gases subject to the PSD and Title V programs; *see also Reconsideration of Interpretation of Regulations That Determine Pollutants Covered by Clean Air Act Permitting Programs*, 75 Fed. Reg. 17,004 (Apr. 2, 2010) (EPA rule reversing long-standing interpretation of Clean Air Act’s applicability provisions to account for new greenhouse gas regulations).

EPA also found that its new statutory construction of the Clean Air Act would create “absurd results” never intended by Congress. *See* 75 Fed. Reg. at 31,516. To avoid those expected

absurd consequences, EPA elected to rewrite the statutory thresholds by creating new thresholds, not authorized by the Clean Air Act, unique to greenhouse gases. *Id.*

In short, the Endangerment Finding immediately triggered a flood of regulations governing emissions of greenhouse gases from numerous stationary and mobile sources.

Soon after the Endangerment Finding was made, affected parties filed petitions for review in the D.C. Circuit; *Coalition for Responsible Regulation v. EPA* (Case No. 09-1322). Several petitioners also filed administrative petitions for reconsideration with EPA. *See Reconsideration Denial*, 75 Fed. Reg. 49,556, 49,557 (Aug. 13, 2010). Some of the administrative petitions urged EPA to reconsider its Endangerment Rule in light of the extensive electronic files from the University of East Anglia's Climate Research Unit released to the public after the comment period closed. *See, e.g.*, 74 Fed. Reg. at 18886-18910 (April 24, 2009); *see also Addendum and Supplementation of Record to Coalition Comments*, dated December 4, 2009, reproduced as **Exhibit F**. Those documents raised important questions regarding the impartiality and data quality of the climate science on which the IPCC and thus EPA relied. Refusing to receive any public comment on the administrative petitions for reconsideration, EPA denied them all. *See* 75 Fed. Reg. at 49,556.

Some of the issues arising out of the massive Endangerment Finding litigation in the D.C. Circuit and related lawsuits are still being contested. One of the most recent lawsuits arises from EPA's promulgation of the Clean Power Plan, *State of West Virginia v. EPA*, (D.C. Circuit Case No. 15-1363), where EPA defended that lawsuit in part because of its Endangerment Finding. The Clean Power Plan has since been stayed by the United States Supreme Court. *See West Virginia v. EPA*, 136 S. Ct. 1000 (Mem.), 194 L.Ed.2d 17 (2016). In a recent executive order issued by President Trump, the EPA has been instructed to reconsider the Clean Power Plan, which deals



with existing fossil fuel electric generation facilities, and certain associated regulations dealing with new facilities. *See Executive Order on Clean Power Plan*: <https://www.whitehouse.gov/the-press-office/2017/03/28/presidential-executive-order-promoting-energy-independence-and-economi-1>.

Because the ubiquitous natural substance carbon dioxide is one of the six greenhouse gases subject to EPA's 2009 Endangerment Finding, the effects of the finding are affecting and will continue to affect virtually all parts of the nation's economy, giving EPA potentially unprecedented power to regulate life in the United States. It is uncontroverted that EPA did not submit the Endangerment Finding to the Science Advisory Board for peer review. *See EPA's Response to the Petitions to Reconsider the Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, Volume 3: Process Issues Raised by Petitioners*, pp 17-18, Response to Comment 3-7, reproduced as **Exhibit G**.

## **ARGUMENT**

### **THE ENDANGERMENT FINDING SHOULD BE RECONSIDERED BECAUSE EPA VIOLATED A STATUTORY MANDATE WHEN IT FAILED TO SUBMIT THE FINDING TO THE SCIENCE ADVISORY BOARD FOR PEER REVIEW**

#### **I. The Text and Legislative History of the SAB Statute Required EPA to Submit the Endangerment Finding to the Science Advisory Board for Peer Review**

In relevant part, the SAB statute provides that

“[for] *any* proposed criteria document, standard, limitation, or regulation . . . . provided to *any* other Federal agency for formal review and comment” [the Administrator] “*shall* make available to the Board such proposed criteria document, standard, limitation, or regulation, together with relevant scientific and technical information in the possession of the Environmental Protection Agency on which the proposed action is based.”

42 U.S.C. § 4365(c)(1) (emphasis added). The duty to submit proposed rules and regulations to the SAB is a mandatory requirement. *See API*, 665 F. 2d at 1188 (“The language of the statute

indicates that making a [regulatory proposal] available to the SAB for comment is mandatory.”).

In an analogous context, the United States Supreme Court determined that Congress’s use of the word “shall” in the Clean Water Act imposed a mandatory and discretionless obligation. *National Association of Home Builders v. Defenders of Wildlife*, 551 U.S. 644, 661 (2007) (citing *Lopez v. Davis*, 531 U.S. 230, 241 (2001)). In *Lopez*, the Supreme Court noted the significance of the fact that Congress, in the same statute, used “may” and “shall” to denote different obligations, such that “may” creates discretionary obligations, while “shall” creates discretionless obligations.

The same is true in the SAB statute. 42 U.S.C. § 4365(c)(1) mandates that the Administrator “shall” submit the material to SAB for review, but then in the very next paragraph, 42 U.S.C. § 4365(c)(2) provides that the SAB “may” provide advice and comments on the material submitted to it. Accordingly, the mandatory nature of EPA’s submittal duty is clear. *See Lopez*, 531 U.S. at 241. *See also Moskal v. United States*, 498 U.S. 103, 109 (1990) (courts must give effect to every clause and word of a statute); *Bennett v. Spear*, 520 U.S. 154, 172 (1997) (describing the “rudimentary” principle of administrative law that regulatory action must comply with statutory requirements). *Chevron v. NRDC*, 467 U.S. 837, 843 (1984) (courts and agencies “must give effect to the unambiguously expressed intent of Congress”).

The legislative history of the SAB submittal requirement further illustrates Congress’s intent. *See Joint Explanatory Statement*, H.R. Conf. Rep. 96-722, 3296 (1977) (“The first paragraph of this section *requires* the Administrator of EPA to make available to the [Science Advisory] Board any proposed criteria document, standard, limitation, or regulation together with scientific background information in the possession of the Agency on which the proposed action is based.”) (emphasis added). Accordingly, an interpretation that the submittal requirement is discretionary runs afoul of Congressional intent. *See Chevron*, 467 U.S. at 845 (agency

interpretation of a statute is impermissible if it “is not one that Congress would have sanctioned.”).

**A. The Endangerment Finding Is a “Regulation”**

Among other regulatory actions, proposed EPA “regulations” must be submitted to the Science Advisory Board for peer review. 42 U.S.C. § 4365(c)(2); *see API*, 665 F.2d at 1188. A regulation, also known as a legislative rule, is “an agency statement of general *or* particular applicability and future effect designed to . . . prescribe law or policy.” 5 U.S.C. § 551(4) (emphasis added). The Endangerment Finding is a “regulation” because it has the force of law, *Thomas v. New York*, 802 F.2d 1443, 1445-47 (D.C. Cir. 1986), *cert. denied*, 482 U.S. 919 (1987), and because it is also of “particular applicability,” in that the Endangerment Finding required EPA to promulgate greenhouse gas emissions standards under Section 202 of the Clean Air Act, 42 U.S.C. § 7521(a). “If EPA makes a finding of endangerment, the [a]gency [is required] to regulate emissions of [greenhouse gases] from motor vehicles.” *Coalition for Responsible Reg., Inc. v. E.P.A.*, 684 F.3d 102, 126 (D.C. Cir. 2012), *aff’d in part, rev’d in part sub nom. Util. Air Reg. Group v. E.P.A.*, 134 S. Ct. 2427 (2014), and *amended sub nom.*, quoting *Massachusetts v. EPA*, 127 S. Ct. 1462 (2007). EPA itself acknowledged the Endangerment Finding obligated it to regulate motor vehicle emissions of greenhouse gases. *See* 76 Fed. Reg. at 57,129 (“With EPA’s December 2009 final findings that certain greenhouse gases may reasonably be anticipated to endanger public health and welfare and that emissions of [greenhouse gases] from section 202 (a) sources cause or contribute to that endangerment, section 202(a) *requires* EPA to issue standards applicable to emissions of those pollutants from new motor vehicles.”) (emphasis added). Accordingly, the Endangerment Finding is a regulation subject to the SAB submittal requirement.

**B. EPA Provided the Endangerment Finding to the Office of Management and Budget “For Formal Review and Comment”**

The SAB statutory language requires EPA to submit any proposed regulation to the Science



Advisory Board for peer review whenever it provides the proposal to “any other Agency for formal review and comment.” 42 U.S.C. 4365. EPA acknowledged that it submitted the Endangerment Finding to the Office of Management and Budget (OMB”) as a “significant regulatory action” pursuant to an overarching executive order:

Under Executive Order (EO) 12866 (58 FR 51735, October 4, 1993), this action is a “significant regulatory action” because it raises novel policy issues. Accordingly, EPA submitted this action to the Office of Management and Budget (OMB) for review under EO 12866 and any changes made in response to Office of Management and Budget (OMB) recommendations have been documented in the docket for this action.

74 Fed. Reg. 66545 (Dec. 15, 2009). This was a “formal” review mandated by EO 12866, and any notion that the OMB submission was “informal” is belied by the text of the executive order cited by EPA. Specifically, EO 12866 declares:

Coordinated review of agency rulemaking is necessary to ensure that regulations are consistent with applicable law, the President’s priorities, and the principles set forth in this Executive order, and that decisions made by one agency do not conflict with the policies or actions taken or planned by another agency. The Office of Management and Budget (OMB) shall carry out that review function.

58 Fed. Reg. 51735 (Sept. 30, 1993). EO 12866 goes on to specify in painstaking detail exactly what must be submitted to OMB, and prescribes a “regulatory plan” that must consist “at a minimum” of a statement of the agency’s regulatory objectives, a summary of each planned significant regulatory action including anticipated costs and benefits, a summary of the legal basis for each such action, a statement of the need for each action, the agency’s schedule for action, and other data. 58 Fed. Reg. 51735 (Sept. 30, 1993). The level of detail required indicates that the review is the epitome of formality. Indeed, the submission requirements are taken so seriously that within 10 days of receiving the submission from EPA, OMB is required to circulate it among other federal agencies to check for possible conflicts. *Id.*

Accordingly, EPA made available the proposed Endangerment Finding to another federal agency, namely, OMB, pursuant to Executive Order 12866, and through OMB, to other federal agencies, for formal review, bringing the review of the Endangerment Finding squarely within the ambit of “formal” federal agency review under 42 U.S.C. § 4365(c)(1), thereby triggering the SAB submittal requirement.

**C. The Endangerment Finding Was Never “Made Available” by EPA to the Science Advisory Board for Peer Review**

The D.C. Circuit has ruled that the mandate to “make available” a regulatory proposal to the SAB for peer review requires that EPA “submit” the proposed regulation to the SAB. *API*, 665 F.2d at 1189 (“the statute *explicitly mandates* that standards be *submitted* to the Board for review.”) (emphasis added). “EPA did not submit the Endangerment Finding for review by its Science Advisory Board.” *Coalition for Responsible Reg., Inc. v. E.P.A.*, 684 F.3d at 124. In addition, EPA admitted in its statements to the public that it never submitted the Endangerment Finding to the SAB for peer review. See *EPA’s Response to the Petitions to Reconsider the Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, Volume 3: Process Issues Raised by Petitioners*, pp 17-18, *Response to Comment 3-7*, reproduced as **Exhibit G**.

EPA’s statement that the Endangerment Finding was generated as a result of the “far reaching and multidimensional” problem addressed by the finding, see 74 Fed. Reg. at 66497, does not excuse its violation of the SAB submittal requirement, because the seriousness of any particular issue facing an administrative agency does not permit it to violate the statute under which it takes administrative action. See *Food and Drug Admin. v. Brown & Williamson*, 529 U.S. 120, 125 (2000) (“Regardless of how serious the problem an administrative agency seeks to address . . . it may not exercise its authority ‘in a manner that is inconsistent with the administrative structure

that Congress enacted into law.”) (quoting *ETSI Pipeline Project v. Missouri*, 484 U.S. 495, 517 (1988)). Put plainly, Congress placed the burden on EPA to make regulatory proposals available to the Science Advisory Board for peer review, and EPA failed to meet that burden when it made the Endangerment Finding without seeking review from the Board. See *U.S. v. Kirby*, 74 U.S. 482, 486 (1868) (“[a]ll laws should receive a sensible construction.”). Regardless of the extent to which the prior Administration’s substantive determination regarding the Endangerment Finding merits any discretion from the courts, this Administration should correct the palpable procedural violation of the mandatory SAB submittal requirement. See *Bennett*, 520 U.S. at 172 (“It is rudimentary administrative law that discretion as to the substance of the ultimate decision does not confer discretion to ignore the required procedures of decisionmaking.”).

## **II. The D.C. Circuit’s Decision in *Coalition for Responsible Regulation v. EPA* Does Not Constrain EPA from Reconsidering the Endangerment Finding**

The Petitioners are mindful of the D.C. Circuit’s decision in *Coalition for Responsible Regulation v. Environmental Protection Agency*, 684 F.3d 102 (D.C. Cir. 2012), where dozens of petitioners challenged EPA’s Endangerment Finding. One of the challenges was based on EPA’s failure to submit the Endangerment Finding to the SAB for peer review. The panel in the case concluded that (1) it was “not clear” whether the Endangerment Finding was submitted “to any other Federal agency for formal review and comment,” thereby triggering the SAB submittal duty, 684 F.3d at 124, and (2) “even if EPA violated its mandate by failing to submit the Endangerment Finding to the SAB, Industry Petitioners have not shown that this error was ‘of such central relevance to the rule that there is a substantial likelihood that the rule would have been significantly changed if such errors had not been made.’” 684 F.3d at 124.

Although it may not have been “clear” to the panel in *Coalition for Responsible Regulation* whether EPA sought “formal review and comment” of the Endangerment Finding from another



federal agency, it is abundantly clear from the foregoing discussion in Section I. B. that EPA did in fact seek formal review and comment on the Endangerment Finding from the Office of Management and Budget pursuant to Executive Order 12866. By stating that it was “not clear” whether EPA sought formal review from another federal agency, the D.C. Circuit panel acknowledged that it could not determine whether EPA sought “formal review and comment.” Accordingly, the record is open on that issue. *See Cooper Industries, Inc. v. Aviall Services, Inc.*, 543 U.S. 157, 170 (2004) (a court’s failure to make a specific ruling on an issue does not constitute binding precedent for that issue).

For three additional reasons set forth in more detail in Subsections II A., B., and C. below, the decision in *Coalition for Responsible Regulation* regarding the Endangerment Finding does not constrain EPA from reconsidering the finding. First, the SAB submittal requirement, which is set forth in a statute separate and independent of the Clean Air Act, is categorically not subject to the “central relevance” and “substantial likelihood” constraints applicable to procedural violations of the Clean Air Act itself. Second, assuming *arguendo* that the Clean Air Act’s “central relevance” and “substantial likelihood” tests apply to the SAB submittal requirement, a “substantial likelihood” that EPA’s regulatory proposals would undergo significant change as a result of SAB review is built into the fabric of the SAB statute and is, therefore, centrally relevant to the issue of whether a proposed regulation, including the Endangerment Finding, would have a substantial likelihood of undergoing significant change as a result of review by the Board. *See* 42 U.S.C. § 4365(c)(1). Third, in any event, EPA has the inherent authority to reconsider a prior rulemaking.

**A. The “Central Relevance” and “Substantial Likelihood” Tests Do Not Apply to EPA’s Duty to Submit the Endangerment Finding to the Science Advisory Board for Peer Review**

In the D.C. Circuit panel's view, "Industry Petitioners *have not shown* that [the SAB] error was 'of such central relevance to the rule that there is a substantial likelihood that the rule would have been significantly changed if such errors had not been made.'" *Coalition for Responsible Regulation*, 684 F.3d at 124 (emphasis added). The panel's summary conclusion that a specific showing was not made does not address the threshold issue of whether the procedural requirements of the Clean Air Act trump those of the distinct SAB statute. *See Cooper Industries, Inc.*, 543 U.S. at 170 (a court's silence regarding issues is not precedent for future decisions).

EPA's duty to submit regulatory proposals to the Science Advisory Board for peer review applies not only to EPA's regulatory proposals under the Clean Air Act but also to regulatory proposals made under *every* "authority of the Administrator." *See* 42 U.S.C. § 4365(c)(1). Under longstanding principles of statutory construction, the statutory authorities administered by EPA must be construed in a way that makes them consistent with each other, if at all possible. *See Parsons Steel, Inc. v. First Alabama Bank*, 474 U.S. 518, 524 (1986) (differing statutes should be interpreted so as to be consistent); *United States v. Freeman*, 44 U.S. 556 (1845) ("Statutes *in pari materia* should be taken into consideration in construing a law. If a thing contained in a subsequent statute be within the reason of a former statute, it shall be taken to be within the meaning of that statute"); *FAIC Sec., Inc. v. United States*, 768 F.2d 352, 363 (D.C. Cir. 1985) ("All parties to the appeal agree, however, that the two statutes before us cannot be construed to reach different results. Because the NHA shares with the FDIA the common purpose of insuring funds placed in depository institutions; and because its legislative history shows that Congress intended it to create the same insurance protection for investors in savings and loan associations as the Banking Act of 1933 had created for bank depositors, these two statutes are *in pari materia* and must be construed together.") (internal citations omitted); *Motion Picture Ass'n of Am., Inc. v. F.C.C.*, 309 F.3d 796,

801 (D.C. Cir. 2002) (“Statutory provisions *in pari materia* normally are construed together to discern their meaning.”).

The SAB statute contains no “central relevance” or substantial likelihood” test. At the same time, the Clean Air Act places those two limitations only on judicial review of rulemaking procedures mandated by the Clean Air Act itself. *Small Refiner Lead Phase-Down Task Force v. EPA*, 705 F.2d 506, 522 (D.C. Cir 1983) (in amending the CAA in 1977, Congress “wanted to add new procedural protections” in the CAA while “[minimizing] disputes over EPA’s compliance with the new procedures” in the 1977 Amendments to the Clean Air Act, and Congress “did not intend to cut back” on statutory procedural requirements and protections set forth in statutes other than the Clean Air Act). Thus, the “central relevance” and “substantial likelihood” standards set forth in the CAA for procedural violations of that Act, 42 U.S.C. § 7607(d)(8), do not apply to violations of rulemaking procedures mandated by statutes other than the CAA, such as the SAB statute. *See Small Refiner*, 705 F.2d at 522-24.

Under the longstanding interpretive principle of harmonizing statutes that an agency administers, EPA must comply with the SAB submittal requirement consistently for all of its regulatory proposals, regardless of the specific law under which a particular regulation is proposed. This result is required because the SAB submittal requirement does not distinguish among EPA’s substantive regulatory authorities but applies equally to all of them, including the Clean Air Act.

Citing *API*, the D.C. Circuit’s panel decision in *Coalition for Responsible Regulation v. EPA*, 684 F.3d 102 (D.C. Cir. 2012), incorrectly applied the “central relevance” and “substantial likelihood” tests to the SAB submittal requirement in the context the Endangerment Finding. In so doing, the panel did not recognize that *API* did not analyze nor even address the crucial relationship between EPA’s singular, independent duty to comply with the SAB submittal



requirement and EPA's diverse duties under each of the programmatic statutes it administers. Thus, the panel mistakenly applied the Clean Air Act's unique "critical relevance" and "substantial likelihood" tests to EPA's overarching obligation to submit regulatory proposals, including the Endangerment Finding, to the Science Advisory Board for peer review.<sup>4</sup>

The report of the Standing House Committee on Interstate and Foreign Commerce (the "Committee"), which investigated the need for and crafted the language of the Clean Air Act's 1977 amendments, is particularly instructive. See Norman J. Singer, 2A Sutherland Statutes and Statutory Construction § 48:6 (7th ed. 2007) ("The report of the standing committee in each house of the legislature which investigated the desirability of the statute under consideration is often used as a source for determining the intent of the legislature."). The Committee noted that the pre-1977 Clean Air Act lacked sufficient "procedural safeguards" and that broad administrative discretion to promulgate regulations to protect health or the environment must be restrained by thorough and careful procedural safeguards that insure an effective opportunity for public participation in the rulemaking process. See H. Rep. 95-294 at 319 (May 12, 1977). Among other things, the Committee concluded that there was a need for "clearly defined procedures applicable to establishing a publicly available record as a basis for decisionmaking" under the Clean Air Act. *Id.* at 320. Of special concern to the Committee were the "new" procedural requirements for cross-examination of witnesses on disputed factual issues, which were added by the 1977 Clean Air Act

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<sup>4</sup> In addition, as discussed in more detail below in Section III, *Coalition for Responsible Regulation* erred in its rote citation of *API* because in that case there was harmless error in that EPA had previously submitted two drafts of the relevant documentation to the Science Advisory Board and had made substantial changes to the regulation at issue there pursuant to the Board's recommendations. In connection with the Endangerment Finding at issue here, however, EPA never submitted anything to the Board.

Amendments in connection with hearings held on rulemaking proposals. To prevent the new procedures from getting bogged down in fine points such as “[whether] a given question involves ‘facts’ or ‘policy’ or whether a given fact is ‘legislative’ or ‘adjudicative,’ . . . the committee has limited the extent to which the Administrator’s decisions on *such* procedural matters [arising under the language of the 1977 Amendments] may be reversed during judicial review.” *Id.* at 322 (emphasis added).

The Committee went on to state that courts may overturn EPA rulemaking under the 1977 Clean Air Act Amendments with regard to

*such* procedural matters [only if] if the procedural errors ‘were so serious and related to matters of such central relevance to the rule that there is a substantial likelihood that the rule would have been significantly changed if such errors had not been made.’

*Id.* (emphasis added). Thus, the only procedural violations subject to the high bar set by Congress were the then-new rulemaking procedures established by Congress in the 1977 Clean Air Act Amendments. *See Small Refiner*, 705 F.2d at 522. The independent duty to submit regulatory proposals to the SAB, which is found entirely outside of the Clean Air Act, is independent of, and is not constrained by, the 1977 Clean Air Act Amendments.

The prior Administration failed to comply with the nondiscretionary requirement to submit the Endangerment Finding to the Science Advisory Board for peer review before it was promulgated. That failure is a violation of the SAB statute and not the Clean Air Act. Accordingly, contrary to the summary conclusion of the panel in *Coalition for Responsible Regulation*, EPA’s failure was not subject to the “central relevance” or “substantial likelihood” standard for procedural violations of the Clean Air Act.

It is true that the earlier D.C. Circuit’s decision in *API* summarily applied the Clean Air Act’s “central relevance” and “substantial likelihood” tests to the SAB submittal requirement. But

a “court’s prior judicial construction of a statute trumps a [subsequent] agency construction . . . only if the prior court decision holds that its construction follows from the unambiguous terms of the statute and thus leaves no room for agency discretion.” *Cuomo v. Clearing House Ass’n, L.L.C.*, 557 U.S. 519, 548–49 (2009) (citing *Brand X*, 545 U.S. at 982) (emphasis added). Neither *API* nor *Coalition for Responsible Regulation* ever held or even asserted that their construction of the applicability of the “central relevance” and “substantial likelihood” tests to SAB review was mandated by the unambiguous terms of either the Clean Air Act or the SAB statute, or, indeed, both of them when viewed in tandem.

Accordingly, as set forth in more detail in Section II. C, *infra*, this Administration is free to revisit the issue based upon its own legal, policy, and scientific evaluations. Significantly, the Clean Air Act’s “central relevance” and “substantial likelihood” standards *cannot* apply to violations of the SAB submittal requirement in connection with rules promulgated by EPA under any statutory authority *other than* the Clean Air Act because no other EPA administered statute authorizes those tests under any circumstance. Accordingly, consistent with the long-honored principle that different statutes administered by the same agency must be construed harmoniously, EPA should now determine that regulations promulgated by EPA under the Clean Air Act are subject to the same SAB peer review requirements as regulations under “any other authority of the Administrator.” *See* 42 U.S.C. § 4365(c)(1); *see also Parsons*, 474 U.S. at 524.

**B. By Enacting the SAB Statute, Congress Itself Implicitly Determined That Peer Review by The Board Is *Always* Centrally Relevant and Carries a Substantial Likelihood of Significant Change in Connection with EPA’s Regulatory Proposals**

Assuming *arguendo* that the “central relevance” and “substantial likelihood” tests apply, congressional contemplation of a “substantial likelihood” that EPA’s regulatory proposals would undergo “significant change” as a result of SAB review, and the “central relevance” of such review



for proposed regulations, is built into the very fabric of the SAB statute. See 42 U.S.C. § 4365(c)(1). The legislative history makes clear that the SAB's role in EPA's rulemaking process is to "be able to preview conflicting claims and advise the [EPA] on the adequacy and reliability of the technical basis for rules and regulations." See *Joint Explanatory Statement*, H.R. Conf. Rep. 96-722, 3295-96. Congress' *Joint Explanatory Statement* goes on to state:

Much of the criticism of the Environmental Protection Agency might be avoided if the decisions of the Administrator were fully supported by technical information which had been reviewed by independent, competent scientific authorities.

. . . [T]he intent of [the SAB submittal requirement] is to ensure that the [SAB] is able to comment in a well-informed manner on any regulation that it so desire.

*Id.* at 3296. That is why SAB submittal is "mandatory." *API*, 665 F.2d at 1188. "[We] must reject administrative constructions which are contrary to clear congressional intent." *Chevron*, 467 U.S. at 843 n.9. Accordingly, even under the CAA's "significant likelihood" standard, the uncertainty created by EPA's failure to submit the Endangerment Finding to the SAB for peer review indicates a "significant likelihood" that the rule would have been "substantially changed" if such errors had not been made and, therefore, is of "central relevance." 42 U.S.C. § 7607(d)(8).

Such a result is compelled by *Kennecott Corp. v. EPA*, 684 F.2d 1007 (D.C. Cir. 1982). In *Kennecott*, EPA denied an administrative petition for reconsideration by asserting that its failure to include certain documents in the rulemaking record was not significant because, even if the documents had been included, EPA would have come to the same regulatory conclusion. The D.C. Circuit disagreed, stating that the "absence of those documents . . . makes impossible any meaningful comment on the merits of EPA's assertions." *Id.* at 1018. "EPA's failure to include such documents constitutes reversible error, for the uncertainty that might be clarified by those documents . . . indicates a 'substantial likelihood' that the regulations would 'have been

significantly changed.” *Id.* at 1018-19. Here too, EPA’s failure to make the proposed Endangerment Finding available to the SAB for peer review is improper because the uncertainty regarding the outcome of SAB’s review and EPA’s response indicates a “substantial likelihood” that the regulation would have been “significantly changed” had SAB been consulted.

This conclusion is supported by the attached declaration of Roger O. McClellan, who served as a member of the Science Advisory Board for over three decades, including years of service as a member of the Board’s Executive Committee and its Clean Air Scientific Advisory Committee. The declaration, attached as **Exhibit H**, was filed in the D.C. Circuit in support of one of the Petitioners in the consolidated cases of *Coalition for Responsible Regulation v. EPA* (Case No. 09-1322, Document # 1388587).

Among other things, McClellan’s declaration states that the Endangerment Finding “can have a profound impact on society.” Declaration of Roger O. McClellan ¶ 8. EPA never contested the fact that the Endangerment Finding can have a profound societal impact.

The McClellan Declaration goes on to state that “SAB essentially serves a critical gatekeeper role whose mission is to ensure that EPA’s regulatory proposals are based upon sound scientific and technical principles.” McClellan Decl. ¶ 11. “On many occasions during the long history of SAB, EPA changed its regulatory proposals and schedules based on review and comment by SAB. This has been the rule rather than the exception, which stands to reason, as SAB was created to provide an expert reality check for EPA scientific and technical determinations that inform policy judgments.” McClellan Decl. ¶ 10.

McClellan further states:

I am familiar with EPA’s finding made in December of 2009 that greenhouse gases pose a threat to human health and welfare (the “Endangerment Finding”). The Endangerment Finding is certainly the type of regulatory action that SAB was created to review. It deals with novel,

cutting edge scientific and technical issues that can have a profound impact on society. Those issues require the type of detailed expert scrutiny that SAB review was intended to provide.

McClellan Decl. ¶ 8. Moreover, the declaration states that EPA's long-standing custom and standard operating procedure was to submit regulatory proposals to SAB for review during public comment periods:

I have always understood that EPA's proposed regulations under the Clean Air Act would be made available to the SAB for review at the earliest possible time and no later than the date the regulations are first published in the Federal Register for comment by other federal agencies and the general public.

McClellan Decl. ¶ 7.

Because the purpose of the SAB submittal requirement is to provide SAB an opportunity to make available "its advice and comments [to EPA] on the adequacy of the scientific and technical basis of [regulatory proposals]," 42 U.S.C. § 4365(c)(2), Congress could not have intended that SAB review would be no more than a mere formality or a superfluous gesture. *Moskal v. United States*, 498 U.S. 103 (1990) (courts should give effect to every clause and word of a statute). In fact, Congress intended that EPA's proposed Clean Air Act regulations would significantly evolve, mature, and otherwise change as a result of SAB's scientific and technical advice. Lynn E. Dwyer, *Good Science in the Public Interest: A Neutral Source of Friendly Facts?* 7 Hastings W-N.W. J. Envtl. L. & Pol'y 3, 6-7 (2000) (SAB was created to function as a scientific and technical peer review panel to provide EPA with guidance, so that the Agency's rulemaking is not based on erroneous or untrustworthy data or conclusions); *see also* McClellan Decl. ¶¶ 10-11.

McClellan goes on to state:

Based upon my more than two decades of experience as a member of SAB, after it was established legislatively, my more than 15 years of service as a



member of the SAB Executive Committee and my knowledge of how SAB interacts with EPA, I believe there is substantial likelihood that the Endangerment Finding would have been substantially changed in response to advice from the SAB had the Endangerment Finding been made available for review prior to its promulgation.

McClellan Decl. ¶ 12.

Accordingly, even if the “substantial likelihood” standards apply to SAB submittals of regulatory proposals made by EPA under the Clean Air Act, those standards are met in the case of the Endangerment Finding.

**C. EPA Has Inherent Authority to Reconsider the Endangerment Finding**

“Agencies are free to change their existing policies as long as they provide a reasoned explanation for the change. When an agency changes its existing position, it need not always provide a more detailed justification than what would suffice for a new policy created on a blank slate. But the agency must at least display awareness that it is changing position and show that there are good reasons for the new policy.” *Encino Motorcars, LLC v. Navarro*, 136 S. Ct. 2117, 2125–26 (2016) (internal citations and quotation marks omitted). Furthermore, “[a]n initial agency interpretation is not instantly carved in stone [although] reasoned decision-making ordinarily demands that an agency acknowledge and explain the reasons for a changed interpretation. But so long as an agency adequately explains the reasons for a reversal of policy, its new interpretation of a statute cannot be rejected simply because it is new.” *Verizon v. FCC*, 740 F.3d 623, 636 (D.C. Cir. 2014). Accordingly, EPA is free to reconsider the Endangerment Finding.

It matters not that the D.C. Circuit in *Coalition for Responsible Regulation* summarily discounted on extremely narrow grounds, without analysis, a claim that EPA violated the SAB statute when it made the Endangerment Finding without seeking peer review. As indicated in the foregoing discussion, the court did not rule that EPA in fact had no duty to submit the

Endangerment Finding to the Science Advisory Board, merely that there was no clear evidence before the court that the triggers for that duty had been activated. *Coalition for Responsible Regulation*, 684 F. 3d at 124-25. As the Supreme Court observed, “[a]gency inconsistency is not a basis for declining to analyze the agency’s interpretation under the *Chevron* framework. . . . [I]n *Chevron* itself, this Court deferred to an agency interpretation that was a recent reversal of agency policy.”). *Nat’l Cable & Telecomm. Ass’n v. Brand X Internet Servs.*, 545 U.S. 967, 981-82 (2005) (citing *Chevron v. NRDC*, 467 U.S. 837, 857-58 (1984)).

Accordingly, EPA may determine as a matter of policy that the Endangerment Finding should have been submitted to the Science Advisory Board for peer review and that EPA’s failure to do so triggers reconsideration of the finding, coupled with submittal to the Board. *See Smiley v. Citibank (South Dakota), N. A.*, 517 U.S. 735, 742 (1996) (“[regulatory] change is not invalidating. . . .”); *Van Hollen, Jr. v. Fed. Election Comm’n*, 811 F.3d 486, 496 (D.C. Cir. 2016) (“An agency ‘must consider varying interpretations and the wisdom of its policy on a continuing basis.’”) (quoting *Brand X*, 545 U.S. at 981). Indeed, as set forth in Section II. B., above, EPA may adopt such an interpretation even if a court had previously construed the statutory requirement differently. *See Cuomo* 557 U.S. at 548–49. Therefore, EPA is free to revisit the Endangerment Finding based upon the instant Administrative Petition.

### **III. EPA’S FAILURE TO SUBMIT THE ENDANGERMENT FINDING TO THE SCIENCE ADVISORY BOARD WAS NOT HARMLESS ERROR**

A careful review of EPA’s statements about the regulations reveals how critical and necessary it was to have the SAB perform a thorough evaluation of the scientific basis of the proposed rule.

The EPA began its overview of the rule by declaring that “[t]he Administrator has determined that the body of scientific evidence compellingly supports this finding.” 74 Fed. Reg.



66497 (Dec.15, 2009). However, the EPA admitted that it relied almost exclusively on data gathered, sifted, and analyzed by others. *Id.* at 66510-12. The input of the Science Advisory Board would have been of major influence on the evaluation of the body of scientific evidence. *See* McClellan Declaration ¶¶ 2-12. EPA acknowledges that “[p]ublic review and comment has always been a major component of EPA’s process.” 74 Fed. Reg. at 66500. EPA is silent, however, as to why, during that period, it failed to comply with the mandatory obligation to let the experts at the Science Advisory Board opine on the data and science underlying the rule, especially in light of the fact that the public noted the error during the public comment period, as described above in the Statement of Facts. EPA even claimed that “the science is sufficiently certain.” 74 Fed. Reg. 66501 (Dec.15, 2009). Such an assertion would seem to require, at a minimum, that EPA comply with the mandatory duty to submit the science for review by the statutorily established expert organization charged with providing EPA with advice in connection with scientific determinations.

The utter failure of EPA to submit the proposed Endangerment Finding and supporting material to SAB at any stage distinguishes this case from another one where failure had been found to be harmless. In *API*, procedural challenges were raised against the ozone standards established by EPA. There, EPA had submitted two drafts of the criteria document to the Science Advisory Board and had made changes to the criteria based on SAB’s recommendations. 665 F. 2d at 1187-88. The proposed ozone standard, which was based entirely upon the previously submitted criteria, as revised, was itself not submitted to the SAB. In rejecting the challenge, the court found that because the Science Advisory Board had *twice* reviewed the criteria documents, which contained the detailed scientific and technical basis for the standard, it was harmless error that EPA did not submit the documentation for a third review. *Id.* at 1189. In the case of the Endangerment Finding, however, SAB never had the opportunity to review anything. Accordingly, there is no basis to

conclude that the failure of EPA to submit the Endangerment Finding to the Science Advisory Board for peer review could under these circumstances be considered harmless error.

As discussed above in the Statement of Facts section of this Petition, the Endangerment Finding has enormous impact on the power generation and distribution industry, as illustrated by the Clean Power Plan, and on diverse other stationary sources, as illustrated by the PSD and Title V requirements triggered by the finding. In addition, the Endangerment Finding has profound consequences for the transportation industry, especially owners and operators of trucks.

In 2011, the EPA finalized its Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy Duty Engines and Vehicles rule. 76 Fed. Reg. 57106 (Sept. 15, 2011). That rule was expressly based on the earlier Endangerment Finding. *See* 76 Fed. Reg. 57109 (Sept. 15, 2011). The rule covers all new heavy-duty trucks starting with the 2014 model year and imposes stringent new fuel consumption standards on such vehicles. 76 Fed. Reg. 57106 (Sept. 15, 2011). In order to reduce greenhouse gas emissions, EPA determined it could not simply impose requirements for the truck engine; the rule requires fundamental changes to the entirety of the truck. *See* 76 Fed. Reg. 57114 (Sept. 15, 2011). The result of imposing new mandates on both truck engines and truck bodies creates an enormous increase in the cost of trucks. *See* 76 Fed. Reg. 57321 (Sept. 15, 2011). Nevertheless, EPA elected to “make no attempt at determining what the impact of increased costs would be on new truck prices.” *Id.* EPA did, however, recognize that there would be research and development costs of at least \$6.8 million per manufacturer per year for five years. *Id.* These costs will necessarily be passed on to the purchasers of the new trucks.

The economic impacts on stationary and mobile sources throughout the nation have had, and will continue to have, repercussions in the job market, resulting in job losses in the mining, manufacturing, construction, and transportation sectors, among others.

These adverse nationwide economic impacts are directly traceable to the Endangerment Finding, and that is yet another reason why it would be untenable to claim that the failure to submit the finding to the Science Advisory Board for peer review was “harmless error.” Accordingly, EPA should reconsider the Endangerment Finding and, in the process, submit the finding to the Science Advisory Board for peer review.

### CONCLUSION

For these reasons, Petitioners respectfully request that the Administrator:

1. Within 180 days of receipt of this Administrative Petition, provide a substantive response to the Petitioners informing them and the public of the commencement of an administrative proceeding to reconsider the Endangerment Finding, *see* 42 U.S.C. Section 7604;
2. During the administrative proceeding:
  - a. provide the public with notice and opportunity for comment, as required by the Administrative Procedure Act and 42 U.S.C. § 7607(d);
  - b. provide interested persons an opportunity for the oral presentation of data, views, or arguments, in accordance with 42 U.S.C. § 7607(d)(5);
  - c. submit the current Endangerment Finding and any appropriate alternatives thereto, as well as all underlying documentation, to the Science Advisory Board for peer review, as required by 42 U.S.C. § 4365(c)(1); and
  - d. based upon the totality of evidence, including input from the Science Advisory Board and public comment, make an independent scientific, technical, policy, and legal evaluation of whether it is appropriate to revise or rescind the Endangerment Finding;
3. Pending completion of the administrative proceeding, suspend the Endangerment Finding and refrain from any rulemaking or enforcement activity based in whole or in part on the Endangerment Finding; and
4. Upon completion of the administrative proceeding, take appropriate final action to revise or rescind the Endangerment Finding.

DATED: May 1, 2017

Respectfully submitted,

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## Comment submitted by Orla E. Collier, Benesch Friedlander Coplan & Aronoff LLP on behalf of Murray Energy Corporation (Appendix B)

The is a Comment on the **Environmental Protection Agency** (EPA) Proposed Rule: **Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Reopening of the Comment Period**

For related information, [Open Docket Folder](#)

### Comment

Please see attached Appendix B to Murray Energy Corporation comments. Appendix C and D will be sent under separate cover. Thank you.

### Attachments (1)



#### Appendix B

View Attachment:



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# **APPENDIX B**

U.S. House Committee on Science, Space & Technology

29 Mar 2017

Testimony of John R. Christy

Professor of Atmospheric Science, Alabama State Climatologist

University of Alabama in Huntsville.

**Summary**

“Science” is not a set of facts but a process or method that sets out a way for us to discover information and which attempts to determine the level of confidence we might have in that information. In the method, a “claim” or “hypothesis” is stated such that rigorous tests might be employed to test the claim to determine its credibility. If the claim fails a test, the claim is rejected or modified then tested again. 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 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 for related policy decisions.

The IPCC inadvertently provided information that supports this conclusion by (a) showing that the tropical trends of climate models *with* extra greenhouse gases failed to match actual trends and (b) showing that climate models *without* extra greenhouse gases agreed with actual trends. A report of which I was a co-author demonstrates that a statistical model that uses only natural influences on the climate also explains the variations and trends since 1979 without the need of extra greenhouse gases. While such a model (or any climate model) cannot “prove” the causes of variations, the fact that its result is not rejected by the scientific method indicates it should be considered when trying to understand why the climate does what it does. Deliberate consideration of the major influences by natural variability on the climate has been conspicuously absent in the current explanations of climate change by the well-funded climate science industry.

One way to aid congress in understanding more of the climate issue than what is produced by biased “official” panels of the climate establishment is to organize and fund credible “Red Teams” that look at issues such as natural variability, the failure of climate models and the huge benefits to society from affordable energy, carbon-based and otherwise. I would expect such a team would offer to congress some very different conclusions regarding the human impacts on climate.

U.S. House Committee on Science, Space & Technology

29 Mar 2017

Testimony of John R. Christy

University of Alabama in Huntsville.

I am John R. Christy, Distinguished Professor of Atmospheric Science, Alabama's State Climatologist and Director of the Earth System Science Center at The University of Alabama in Huntsville. I have served as Lead Author, Contributing Author and Reviewer of United Nations IPCC assessments, have been awarded NASA's Medal for Exceptional Scientific Achievement, and in 2002 was elected a Fellow of the American Meteorological Society.

It is a privilege for me to offer my analysis of the current situation regarding atmospheric temperature datasets and whether the traditional scientific method using these datasets has been applied in climate science regarding the pronouncements about climate change used in policy. I addressed other aspects of climate change including extreme events, crop production, impact of regulation (there is none on the climate) and data confidence in my last Senate (Commerce, Science and Transportation, 8 Dec 2015) and House (Science, Space and Technology, 2 Feb 2016) appearances.

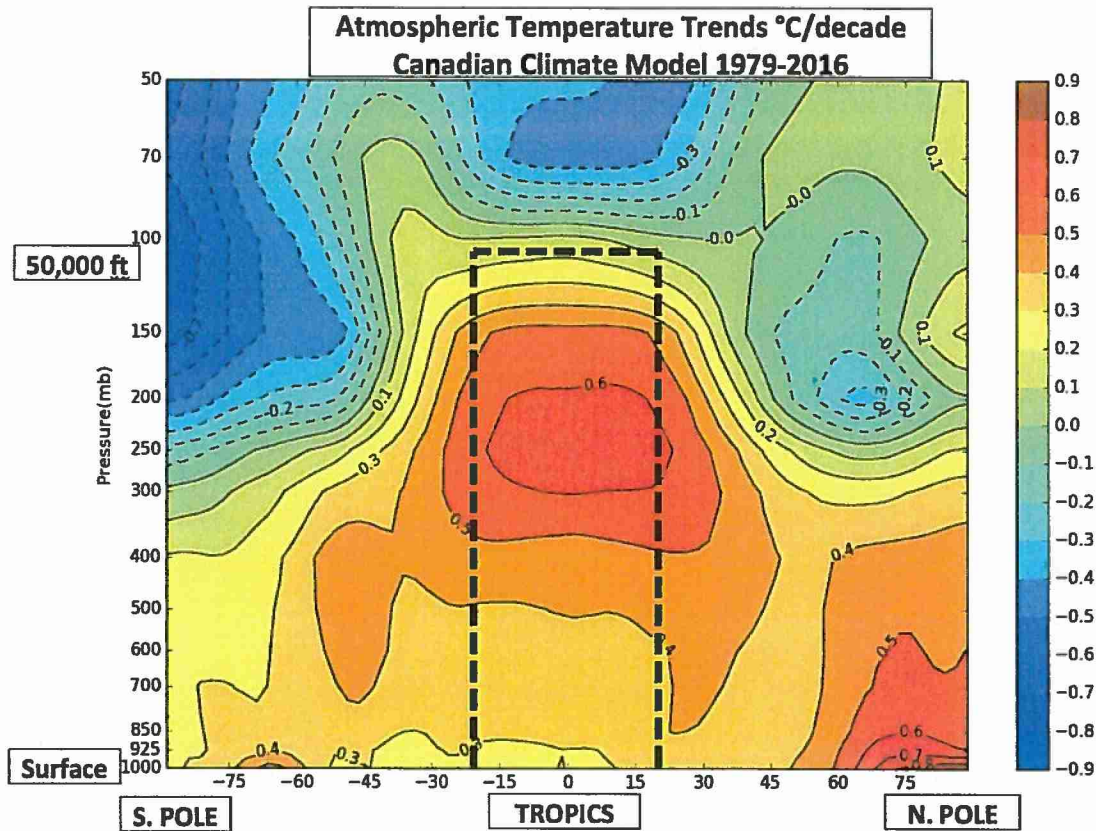
My research area might be best described as building datasets from scratch to advance our understanding of what the climate is doing and why – an activity I began as a teenager over 50 years ago. I have used traditional surface observations as well as measurements from balloons and satellites to document the climate story. Many of our UAH datasets, generated by myself and UAH colleagues Drs. Roy Spencer and W. Daniel Braswell, are used to test hypotheses of climate variability and change.

**(1) Applying the scientific method to climate models from the IPCC AR5**

In my last appearance before this committee (2 Feb 2016) I addressed the active campaign of negative assertions made against the various sources of data we use to monitor the temperature of bulk atmosphere. I demonstrated that main assertions were incorrect and that we can have confidence in the observations and one reason was that we now have several independent sources from around the world providing data with which to inter-compare. In this testimony I shall focus on the temperature of the bulk atmospheric layer from the surface to about 50,000 ft. – a layer which is often called by its microwave profile name  $T_{MT}$  (Temperature of Mid-Troposphere). This layer is particularly important because it captures the atmospheric region that is anticipated to warm rapidly and unambiguously if greenhouse theory is well-understood. As such, if the impact of extra



greenhouse gases (GHGs) is to be detected, it should be detected here. In Fig. 1 I show an example from a climate model simulation (Canadian Climate Model run CanESM2\_rcp45\_r3i1p1) of the anticipated temperature change for the period 1979-2016.



*Figure 1 Temperature trends ( $^{\circ}\text{C}/\text{decade}$ ) for 1979-2016 of the cross-section of the atmosphere as simulated by the Canadian Climate Model. The tropical band ( $20^{\circ}\text{S}$ - $20^{\circ}\text{N}$ ) is outlined for the bulk layer (surface to 50,000 ft) that represents the microwave  $T_{\text{MT}}$  measurement (Temperature Mid-Troposphere). This outlined-layer is the region of prominent warming for the 1979-2016 period as depicted in all models and thus is the region to examine relative to observations (Figure by Rob Junod, UAH).*

Figure 1 indicates that, according to theory, the tropical region should have experienced significant warming over the past 38 years due to extra GHGs. (There were 102 model runs to check and they all indicated a warming tropical atmosphere but to different degrees as shown later.) To test this result we follow the traditional scientific method in which a claim (hypothesis) is made and then is tested against independent information to see if the claim can be sustained or whether it is falsified. If the claim is confirmed, then we generally look for another test to confirm the claim again. If many tests are consistent

with the claim, then we may have confidence in it. If the claim fails a test, we look for reasons why and modify or reject the original claim and start over. Since the thrust of this Hearing is to see how the scientific method was or was not applied in the pronouncements about climate science, this will serve as an excellent example because it deals with a foundational climate metric that should reveal significant change if theory is correct – the temperature of the bulk atmosphere.

## **(2) Observational data used to test climate models**

Recall that the results from climate models are simply hypotheses (claims) about how the climate should have evolved in the past. The claim here is, **“The bulk atmospheric temperature trend since 1979 of the consensus of the IPCC AR5 climate models represents the actual trend since 1979.”** (1979 is the beginning of the satellite temperature era.) To test this claim we compare the  $T_{MT}$  model trends against  $T_{MT}$  from several observational datasets. The first type of observational dataset is built from satellites that directly measure the bulk atmospheric temperature through the intensity of microwave emissions. These data are essentially global in coverage and monitor the Earth everyday. There are three sources, UAH (University of Alabama in Huntsville), RSS (Remote Sensing Systems, San Rafael CA) and NOAA.

The second type of measurement is produced from the ascent of balloons which carry various instruments including thermistors (which monitor the air temperature) as the balloon rises through this layer. From these measurements a value equivalent to the satellite  $T_{MT}$  profile is calculated. Balloon stations are not evenly spaced throughout the Earth, but because the upper air is much more horizontally coherent in its features than the surface, a few balloons can represent a very large area in terms of temperature variability. The sources of these balloon datasets are RAOBCORE and RICH (University of Vienna, Austria), NOAA and UNSW (University of New South Wales, Australia).

Finally, major weather centers around the world generate atmospheric conditions every six hours or so of the entire Earth at many vertical levels, called Reanalyses. These products use many sources of data, including satellites and balloons, and merge the observations with a continuously running general circulation model. From the information at the vertical levels the  $T_{MT}$  quantity is generated for an apples-to-apples comparison with models, satellites and balloons. The sources of the Reanalyses are ERA-I (European Centre for Medium-Range Weather Forecasts (ECMWF) – ReAnalysis-Interim), NASA-MERRA2 and JRA-55 (Japan ReAnalyses). These three types of systems - satellites, balloons and reanalyses - represent very different means of computing the bulk atmospheric temperature and are provided by independent, international entities giving us confidence in the observational results.



### (3) Testing the claim – applying the scientific method

In Figure 2 we show the evolution of the tropical  $T_{MT}$  temperature since 1979 for the 102 climate model runs grouped in 32 curves by institution. Some institutions contributed a single simulation, others as many as 18. Multiple runs from a single institution's model category were averaged into a single time series here. The curves show the temperature evolution of the atmosphere in the tropical box shown in Fig. 1.

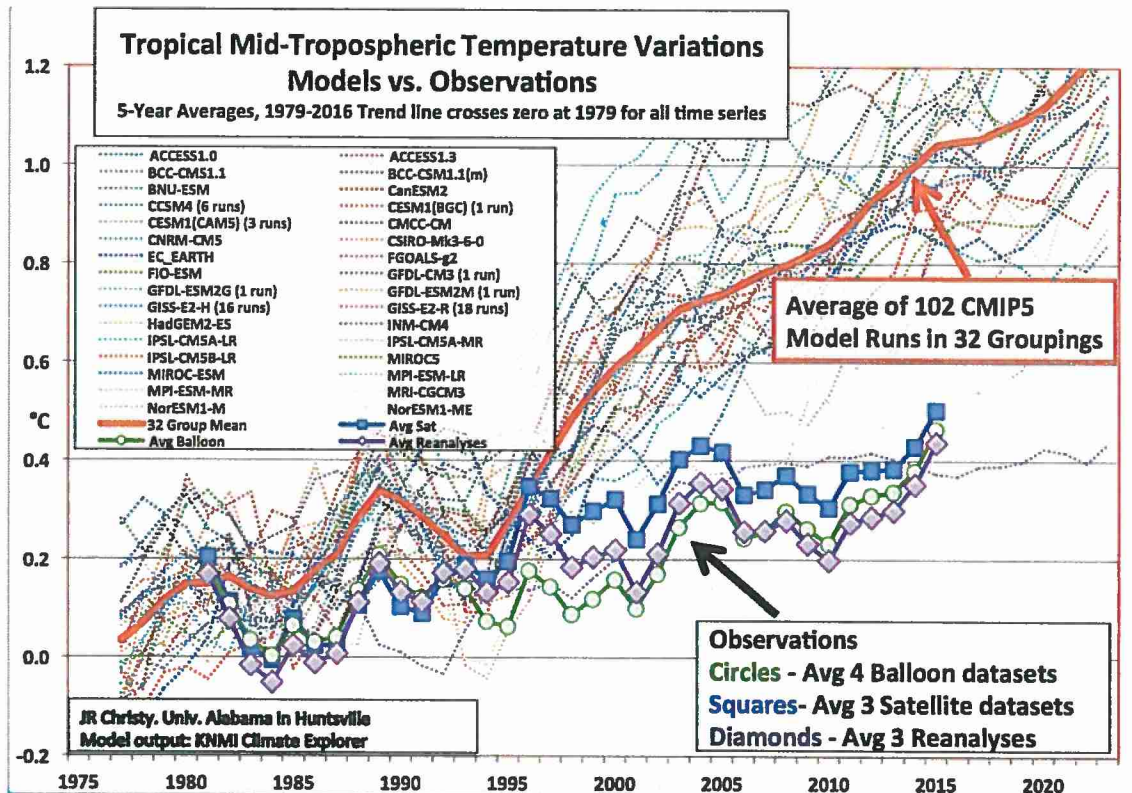


Figure 2: Five-year averaged values of annual mean (1979-2016) tropical bulk  $T_{MT}$  as depicted by the average of 102 IPCC CMIP5 climate models (red) in 32 institutional groups (dotted lines). The 1979-2016 linear trend of all time series intersects at zero in 1979. Observations are displayed with symbols: Green circles - average of 4 balloon datasets, blue squares - 3 satellite datasets and purple diamonds - 3 reanalyses. See text for observational datasets utilized. The last observational point at 2015 is the average of 2013-2016 only, while all other points are centered, 5-year averages.

Here we have climate model results (i.e. “claims” or “hypotheses”) to compare with observational datasets in a test to check whether the model average agrees with the observed data (i.e. the “claim” or “hypothesis”). We test the model average because it

represents the consensus of the theoretical models and is used to develop policy which is embodied in policy-related products such as the Social Cost of Carbon, the National Climate Assessment and the EPA Endangerment Finding.

I provided the model and observational information as annual temperature anomalies (both tropical and global) to Dr. Ross McKittrick (University of Guelph) who has published extensively as an applied econometrician on the application of statistical techniques to the testing of climate hypotheses. He applied the Vogelsang-Franches F-Test method to these data as described in McKittrick, Ross R., S. McIntyre and C. Herman (2010) "Panel and Multivariate Methods for Tests of Trend Equivalence in Climate Data Sets", Atmosph. Sci. Lett., 11. DOI: 10.1002/asl.290. This method is particularly suitable for determining whether the trends of two time series are equivalent or significantly different. [The result found in their 2010 paper indicated model trends were significantly warmer than observations for the earlier datasets available at that time.]

What we are really testing here are the rates of warming depicted by the models and the observations for the period 1979-2016. I have simplified a depiction of the test in Figure 3 so the rate of warming is directly viewed, showing what the test is measuring.

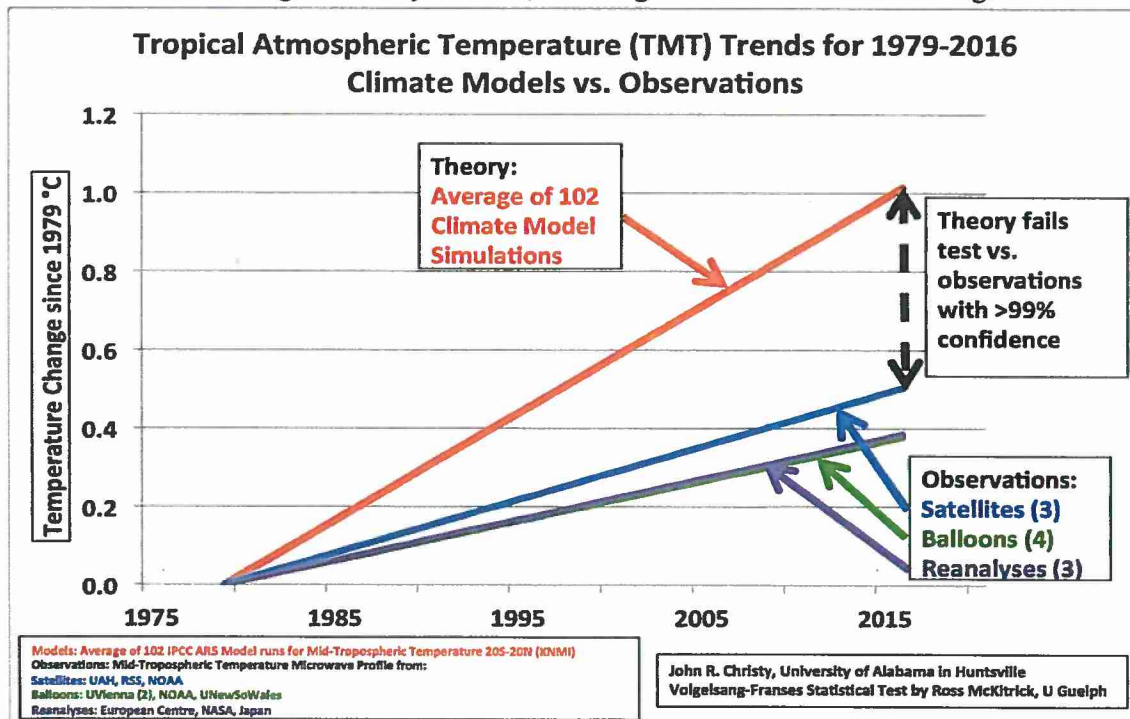


Figure 3. The linear trends of the average of the climate model simulations (red) and the averages of the three types of observational datasets described in the text.

The basic test question is, "Is the red line significantly different from the others?" The results are shown in Table 1 recognizing that there is no equivalence between the model



average trend and the observational datasets whenever the value of the test is greater than 84 at the <1% level. As shown, all test values exceed 84, and thus the mean model trend is highly significantly different from the observations.

*Table 1. Test for equivalence between the 1979-2016 trend of the mean of 102 CMIP-5 Climate Model simulations and the trends of various observational datasets. The test is the Vogelsang-Fransas F-Test (see McKittrick et al. 2010) that indicates non-equivalence at the 99% confidence level for values greater than 84 and shown in red. All values in the various tests are significant at this level.*

	Tropics		Global	
	Trend	Test Value	Trend	Test Value
Balloons	<b>+0.102</b>	<b>259</b>	<b>+0.111</b>	<b>165</b>
Satellites	<b>+0.136</b>	<b>104</b>	<b>+0.117</b>	<b>149</b>
Reanalyses	<b>+0.104</b>	<b>157</b>	<b>+0.123</b>	<b>87</b>
Avg All	<b>+0.113</b>	<b>187</b>	<b>+0.117</b>	<b>158</b>
CMIP-5 Models	<b>+0.274</b>		<b>+0.216</b>	

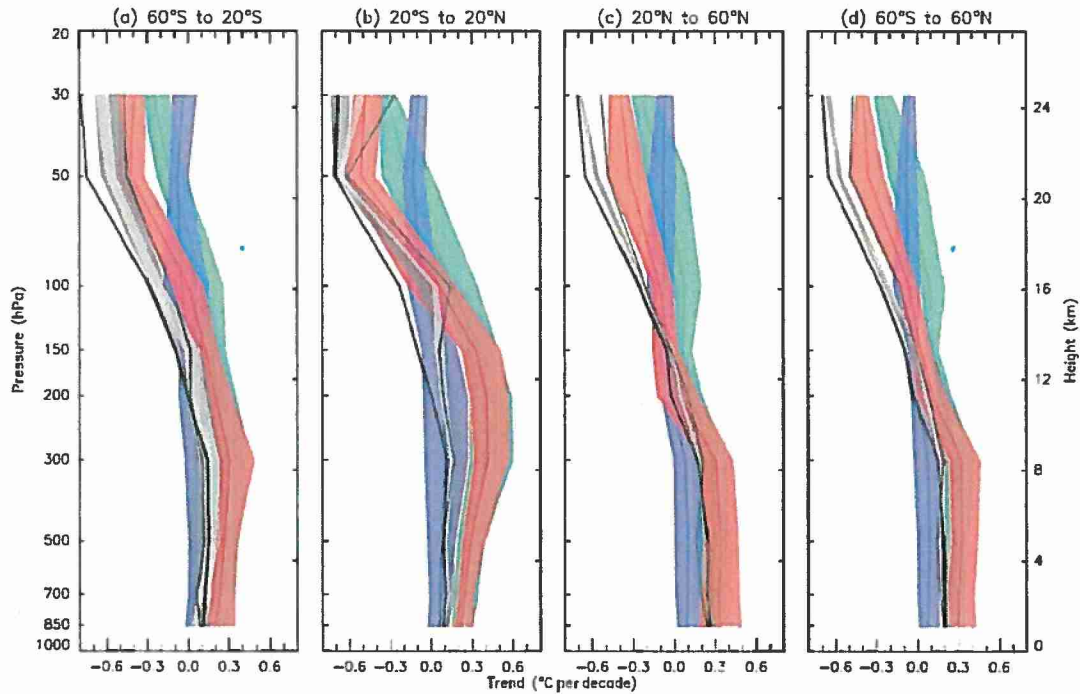
The scientific conclusion here, if one follows the scientific method, is that the average model trend fails to represent the actual trend of the past 38 years by a highly significant amount. As a result, applying the traditional scientific method, one would accept this failure and not promote the model trends as something truthful about the recent past or the future. Rather, the scientist would return to the project and seek to understand why the failure occurred. The most obvious answer is that the models are simply too sensitive to the extra GHGs that are being added to both the model and the real world.

[We do not use surface temperature as a testable metric because models, to varying degrees, are tuned to agree with the surface temperature observations already – i.e. they’ve been given the answer ahead of time - thus a comparison of the surface would not be a valid scientific test (Hourdin, F.T. et al., “The art and science of climate model tuning”, 2016, doi:10.1175/BAMS-D-00135.1. and Voosen, P., “Climate scientists open up their black boxes to scrutiny”, 2016, Science, 354, pp 401-402. DOI:10.1126/Science.354.6311.401).]

#### **(4) The IPCC AR5 (2013) displayed a similar result – the models failed**

Oddly enough, such an important result (i.e. that models fail the test of representing the real-world bulk temperature trend) was available to see in the most recent IPCC AR5.

Unfortunately, it was buried in the Supplementary Material of Chapter 10 without comment. In Fig. 4, I present the figure that appeared in this IPCC section. I was a reviewer (a relatively minor position in that report) in the AR5 and had insisted that such a figure be shown in the main text because of its profound importance, but the government-appointed lead authors decided against it. They opted to place it in the Supplementary Material where little attention would be paid, and to fashion the chart in such a way as to make it difficult to understand and interpret.



**Figure 10.SM.1** | Observed and simulated zonal mean temperatures trends from 1979 to 2010 for CMIP5 simulations containing both anthropogenic and natural forcings (red), natural forcings only (blue) and greenhouse gas forcing only (green) where the 5th to 95th percentile ranges of the ensembles are shown. Three radiosonde observations are shown (thick black line: Hadley Centre Atmospheric Temperature data set 2 (HadAT2), thin black line: Radiosonde Observation COrrrection using REanalyses (RAOBCORE) 1.5, dark grey band: Radiosonde Innovation Composite Homogenization (RICH)-obs 1.5 ensemble and light grey: RICH- $\tau$  1.5 ensemble. (Adapted from Lott et al. (2013) but for the more recent period from 1979 to 2010.)

*Figure 4. This is Fig. 10.SM.1 of the IPCC AR5 Supplementary Material for Chapter 10. These are trends (1979-2010) for various vertical levels of the atmosphere from (a) observations (gray band – difficult to see), from (b) models without extra GHGs (blue band) and (c) models with extra GHGs and other forcings (red band). The lower portion of the tropical chart (second panel from left) is simplified in Fig. 5 and used for the following discussion.*

I have taken the same information in Fig. 4 (IPCC AR5 Fig. 10.SM.1) and simplified the presentation so as to be clearer in Fig. 5 below. The trends here represent trends at different levels of the tropical atmosphere from the surface up to 50,000 ft. The gray lines are the bounds for the range of observations, the blue for the range of IPCC model results *without* extra GHGs and the red for IPCC model results *with* extra GHGs.

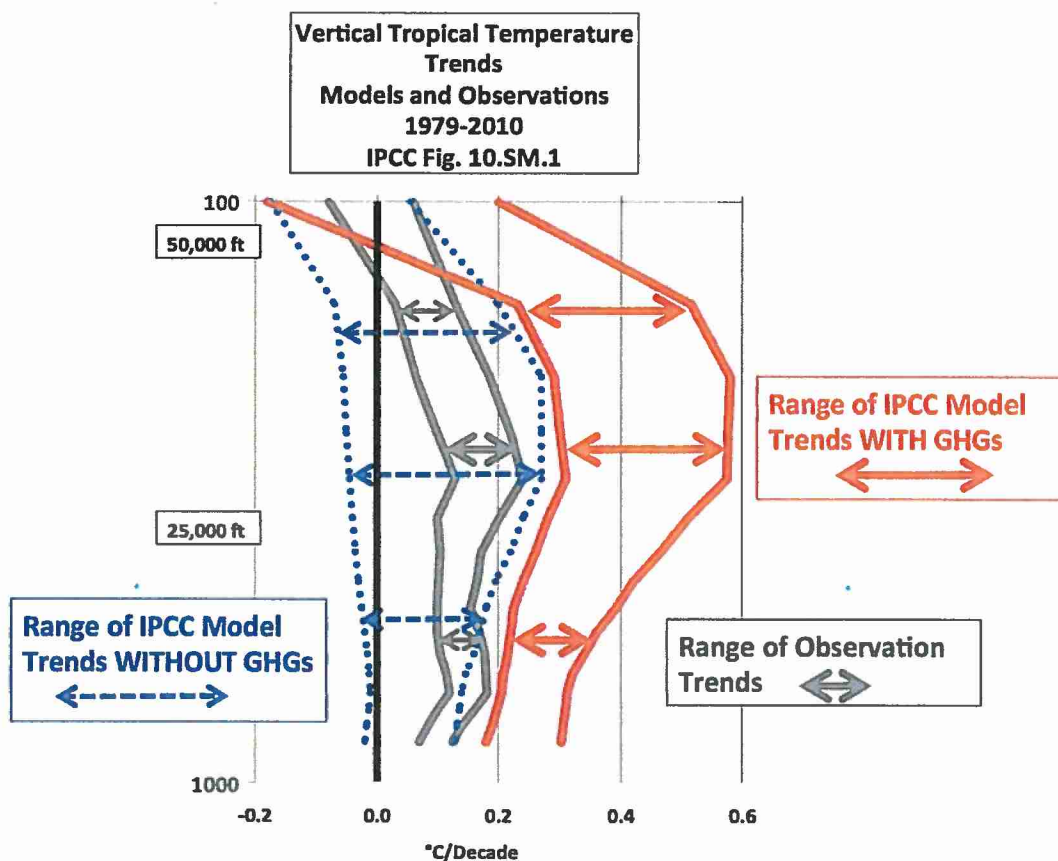


Figure 5. Simplification of IPCC AR5 shown above in Fig. 4. The colored lines represent the range of results for the models and observations. The key point displayed is the lack of overlap between the GHG model results (red) and the observations (gray). The non-GHG model runs (blue) overlap the observations almost completely.

What is immediately evident is that the model trends in which extra GHGs are included lie completely outside of the range of the observational trends, indicating again that the models, as hypotheses, failed a simple “scientific-method” test applied to this fundamental, climate-change variable. That this information was not clearly and openly presented in the IPCC is evidence of a political process that was not representative of the dispassionate examination of evidence as required by the scientific method. Further, (and this took guts) the IPCC then claimed high confidence in knowing *why* the climate evolved as it did over the past few decades (humans as the main cause) ignoring the fact the models on which that claim was based had failed an obvious and rather easy-to-perform validation test. Incredibly, what Fig. 5 shows is that the bulk tropical atmospheric temperature change is modeled best when *no extra* GHGs are included – a direct contradiction to the IPCC conclusion that observed changes could only be modeled *if extra* GHGs were included.



### **(5) A simple statistical model that passed the same “scientific-method” test**

The IPCC climate models performed best versus observations when they did *not* include extra GHGs and this result can be demonstrated with a statistical model as well. I was co-author of a report which produced such an analysis (Wallace, J., J. Christy, and J. D’Aleo, “On the existence of a ‘Tropical Hot Spot’ & the validity of the EPA’s CO2 Endangerment Finding – Abridged Research Report”, August 2016 (Available here <https://thsresearch.files.wordpress.com/2016/09/ef-cpp-sc-2016-data-ths-paper-ex-sum-090516v2.pdf>).

In this report we examine annual estimates from many sources of global and tropical deep-layer temperatures since 1959 and since 1979 utilizing explanatory variables that did not include rising CO2 concentrations. We applied the model to estimates of global and tropical temperature from the satellite and balloon sources, individually, shown in Fig. 2 above. The explanatory variables are those that have been known for decades such as indices of El Nino-Southern Oscillation (ENSO), volcanic activity, and a solar activity (e.g. see Christy and McNider, 1994, “Satellite greenhouse signal”, *Nature*, 367, 27Jan). [One of the ENSO explanatory variables was the accumulated MEI (Multivariate ENSO Index, see <https://www.esrl.noaa.gov/psd/enso/mei/>) in which the index was summed through time to provide an indication of its accumulated impact. This “accumulated-MEI” was shown to be a potential factor in global temperatures by Spencer and Braswell, 2014 (“The role of ENSO in global ocean temperature changes during 1955-2011 simulated with a 1D climate model”, *APJ.Atmos.Sci.* 50(2), 229-237, DOI:10.1007/s13143-014-001-z.) Interestingly, later work has shown that this “accumulated-MEI” has virtually the same impact as the accumulated solar index, both of which generally paralleled the rise in temperatures through the 1980s and 1990s and the slowdown in the 21<sup>st</sup> century. Thus our report would have the same conclusion with or without the “accumulated-MEI.”]

The basic result of this report is that the temperature trend of several datasets since 1979 can be explained by variations in the components that naturally affect the climate, just as the IPCC inadvertently indicated in Fig. 5 above. The advantage of the simple statistical treatment is that the complicated processes such as clouds, ocean-atmosphere interaction, aerosols, etc., are implicitly incorporated by the statistical relationships discovered from the actual data. Climate models attempt to calculate these highly non-linear processes from imperfect parameterizations (estimates) whereas the statistical model directly accounts for them since the bulk atmospheric temperature is the response-variable these processes impact. It is true that the statistical model does not know what each sub-process is or how each might interact with other processes. But it also must be made clear: it is an understatement to say that no IPCC climate model accurately incorporates all of the non-

linear processes that affect the system. I simply point out that because the model is constrained by the ultimate response variable (bulk temperature), these highly complex processes are included.

The fact that this statistical model explains 75-90 percent of the real annual temperature variability, depending on dataset, using these influences (ENSO, volcanoes, solar) is an indication the statistical model is useful. In addition, the trends produced from this statistical model are not statistically different from the actual data (i.e. passing the “scientific-method” trend test which assumes the natural factors are not influenced by increasing GHGs). This result promotes the conclusion that this approach achieves greater scientific (and policy) utility than results from elaborate climate models which on average fail to reproduce the real world’s global average bulk temperature trend since 1979.

The over-warming of the atmosphere by the IPCC models relates to a problem the IPCC AR5 encountered elsewhere. In trying to determine the climate sensitivity, which is how sensitive the global temperature is relative to increases in GHGs, the IPCC authors chose *not* to give a best estimate. [A high climate sensitivity is a foundational component of the last Administration’s Social Cost of Carbon.] The reason? ... climate models were showing about twice the sensitivity to GHGs than calculations based on real, empirical data. I would encourage this committee, and our government in general, to consider empirical data, not climate model output, when dealing with environmental regulations.

#### **(6) Red Teams needed because Consensus Science is not Science**

One way for congress to receive better (less biased) information about claims of climate science is to organize “Red Teams” as is done in other parts of government and industry when critical systems, programs or infrastructure are under consideration. I have discussed this idea in several previous congressional hearings. I will include here the section describing Red Teams from my testimony on 20 Sep 2012 before the Subcommittee on Energy and Power of the House Committee on Energy and Commerce.

*The term “consensus science” will often be appealed to regarding arguments about climate change to bolster an assertion. This is a form of “argument from authority.” Consensus, however, is a political notion, not a scientific notion. As I testified to the Inter-Academy Council in June 2010, wrote in Nature that same year (Christy 2010), and documented in my written House Testimony last year (House Space, Science and Technology, 31 Mar 2011) the IPCC and other similar Assessments do not represent for me a consensus of much more than the consensus of those selected to agree with a particular consensus. The content of these climate reports is actually under the control*



*of a relatively small number of individuals - I often refer to them as the "climate establishment" – who through the years, in my opinion, came to act as gatekeepers of scientific opinion and information, rather than brokers. The voices of those of us who object to various statements and emphases in these assessments are by-in-large dismissed rather than accommodated. This establishment includes the same individuals who become the "experts" called on to promote IPCC claims in government reports such as the Endangerment Finding by the Environmental Protection Agency. As outlined in my [31 Mar 2011] House Testimony, these "experts" become the authors and evaluators of their own research relative to research which challenges their work. But with the luxury of having the "last word" as "expert" authors of the reports, alternative views vanish.*

*I've often stated that climate science is a "murky" science. We do not have laboratory methods of testing our hypotheses as many other sciences do. As a result what passes for science includes, opinion, arguments-from-authority, dramatic press releases, and fuzzy notions of consensus generated by preselected groups. This is not science.*

*I noticed the House passed an amendment last year to de-fund the U.N.'s Intergovernmental Panel on Climate Change (IPCC.) We know from Climategate emails and many other sources that the IPCC has had problems with those who take different positions on climate change than what the IPCC promotes. There is another way to deal with this however. Since the IPCC activity is funded by US taxpayers, then I propose that five to ten percent of the funds be allocated to a group of well-credentialed scientists to produce an assessment that expresses legitimate, alternative hypotheses that have been (in their view) marginalized, misrepresented or ignored in previous IPCC reports (and thus EPA and National Climate Assessments). Such activities are often called "Red Team" reports and are widely used in government and industry. Decisions regarding funding for "Red Teams" should not be placed in the hands of the current "establishment" but in panels populated by credentialed scientists who have experience in examining these issues. Some efforts along this line have arisen from the private sector (i.e. The Non-governmental International Panel on Climate Change at <http://nipccreport.org/> and Michaels (2012) ADDENDUM:Global Climate Change Impacts in the United States). I believe policymakers, with the public's purse, should actively support the assembling all of the information that is vital to addressing this murky and wicked science, since the public will ultimately pay the cost of any legislation alleged to deal with climate.*

*Topics to be addressed in this "Red Team" assessment, for example, would include (a) evidence for a low climate sensitivity to increasing greenhouse gases, (b) the role and importance of natural, unforced variability, (c) a rigorous and independent evaluation of climate model output, (d) a thorough discussion of uncertainty, (e) a focus on metrics that most directly relate to the rate of accumulation of heat in the climate system, (f) analysis of the many consequences, including benefits, that result from CO2 increases, and (g) the importance that affordable and accessible energy has to human health and welfare.*

*What this proposal seeks is to provide to the Congress and other policymakers a parallel, scientifically-based assessment regarding the state of climate science which addresses issues which here-to-for have been un- or under-represented by previous tax-payer funded, government-directed climate reports. In other words, our policymakers need to see the entire range of findings regarding climate change.*

### **(7) In Summary**

“Science” is not a set of facts but a process or method that sets out a way for us to discover information and which attempts to determine the level of confidence we might have in that information. In the method, a “claim” or “hypothesis” is stated such that rigorous tests might be employed to test the claim to determine its credibility. If the claim fails a test, the claim is rejected or modified then tested again. 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 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 for related policy decisions.

The IPCC inadvertently provided information that supports this conclusion by (a) showing that the tropical trends of climate models *with* extra greenhouse gases failed to match actual trends and (b) showing that climate models *without* extra greenhouse gases agreed with actual trends. A report of which I was a co-author demonstrates that a statistical model that uses only natural influences on the climate also explains the variations and trends since 1979 without the need of extra greenhouse gases. While such a model (or any climate model) cannot “prove” the causes of variations, the fact that its result is not rejected by the scientific method indicates it should be considered when trying to understand why the climate does what it does. Deliberate consideration of the major influences by natural variability on the climate has been conspicuously absent in the current explanations of climate change by the well-funded climate science industry.

One way to aid congress in understanding more of the climate issue than what is produced by biased “official” panels of the climate establishment is to organize and fund credible “Red Teams” that look at issues such as natural variability, the failure of climate models and the huge benefits to society from affordable energy, carbon-based and otherwise. I would expect such a team would offer to congress some very different conclusions regarding the human impacts on climate.



## John R. Christy

### The University of Alabama in Huntsville

Dr. John R. Christy is the Distinguished Professor of Atmospheric Science and Director of the Earth System Science Center at the University of Alabama in Huntsville where he began studying global climate issues in 1987. Since 2000 he has been Alabama's State Climatologist. In 1989 Dr. Roy Spencer (then a NASA scientist and now a Principle Research Scientist at UAH) and Christy developed a global temperature data set from satellite microwave data beginning in 1979. For this achievement, the Spencer-Christy team was awarded NASA's Medal for Exceptional Scientific Achievement in 1991. In 1996, they were selected to receive a Special Award by the American Meteorological Society "for developing a global, precise record of earth's temperature from operational polar-orbiting satellites, fundamentally advancing our ability to monitor climate." In January 2002 Christy was inducted as a Fellow of the American Meteorological Society.

Dr. Christy has served as Lead Author (2001) and Contributor/Reviewer (1992, 1994, 1996, 2007, 2013) for the U.N. reports by the Intergovernmental Panel on Climate Change in which the satellite temperatures were included for studying global climate change. He has served on five NRC and NAS panels and has performed research funded by NASA, NOAA, DOE, DOT and the State of Alabama, publishing many studies appearing in, for example, *Science*, *Nature*, *Journal of Climate* and *The Journal of Geophysical Research*.


Dr. Christy received the M.S. and Ph.D. degrees in Atmospheric Sciences from the University of Illinois (1984, 1987). Prior to this career path he had graduated from the California State University in Fresno (B.A. Mathematics, 1973) and taught Physics and Chemistry as a missionary teacher in Nyeri, Kenya for two years. After earning a Master of Divinity degree from Golden Gate Baptist Seminary (1978) he served four years as a bivocational mission-pastor in Vermillion, South Dakota where he also taught college math. He has been profiled in the February 2001 issue of [Discover magazine](#), by National Public Radio in 2004 and in the *NY Times* in 2014 where his diverse background was highlighted.

Dr. Christy was married to the former Babs Joslin for almost 39 years until her death in 2014 of cancer. She was a fellow missionary whom he met in Kenya. Their two children are now married; Alison has three children and Brian has two. Recently, Dr. Christy and Ms. Sherry Upshaw were joined in marriage. Dr. Christy's favorite hobby is gold panning which he developed as a teenager in California, and he also runs, completing races from 2 miles to ultra-marathons over rugged terrain.



Comment submitted by Orla E. Collier, Benesch Friedlander Coplan & Aronoff LLP on behalf of Murray Energy Corporation (Appendix C)

The is a Comment on the **Environmental Protection Agency** (EPA) Proposed Rule: [Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Reopening of the Comment Period](#)

For related information, [Open Docket Folder](#) 

## Comment

Please see attached Appendix C to Murray Energy Corporation Comments. Appendix D will be sent under separate cover. Thank you.

## Attachments (1)



[Appendix C](#)

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# **APPENDIX C**

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United States Environmental Protection Agency

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**Petition of the**

**Competitive Enterprise Institute and the Science and Environmental Policy Project**

**for Rulemaking on the Subject of Greenhouse Gases**

**and Their Impact on Public Health and Welfare,**

**in Connection with EPA's 2009 Endangerment Finding, 74 FR 66,496 (Dec. 15, 2009)**

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Hans Bader, Senior Counsel

February 17, 2017  
(corrected February 23)

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## PETITION FOR RULEMAKING ON THE ISSUE OF GREENHOUSE GASES AND PUBLIC HEALTH AND WELFARE

Petitioners Competitive Enterprise Institute, the Science and Environmental Policy Project, and four individual members of the latter's Board of Directors hereby petition EPA to initiate a rulemaking proceeding on the subject of greenhouse gases and their impact on public health and welfare.

EPA addressed this matter in 2009 in its "Endangerment Finding." EPA, Final Rule, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 FR 66,496 (Dec. 15, 2009). However, as explained below, since that finding was issued, evidence has continued to mount that directly contradicts it. For these reasons, we request that EPA commence a new proceeding on this matter.

### Procedural Background

We bring this petition pursuant to 5 U.S.C. § 553(e), which grants any "interested person the right to petition for the issuance, amendment, or repeal of a rule." A rulemaking proceeding is appropriate when new developments demonstrate that an existing rule or finding rests on erroneous factual premises, and a rulemaking petition is a proper vehicle for asking an agency "to reexamine" the "continuing vitality" of a rule.<sup>1</sup> EPA's own website expressly notes the applicability of section 553(e) to the environmental statutes that it administers. EPA, Petitions for Rulemaking, <https://www.epa.gov/aboutepa/petitions-rulemaking>.<sup>2</sup>

### Identity and Interest of the Petitioners

The Competitive Enterprise Institute (CEI) is a non-profit, 501(c)(3) public policy organization that focuses on issues of overregulation, especially its implications for affordable energy. CEI was founded in 1984 and is headquartered in Washington, D.C.

The Science and Environmental Policy Project (SEPP) is a non-profit 501(c)(3) organization, incorporated in 1993 in the State of Virginia for the purpose of promoting sound and credible science as the basis for regulatory decisions.

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<sup>1</sup> *Geller v. FCC*, 610 F.2d 973, 978–80 (D.C. Cir. 1979) (overturning agency's denial of petition for new rulemaking). An agency's "refusal to initiate a rulemaking naturally sets off a special alert when a petition has sought modification of a rule on the basis of a radical change in its factual premise." *American Horse Protection Ass'n v. Lyng*, 812 F.2d 1, 5 (D.C. Cir. 1987) (overturning agency's denial of petition for rulemaking in light of agency's failure to offer a satisfactory explanation). Alternatively, EPA may choose to treat our filing as a petition for reconsideration of its Endangerment Finding. The procedural basis for doing so is discussed in *Concerned Household Electricity Consumers Council et al., Petition for Reconsideration of "Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act"* (filed Jan. 20, 2017), at 1-5.

<sup>2</sup> See, e.g., *Commonwealth of Va. v. EPA*, 108 F.3d 1397, 1402 n.3 (D.C. Cir. 1997) (successful challenge to ozone pollution rule by Virginia) ("any interested person has 'the right to petition' EPA 'for the issuance, amendment, or repeal' of any rule. 5 U.S.C. § 553(e)"), *decision modified on reh'g*, 116 F.3d 499 (D.C. Cir. 1997).

The individual petitioners, who are members of SEPP's Board of Directors, are the following: Donna Bethell (DC), Kenneth A. Haapala (VA), Thomas Sheahen (MD), and S. Fred Singer (VA). They are citizens of the United States who reside in the jurisdictions indicated for each of them. They and/or the households to which they belong pay utility bills that are affected by EPA regulations that are based, directly or indirectly, on the Endangerment Finding – such as the Clean Power Plan, 80 FR at 64,662 (codified at 40 C.F.R. § 60.5700 *et seq.*), which threatens to increase the cost of electricity.<sup>3</sup> Thus, they are not only interested parties, but have standing to judicially challenge the Endangerment Finding given the new facts cited in this petition.<sup>4</sup>

### **The Lines of Evidence for EPA's Endangerment Finding**

EPA's 2009 Endangerment Finding described its scientific basis in the following terms:

“The attribution of observed climate change to anthropogenic activities is based on multiple lines of evidence. The first line of evidence arises from the basic physical understanding of the effects of changing concentrations of GHGs, natural factors, and other human impacts on the climate system. The second line of evidence arises from indirect, historical estimates of past climate changes that suggest that the changes in global surface temperature over the last several decades are unusual. The third line of evidence arises from the use of computer-based climate models to simulate the likely patterns of response of the climate system to different forcing mechanisms (both natural and anthropogenic).”

74 FR 66,518 (footnote omitted).

But as discussed below, in the seven years since the Endangerment Finding was issued, new evidence and research has cast serious doubt on the validity of its three lines of evidence.

#### **I. There Has Been No Statistically Significant Atmospheric Warming Despite a Continued Increase in Atmospheric Carbon Dioxide Levels; This Seriously Undercuts the Endangerment Finding's First Line of Evidence Regarding an Adequate Understanding of Climate**

Prior to 2016, the atmospheric temperatures showed the warmest year on record to be 1998. The atmospheric carbon dioxide concentration for December of that year was 367.13 part per million (ppm).<sup>5</sup>

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<sup>3</sup> See, e.g., Concerned Household Electricity Consumers Council, *Petition for Reconsideration*, *supra* n.1, at 5–8 (describing in detail how the Endangerment Finding leads to increased electricity costs).

<sup>4</sup> See *CEI v. NHTSA*, 901 F.2d 107, 111–13 (D.C. Cir. 1990) (regulations that allegedly resulted in “high prices” for “large cars” could be challenged by group whose members sought “opportunity to buy” them); *Energy Action Educ. Found. v. Andrus*, 654 F.2d 735, 756 n.\*\* (D.C. Cir. 1980) (consumers had standing to challenge activities claimed to “inflat[e] prices, limit[] supplies, and restrict[] choice on the market”), *rev'd on other grounds*, 454 U.S. 151 (1981); *Community Nutrition Inst. v. Block*, 698 F.2d 1239, 1248 (D.C. Cir. 1983), *rev'd on other grounds*, 467 U.S. 340 (1984) (consumers could challenge exactions imposed on milk handlers, which allegedly would be passed on to consumers).

<sup>5</sup> [http://afip.cmdl.noaa.gov/products/trends/co2/co2\\_num\\_mlo.txt](http://afip.cmdl.noaa.gov/products/trends/co2/co2_num_mlo.txt)



The past year, 2016, was reportedly warmer than 1998 by 0.02 deg. C.<sup>6</sup> The atmospheric carbon dioxide concentration in December 2016 was 404.48 ppm.<sup>7</sup>

Despite this 10 percent increase in atmospheric CO<sub>2</sub> concentrations, however, the temperature difference between 1998 and 2016 was not statistically significant. As Dr. Roy Spencer of the University of Alabama in Huntsville has pointed out, “2016 would have had to be 0.10 C warmer than 1998 to be significantly different at the 95% confidence level.”<sup>8</sup> In fact, the temperature difference between the two years was only one fifth of that amount.

In its Endangerment Finding, EPA acknowledged that “there have not been strong trends over the last seven to ten years in global surface temperature or lower troposphere temperatures measured by satellites.” 74 FR 66,522. EPA claimed, however, that “this pause in warming should not be interpreted as a sign that the Earth is cooling or that the science supporting continued warming is in error. Year-to-year variability in natural weather and climate patterns make it impossible to draw any conclusions about whether the climate system is warming or cooling from such a limited analysis.” *Id.*

Here, however, the absence of any strong warming trend has continued for 18 years. That is twice as large as the 2001–09 time period touted in the Finding as containing “eight of the 10 warmest years on record.” *Id.* Moreover, the fact that the starting and end years for this 18-year period are the two reportedly warmest years on record makes the lack of warming all the more significant. In short, the absence of a strong warming trend in the face of increasing atmospheric CO<sub>2</sub> concentrations cannot be dismissed, yet again, as being based on an overly “limited analysis.” It draws into serious question EPA’s contention that we have an adequate “physical understanding of the effects of changing concentrations of GHGs ... on the climate system.” 74 FR 66,518.

## **II. Contrary to the Endangerment Finding’s Second Line of Evidence, Changes in Global Temperatures in Recent Decades Are Far From Unusual**

The Endangerment Finding states that “indirect, historical estimates of past climate changes ... suggest that the changes in global surface temperature over the last several decades are unusual.” 74 FR 66,518. But a more recent, comprehensive review of the scientific literature comes to exactly the opposite conclusion:

- “Over recent geological time, Earth’s temperature has fluctuated naturally between about +4°C and -6°C with respect to twentieth century temperature. A warming of 2°C above today, should it occur, falls within the bounds of natural variability;”

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<sup>6</sup> *Global Temperature Report: December, 2016*, Earth System Science Center, Univ. of AL at Huntsville, [http://www.nsstc.uah.edu/climate/2016/december/dec2016\\_GTR.pdf](http://www.nsstc.uah.edu/climate/2016/december/dec2016_GTR.pdf)

<sup>7</sup> See n.5.

<sup>8</sup> Roy Spencer, Ph.D., *Global Satellites: 2016 not Statistically Warmer than 1998*, DRROYSPENCER.COM, (Jan. 3, 2017), <http://www.drroyspencer.com/2017/01/global-satellites-2016-not-statistically-warmer-than-1998/>.

- “At the current level of ~400 ppm we still live in a CO<sub>2</sub>-starved world. Atmospheric levels 15 times greater existed during the Cambrian Period (about 550 million years ago) without known adverse effects.”
- The overall warming since about 1860 corresponds to a recovery from the Little Ice Age modulated by natural multidecadal cycles driven by ocean-atmosphere oscillations, or by solar variations at the de Vries (~208 year) and Gleissberg (~80 year) and shorter periodicities.”
- “The causes of historic global warming remain uncertain, but significant correlations exist between climate patterning and multidecadal variation and solar activity over the past few hundred years.”<sup>9</sup>

Similarly, a comprehensive new study of 13 complete temperature data sets (nine in the tropics, one in the U.S. and three global) found that “once just the ENSO [El Nino Southern Oscillation] impacts on temperature data are accounted for, there is no ‘record setting’ warming to be concerned about.”<sup>10</sup>

For these reasons, the Finding’s second line of evidence should be reconsidered.

### **III. The Growing Accumulation and Refinement of Balloon and Satellite Data Demonstrates that the Atmosphere Is Far Less Sensitive to CO<sub>2</sub> Forcing than Predicted by the Climate Models; As a Result, EPA’s Third Line of Evidence Is No Longer Valid**

EPA’s Endangerment Finding expressly noted the importance of global atmospheric temperature as a “reasonable indicator of human-induced climate change.” 74 FR at 66,522 (capitalization omitted). However, EPA largely ignored the two most precise methods for measuring atmospheric temperature, satellites and weather balloons. The Finding contained no discussion at all of balloon temperature data, and there was only one brief discussion of satellite temperature data. *Id.* Computer-based climate models, on the other hand, received far more attention. EPA characterized these models as “well tested,” and they were singled out by EPA as constituting the Finding’s “third line of evidence.”

But as demonstrated by the congressional testimony of John R. Christy, Director of the Earth System Science Center at the University of Alabama, the continued accumulation of both satellite and balloon data has thrown increasing doubt over two of EPA’s three lines of evidence. Contrary to the Finding’s claim that we have a “basic physical understanding of ... the climate system,” Christy concludes that “the theory of how climate changes occur, and the associated impact of extra greenhouse gases, is not understood well enough to even reproduce the past

<sup>9</sup> Idso, Carter, and Singer, *Climate Change Reconsidered II: Physical Science* (2013), <https://www.heartland.org/media-library/pdfs/CCR-II/CCR-II-Full.pdf>; Summary for Policymakers: [http://climatechangereconsidered.org/wp-content/uploads/2016/08/09-25-2013\\_CCR-II-Summary-for-Policymakers.pdf](http://climatechangereconsidered.org/wp-content/uploads/2016/08/09-25-2013_CCR-II-Summary-for-Policymakers.pdf), p.4.

<sup>10</sup> Wallace, Christy, and D’Aleo, *On the Existence of a “Tropical Hotspot” & the Validity of EPA’s CO<sub>2</sub> Endangerment Finding* (Aug. 2016), at pp. 4 and 13, Table II-1, <https://thsresearch.files.wordpress.com/2016/10/ef-cpp-sc-2016-data-ths-paper-ex-sum-101416.pdf>.



climate.” Prepared Testimony of John R. Christy to the U.S. House Committee on Science, Space and Technology (Feb. 2, 2016), p.2, <https://science.house.gov/sites/republicans.science.house.gov/files/documents/HHRG-114-SY-WState-JChristy-20160202.pdf>, attached hereto.

As Dr. Christy explains, both surface temperature stations and water temperature suffer from a number of problems. Stations are affected by “the growth of infrastructure” around them and by the “variety of changes” that they “undergo through time.” Christy at 6. Water temperature readings “do not track well with those of the air temperature just above the water ... even if both are measured on the same buoy over 20 years.” *Id.*

Satellite and balloon data do not suffer from these problems. Moreover, the fact that balloon and satellite data correlate extremely well with one another despite their being collected through distinctly different methods makes their results far more reliable. “To be sure, satellite and balloon temperatures require their own adjustments and cannot be considered ‘perfect’, but do offer an independence from one another to allow direct comparison studies.” *Id.* at 7.

Based on this data, Dr. Christy’s essential conclusion is that the computer models “clearly overcook the atmosphere,” *Id.* 2. They project a far higher rate of warming than actually observed—2.5 times faster generally, and 3 times faster for the tropical atmosphere. *Id.* at 4–5. The models were “demonstrably deficient.” *Id.* at 2. They “failed at the simple test of telling us ‘what’ has already happened, and thus would not be in a position to give us a confident answer to ‘what’ may happen in the future and ‘why.’” *Id.* at 12. And Dr. Christy emphasized the fact that the 37-year period that he had examined is “the period with the highest concentration of greenhouse gases and thus the period in which the response should be of largest magnitude.” *Id.*

In short, EPA’s claim in its Endangerment Finding that the climate models are “well-tested” no longer bears scrutiny, and its third line of evidence clearly needs to be reconsidered.

#### **IV. Given the Mounting Evidence that EPA’s Greenhouse Gas Regulations Will Have No Discernible Climate Impact, the Rationale for Its Endangerment Finding Requires Reexamination**

In its Finding, EPA gave the following analogy for endangerment:

“The question of whether there is endangerment is like the question of whether there is an illness. Once one knows there is an illness, then the next question is what to do, if anything, in response to that illness.”

74 FR 66,515.

But as Dr. Christy noted in his testimony, even a total *elimination* of U.S. emissions would have a near zero impact on global climate. As he put it, if the U.S. were simply to vanish, after 50 years there would be no discernible global temperature difference, given the satellite and balloon data findings regarding atmospheric sensitivity: “the impact ... would be only 0.05 to 0.08 degrees C – an amount less than that which the global temperature fluctuates from month to

month.” Christy at 14. Given this impossibility of treating the “illness” supposedly identified by EPA’s Finding, the basis for making the Finding in the first place needs reconsideration.

This point is buttressed by testimony last year from then-EPA Administrator Gina McCarthy, when she stated that the alleged environmental benefits of EPA’s massive Clean Power Plan were not purpose. At a March 22, 2016, congressional hearing, one U.S. Representative asked her: “I don’t understand – if it doesn’t have an impact on climate change around the world, why are we subjecting our hard working taxpayers and men and women in the coal fields to something that has no benefit?”<sup>11</sup>

Gina McCarthy’s answer: “We see it as having had enormous benefit in showing [the] sort of domestic leadership as well as garnering support around the country for the agreement we reached in Paris.”

## CONCLUSION

As shown above, there is significant new data and research that seriously undercuts each of the Endangerment Finding’s lines of evidence. For these reasons, EPA should conduct a new rulemaking on this issue.

Respectfully submitted on behalf of CEI, SEPP, Donna Bethell, Kenneth A. Haapala, Thomas Sheahen, and S. Fred Singer.

Dated: February 17, 2017  
(corrected Feb. 23)

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<sup>11</sup> *Fiscal Year 2017 EPA Budget: Hearing Before the H. Comm. on Energy and Commerce, Subcomm. on Energy and Power*, 114th Cong. at 73–74 (Mar. 22, 2016) (testimony of EPA Administrator Gina McCarthy), available at <http://docs.house.gov/meetings/IF/IF03/20160322/104715/HHRG-114-IF03-Transcript-20160322.pdf>.

## ATTACHMENT



U.S. House Committee on Science, Space & Technology

2 Feb 2016

Testimony of John R. Christy  
University of Alabama in Huntsville.

I am John R. Christy, Distinguished Professor of Atmospheric Science, Alabama's State Climatologist and Director of the Earth System Science Center at The University of Alabama in Huntsville. I have served as Lead Author, Contributing Author and Reviewer of United Nations IPCC assessments, have been awarded NASA's Medal for Exceptional Scientific Achievement, and in 2002 was elected a Fellow of the American Meteorological Society.

It is a privilege for me to offer my analysis of the current situation regarding (1) the temperature datasets used to study climate, (2) our basic understanding of climate change and (3) the effect that regulations, such as the Paris agreement, might have on climate. I have also attached an extract from my Senate Testimony last December in which I address (1) the popular notion that extreme climate events are increasing due to human-induced climate change (they are not), and (2) the unfortunate direction research in this area has taken.

My research area might be best described as building datasets from scratch to advance our understanding of what the climate is doing and why – an activity I began as a teenager over 50 years ago. I have used traditional surface observations as well as measurements from balloons and satellites to document the climate story. Many of our UAH datasets are used to test hypotheses of climate variability and change.

**(1.1) Upper air temperature data from satellites and balloons**

I shall begin with a discussion that was precipitated by an increasingly active campaign of negative assertions made against the observations, i.e. the data, of upper air temperatures. Figure 1 in particular has drawn considerable attention from those who view the climate system as undergoing a rapid, human-caused transformation into a climate to which people would have great difficulty adapting. This simple chart tells the story that the average model projection, on which their fears (or hopes?) are based, does poorly for the fundamental temperature metric that is allegedly the most responsive to extra greenhouse gases - the bulk atmospheric temperature of the layer from the surface to 50,000ft. [The layer shown is known as the mid-troposphere or MT and is used because it overlaps with the region of the tropical atmosphere that has the largest anticipated signature of the greenhouse response by bulk mass – between 20,000 and 50,000 feet.] The chart indicates that the theory of how climate changes occur, and the



associated impact of extra greenhouse gases, is not understood well enough to even reproduce the past climate [much more in section (2)]. Indeed, the models clearly overcook the atmosphere. The issue for congress here is that such demonstrably deficient model projections are being used to make policy.

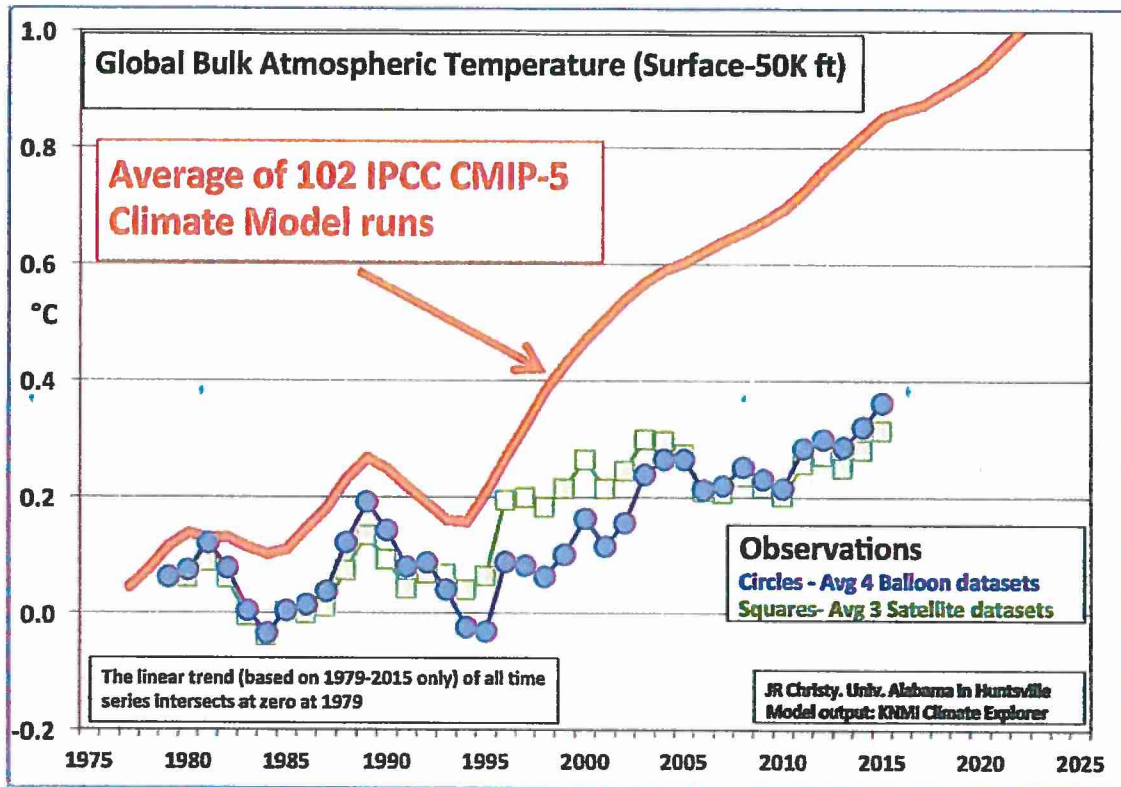


Fig. 1: Five-year averaged values of annual mean (1979-2015) global bulk (termed “mid-tropospheric” or “MT”) temperature as depicted by the average of 102 IPCC CMIP5 climate models (red), the average of 3 satellite datasets (green - UAH, RSS, NOAA) and 4 balloon datasets (blue, NOAA, UKMet, RICH, RAOBCORE).

Because this result challenges the current theory of greenhouse warming in relatively straightforward fashion, there have been several well-funded attacks on those of us who build and use such datasets and on the datasets themselves. As a climate scientist I’ve found myself, along with fellow like-minded colleagues, tossed into a world more closely associated with character assassination and misdirection, found in Washington politics for example, rather than objective, dispassionate discourse commonly assumed for the scientific endeavor. Investigations of us by congress and the media are spurred by the idea that anyone who disagrees with the climate establishment’s view of dangerous climate change must be on the payroll of scurrilous organizations or otherwise mentally

deficient. Also thrust into this milieu is promotional material, i.e., propaganda, attempting to discredit these data (and researchers) with claims that amount to nothing.

Several of these allegations against the data appeared a few weeks ago in the form of a well-made video. I shall address the main assertions with the following material, which in similar form has appeared in the peer-reviewed literature through the years.

The video of interest was promoted by a climate change pressure group (Yale Climate Connections, <http://www.yaleclimateconnections.org/2016/01/over-reliance-on-satellite-data-alone-criticized/>) in which well-known scientists make claims that are mostly meaningless or completely wrong relative to the evidence in Fig. 1. I wish to make four points regarding the video and demonstrate the misdirection for which such agendized videos, along with a happily mimicking media, are so famous.

First, the claim is made the satellites do not measure temperature. In reality, the sensors on satellites measure temperature by emitted radiation - the same method that a physician uses to measure your body temperature to high precision using an ear probe. Atmospheric oxygen emits microwaves, the intensity of which is directly proportional to the temperature of the oxygen, and thus the atmosphere. That the satellites measure temperature is evident by the following chart which compares our UAH satellite data with temperatures calculated from balloon thermistors. As an aside, most surface temperature measurements are *indirect*, using electronic resistance.

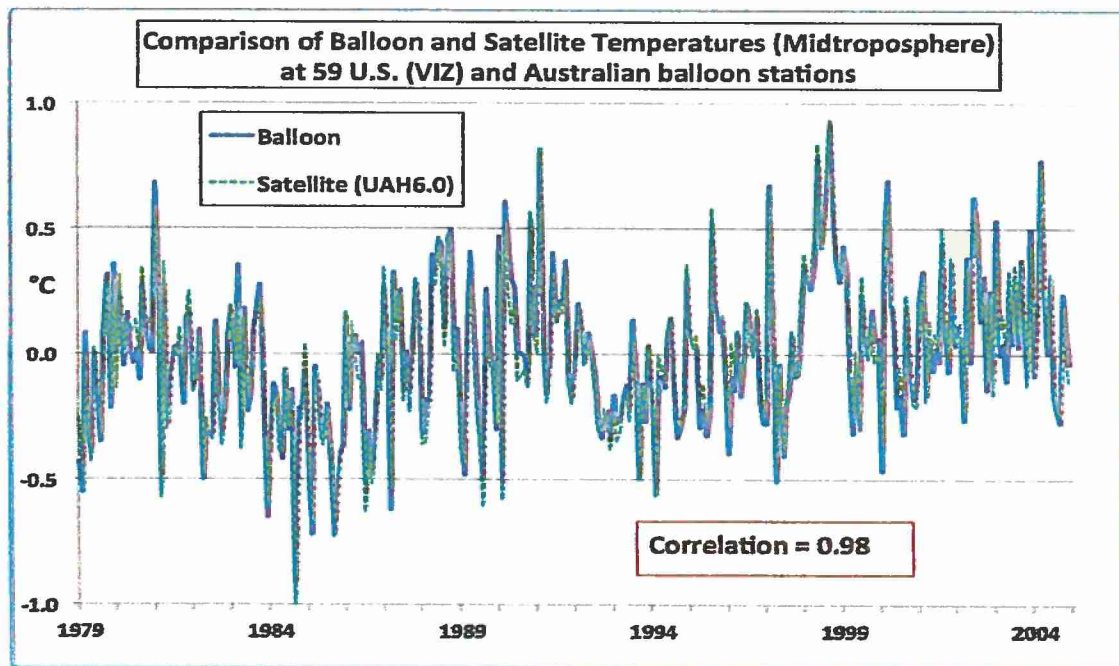




Fig. 2: Average temperature variations measured at 59 radiosonde stations in the U.S. (VIZ manufacturer) and Australia.

Secondly, the scientists claim that the vertical drop (orbital decay) of the satellites due to atmospheric friction causes spurious cooling through time. This vertical fall has an immeasurable impact on the layer (MT) used here and so is a meaningless claim. In much earlier versions of another layer product (LT or Lower Troposphere), this was a problem, but was easily corrected almost 20 years ago. Thus, bringing up issues that affected a different variable that, in any case, was fixed many years ago is a clear misdirection that, in my view, demonstrates the weakness of their position.

Thirdly, the scientists speak of the spurious temperature changes that occur as the satellites drift in the east-west direction, the so-called diurnal drift problem (which was first detected and accounted for by us). They speak of a sign error in the correction procedure that changed the trend. Again, this error was not a factor in the MT layer in Fig. 1, but for the different LT layer. And, again, this issue was dealt with for LT 10 years ago.

Finally, though not specifically mentioned in this video, some of these scientists claim Fig. 1 above is somehow manipulated to hide their belief in the prowess and validity of the climate models. To this, on the contrary, I say that we have displayed the data in its most meaningful way. The issue here is the rate of warming of the bulk atmosphere, i.e., the trend. This metric tells us how rapidly heat is accumulating in the atmosphere – the fundamental metric of global warming. To depict this visually, I have adjusted all of the datasets so that they have a common origin. Think of this analogy: I have run over 500 races in the past 25 years, and in each one all of the runners start at the same place at the same time for the simple purpose of determining who is fastest and by how much at the finish line. Obviously, the overall relative speed of the runners is most clearly determined by their placement as they cross the finish line – but they must all start together.

In the same way I constructed the chart so that the trend line of all of the temperature time series starts at the same point in magnitude and time (zero value at 1979) so the viewer may see how wide the spread is at the finish line (2015). One way to look at this is seen in Fig. 3 where I provide what is seen in Fig. 1 except this is only the trend line without the variations that occur from year due to volcanoes and such. This is analogous to plotting the overall average speed of a runner along the course even though they likely ran slower on an uphill, and faster on a downhill.

This image indicates the models, on average, warm this global layer about 2.5 times faster than the observations indicate. This is a significant difference that has not been

explained and indicates the theory of greenhouse impact on atmospheric temperature is not sufficiently known to even reproduce what has already happened. We are not talking about 10 or 15 years here, but 37 years - well over a third of a century. That two very independent types of measuring systems (balloons and satellites) constructed by a variety of institutions (government, university, private) all showing the much slower rate of warming gives high confidence in its result. Thus, the evidence here strongly suggests the theory, as embodied in models, goes much too far in forcing the atmosphere to retain heat when in reality the atmosphere has a means to relinquish that heat and thus warms at a much slower rate.

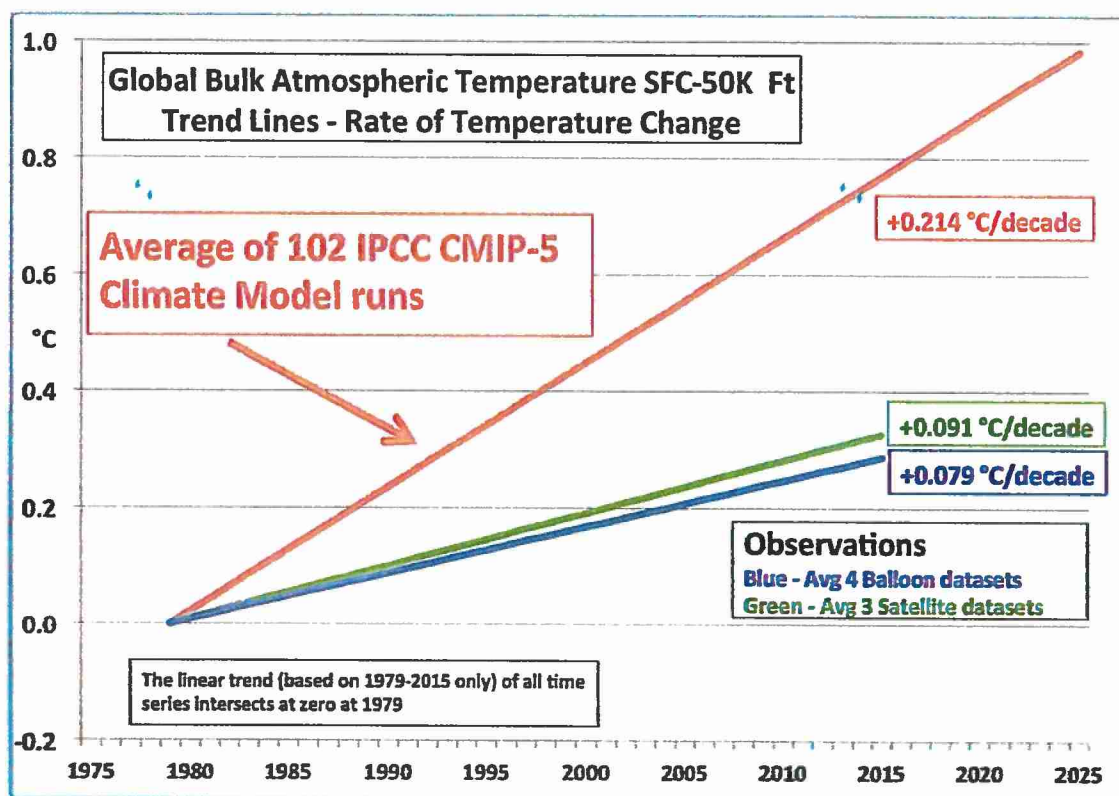


Fig. 3: The linear trend line over the period 1979-2015. The colors represent the same source data as in fig. 1.

I've shown here that for the global bulk atmosphere, the models overwarm the atmosphere by a factor of about 2.5. As a further note, if one focuses on the tropics, the models show an even stronger greenhouse warming in this layer. However, a similar calculation with observations as shown in Fig. 3 indicates the models over-warm the tropical atmosphere by a factor of approximately 3, (Models +0.265, Satellites +0.095, Balloons +0.073 °C/decade) again indicating the current theory is at odds with the facts. (again, see section 2.)



It is a bold strategy in my view to actively promote the output of theoretical climate models while attacking the multiple lines of evidence from observations. Note that none of the observational datasets are perfect and continued scrutiny is healthy, but when multiple, independent groups generate the datasets and then when the results for two completely independent systems (balloons and satellites) agree closely with each other and disagree with the model output, one is left scratching one's head at the decision to launch an offensive against the data. This doesn't make scientific sense to me.

## **(1.2) Surface temperature issues**

There are several issues regarding surface temperature datasets that are too involved to discuss in this material. I shall focus on a few points with which I am familiar and on which I have published.

### **(1.2.a) Surface temperature as a metric for detecting the influence of the increasing concentrations of greenhouse gases**

One of my many climate interests is the way surface temperatures are measured and how surface temperatures, especially over land, are affected by their surroundings. In several papers (Christy et al. 2006 *J. Climate*, Christy et al. 2009 *J. Climate*, Christy 2013 *J. Appl. Meteor. Clim.*, Christy et al. 2016 *J. Appl. Meteor. Clim.*) I closely examined individual stations in different regions and have come to the conclusion that the magnitude of the relatively small signal we seek in human-induced climate change is easily convoluted by the growth of infrastructure around the thermometer stations and the variety of changes these stations undergo through time, as well as the variability of the natural ups and downs of climate. It is difficult to adjust for these contaminating factors to extract a pure dataset for greenhouse detection because often the non-climatic influence comes along very gradually just as is expected of the response to the enhanced greenhouse effect.

In examining ocean temperatures (Christy et al. 2001, *Geophys. Res. Lett.*) I discovered that the trends of the water temperature (1m depth) do not track well with those of the air temperature just above the water (3m), even if both are measured on the same buoy over 20 years. This is important for the discussion below where NOAA used marine air temperatures to adjust water temperature measurements from ships.

There are many other factors that render surface temperature datasets to be of low effectiveness for the detection of enhanced greenhouse warming, (a) lack of systematic geographical coverage in time, (b) unsystematic measuring methods and instrumentation

in time and space, (c) the point measurement represents at best a tiny, local area and (d) is easily impacted by slight changes in the surroundings, which can occur for example when a station moves. There have been huge efforts to try and adjust the raw surface data to give a time series that would represent that of a pristine environment, and I have led or been a part in some of these (e.g. for Central California in Christy et al. 2006 and East Africa in Christy et al. 2009 and Christy 2013).

Thus, having experience in building surface, satellite and balloon temperature datasets, and taking into account the signal we are looking for to detect the enhanced greenhouse effect, the evidence suggests to me that utilizing the bulk atmospheric measurements provides the best opportunity to answer questions about the climate's response to this human-induced change in atmospheric composition. The deep atmosphere is much more coherent in space and time in terms of its variations. It is not affected by human development at the surface. It is measured systematically. To be sure, satellite and balloon temperatures require their own adjustments and cannot be considered "perfect", but do offer an independence from one another to allow direct comparison studies. Regarding the detection of the enhanced greenhouse effect, the troposphere, as indicated by models, happens to be the atmospheric region that will respond the most, i.e. warm the fastest, and thus, in my view, is a metric that provides a better way to detect human influence on the climate.

#### (1.2.b) The new NOAA surface temperature dataset

A series of papers appeared last year (including Huang et al. 2015 *J. Climate*, Karl et al. 2015 *Science*) describing a new surface temperature dataset constructed by NOAA which indicated a bit more warming in the past 10 to 25 years than the previous versions. The key change dealt with seawater temperatures in the dataset now known as ERSSTv4. This change introduced an additional warming into the record from about 1990 onward. The main reason for this new warming, as the authors note, was the adjustment applied to buoy data, adding about +0.12 °C to the buoy readings. In 1980, only about 10 percent of the data reports were from buoys, but by 2000 about 90 percent were buoy data. Thus, because the influence of the buoy data grew significantly through time, the simple addition of a bias to all the buoys from the beginning created a warmer trend as they became the dominate source of information.

Some background is necessary. Unlike satellite and balloon datasets which measure a systematic quantity (essentially atmospheric air temperature), surface temperature datasets are a mixture of air (over land) and water (over ocean) temperatures measured over a considerable range of instruments, exposures and methods. Over land, weather stations measure the temperature of the air in varying types of instrument shelters and by



varying techniques at a level about 5 ft above the ground. Over the ocean, however, the temperature utilized is that of the water itself, not the air above, so traditional global surface datasets do not measure a homogenous physical parameter over land versus ocean. Further, the depth of the water temperature measurement is quite varied from 2 ft to 50 ft or so, by methods that range from buckets drawn up on deck into which a thermometer is inserted to engine-intake temperatures much deeper in the water and to buoys, drifting or moored to the bottom. So the fact temperature varies by depth is an issue to tackle before the possibility of constructing a systematic dataset may be attempted. Then too, the measurements are not spatially or temporally consistent with large regions, such as Africa and the southern oceans, unmeasured.

Keep in mind that even though the trend of this NOAA dataset became more positive in the past 10 to 20 years, it is still below climate model projections over the longer term. For longer periods, such as the period since 1979 when satellites began measuring bulk atmospheric temperatures, the new global dataset is similar to that of the Hadley Centre (1979-2015: NOAA +0.155 °C/decade, Hadley Centre UKMet, +0.165 °C/decade). However, there are questions that remain concerning the new NOAA seawater dataset, especially how it indicates more warming in the last 20 years than others. Figure 4 displays the ocean trends for the region 20S to 60N (i.e. tropical and northern hemisphere oceans - there was too little data south of 20S for generating near-surface air temperatures there). There are 4 datasets represented, NOAA (NOAA, red), Hadley Centre (HadCRUT4, orange), a preliminary near-surface air temperature over the oceans by my graduate student Rob Junod (yellow) and the UAH deep layer air temperature from satellites (blue). Both NOAA and HadCRUT4 are temperatures of the seawater near the surface, so should be the same.

NOAA used a curious reference variable to calibrate the water temperatures measured from ship intakes – the Night Marine Air Temperature (NMAT). This is curious because there are considerable adjustments required for the NMATs themselves, i.e. corrections for height of ship deck, etc. In any case, from this, the buoy data were then adjusted to match the ship data. It appears, then, that the foundational adjustment process depends on NMATs to adjust the ship data to then adjust the buoy data. The final product from NOAA mixes all of these together, and because the geographic representation of the different systems changed dramatically (as noted, from approximately 10% buoys and 90% ships in 1980 to 90% buoys and 10% ships today – Huang et al. 2015), an adjustment applied to the buoys will automatically influence the trend.

I'm aware that the Committee sought information about this curious process and asked NOAA to generate datasets based only on consistent measuring systems, i.e. ships alone, buoys alone and NMATs alone, to see if one system might have impacted the trends

improperly due to distribution changes. NOAA was unable to accommodate this request. At the same time I asked my graduate student, Rob Junod, to do the work for NMAT. What is presented here is preliminary, but follows much of the previous work on NMATs (developed at the National Oceanographic Centre and the Hadley Centre in the UK) with that added advantage of being updated to 2014. The best geographical data coverage was found to be 20°S to 60°N, so this area was also applied to the other datasets for an apples to apples comparison. The results are shown in Fig. 4 in which all trends end in 2014 but cover periods in two-year increments from 20 years to 10 years.

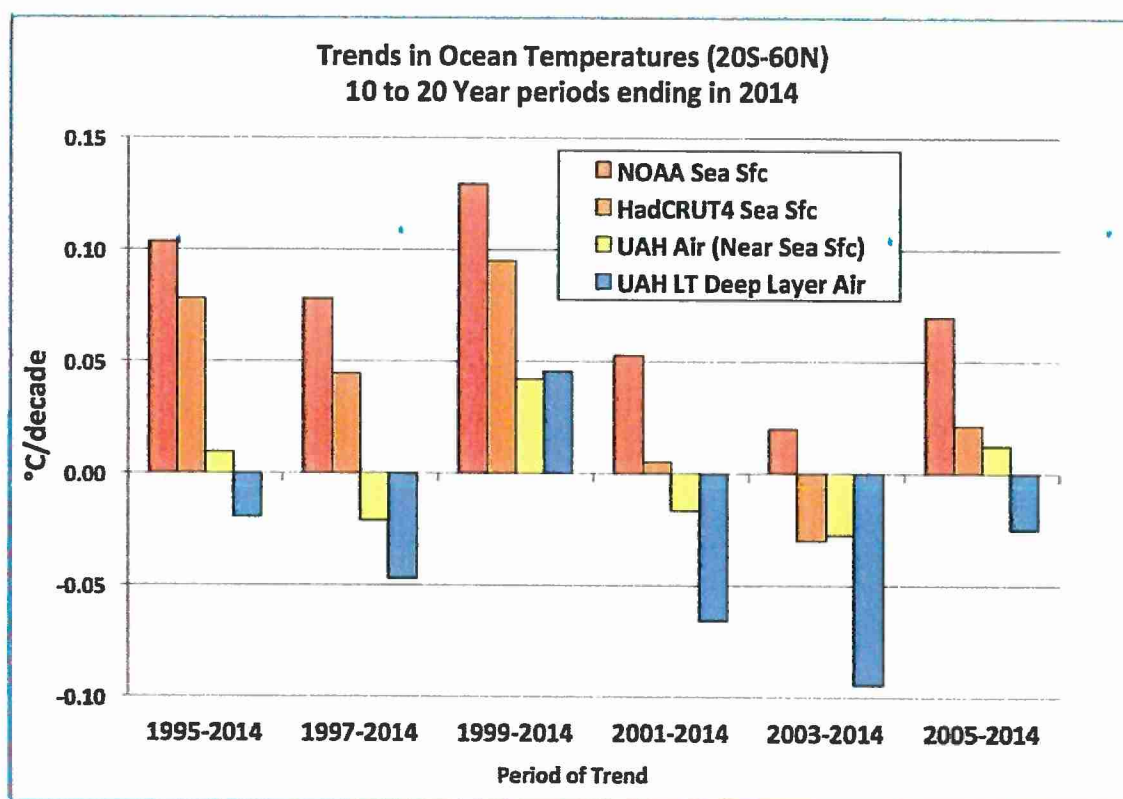


Figure 4. Decadal trends (°C/decade) of four temperature datasets over the oceans from 20°S to 60°N for varying periods ending in 2014. Red and orange are surface seawater temperature datasets from NOAA and the Hadley Centre (HadCRUT4). Yellow is a near-surface air temperature dataset (Night Marine Air Temperature) built by UAH (preliminary). Blue is the temperature trend of the deep atmosphere (surface to 35,000 ft or Lower Troposphere) from microwave emissions captured by satellites (also UAHv6.0b5.)

A number of observations are evident in Fig. 4. (1) In terms of the temperature trend, the air temperatures are less than those of the water (as indicated in my 2001 study mentioned above.) (2) NOAA warms the fastest in all periods. (3) In the past 10-14



years, the trends of the HadCRUT4 agree better with the near-surface air temperature dataset (being near zero and supporting the notion of a hiatus) than with the trends from its physically-identical quantity from NOAA. (4) The magnitude of the NMAT trends lies between the trends of the deep atmospheric and sea water.

This figure generates a number of data quality questions too. (1) If NMATs were used to calibrate the ship temperatures and then the ships were used to calibrate the buoy temperatures, why does the NOAA dataset differ so much from its basic reference point – NMATs? (2) What do the time series look like and what are the sub-period trends for seawater under the condition that only ships and/or only buoys are used to build the dataset for the past 20-25 years? (3) What does the time series of NOAA's NMAT (i.e. their reference) dataset show?

The real science questions here are those which have significant importance to the understanding of how extra greenhouse gases might affect the climate as shown in the following section.

## **(2) How well do we understand climate change?**

A critical scientific goal in our era is to determine whether emissions from human activities impact the climate and if so by how much. This is made especially difficult because we know the climate system already is subject to significant changes without the influence of humans. Because there is no measuring device that explicitly determines the cause of the climate changes we can measure, such as temperature, our science must take a different approach to seek understanding as to what causes the changes, i.e. how much is natural and how much is human induced. The basic approach today utilizes climate models. (The projections of these models are being utilized for carbon policies as well.)

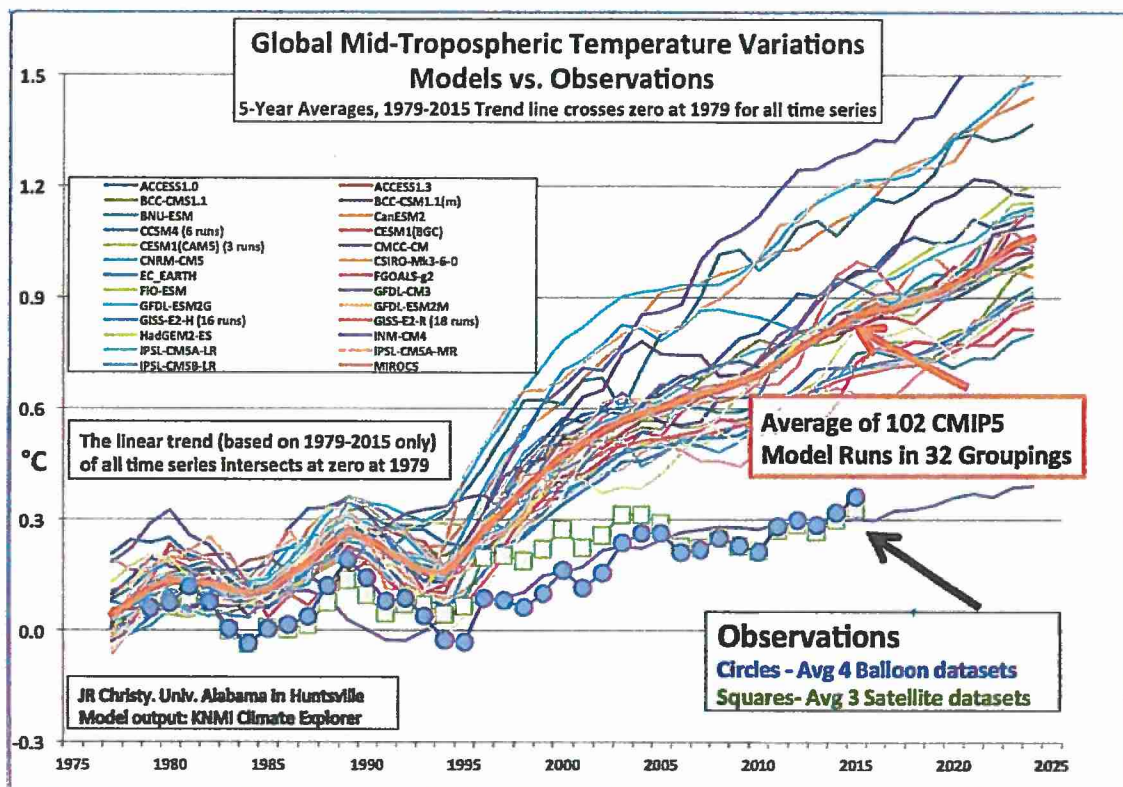
It is important to understand that output from these models, (i.e. projections of the future climate and the specific link that increasing CO<sub>2</sub> might have on the climate) are properly defined as scientific hypotheses or claims – model output cannot be considered as providing proof of the links between climate variations and greenhouse gases. These models are complex computer programs which attempt to describe through mathematical equations as many factors that affect the climate as is possible and thus estimate how the climate might change in the future. The model, it is hoped, will provide accurate responses of the climate variables, like temperature, when extra greenhouse gases are included in the model. However, the equations for nearly all of the important climate processes are not exact, representing the best approximations modelers can devise and that computers can handle at this point.

A fundamental aspect of the scientific method is that if we say we understand a system (such as the climate system) then we should be able to predict its behavior. If we are unable to make accurate predictions, then at least some of the factors in the system are not well defined or perhaps even missing. [Note, however, that merely replicating the behavior of the system (i.e. reproducing “what” the climate does) does not guarantee that the fundamental physics are well-known. In other words, it is possible to obtain the right answer for the wrong reasons, i.e. getting the “what” of climate right but missing the “why”.]

Do we understand how greenhouse gases affect the climate, i.e. the link between emissions and climate effects? As noted above, a very basic metric for climate studies is the temperature of the bulk atmospheric layer known as the troposphere, roughly from the surface to 50,000 ft altitude. This is the layer that, according to models, should warm significantly as CO<sub>2</sub> increases – even faster than the surface. Unlike the surface temperature, this bulk temperature informs us about the crux of the global warming question – how much heat is accumulating in the global atmosphere? And, this CO<sub>2</sub>-caused warming should be easily detectable by now, according to models. This provides a good test of how well we understand the climate system because since 1979 we have had two independent means of monitoring this layer – satellites from above and balloons with thermometers released from the surface.

I was able to access 102 CMIP-5 rcp4.5 (representative concentration pathways) climate model simulations of the atmospheric temperatures for the tropospheric layer and generate bulk temperatures from the models for an apples-to-apples comparison with the observations from satellites and balloons. These models were developed in institutions throughout the world and used in the IPCC AR5 Scientific Assessment (2013).





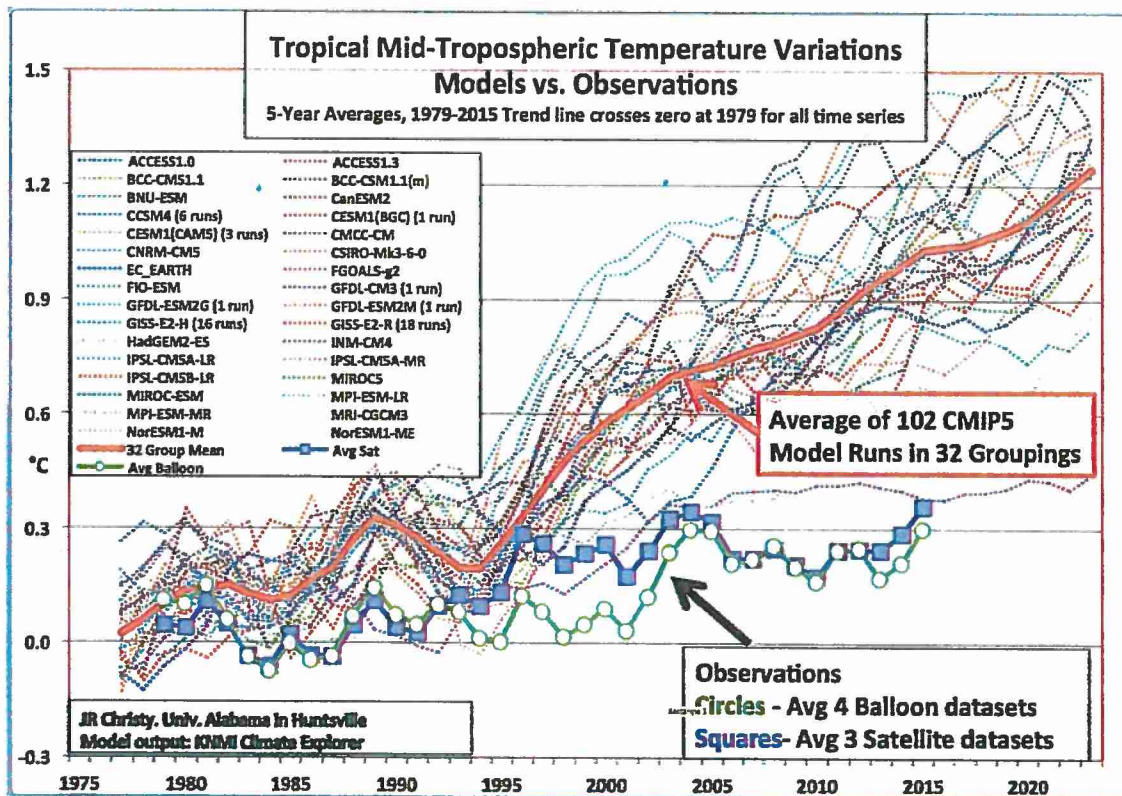
Above: Global average mid-tropospheric temperature variations (5-year averages) for 32 models (lines) representing 102 individual simulations. Circles (balloons) and squares (satellites) depict the observations. The Russian model (INM-CM4) was the only model close to the observations.

The information in this figure provides clear evidence that the models have a strong tendency to over-warm the atmosphere relative to actual observations. On average the models warm the global atmosphere at a rate 2.5 times that of the real world. This is not a short-term, specially-selected episode, but represents the past 37 years, over a third of a century. This is also the period with the highest concentration of greenhouse gases and thus the period in which the response should be of largest magnitude.

Following the scientific method of testing claims against data, we would conclude that the models do not accurately represent at least some of the important processes that impact the climate because they were unable to “predict” what has already occurred. In other words, these models failed at the simple test of telling us “what” has already happened, and thus would not be in a position to give us a confident answer to “what” may happen in the future and “why.” As such, they would be of highly questionable

value in determining policy that should depend on a very confident understanding of how the climate system works.

There is a related climate metric that also utilizes atmospheric temperature which in models has an even larger response than that of the global average shown above. This metric, then, provides a stronger test for understanding how well models perform regarding greenhouse gases specifically. In the models, the tropical atmosphere warms significantly in response to the added greenhouse gases – more so than that of the global average atmospheric temperature.



Above: Tropical average mid-tropospheric temperature variations (5-year averages) for 32 models (lines) representing 102 individual simulations. Circles (balloons) and squares (satellites) depict the observations.

In the tropical comparison here, the disparity between models and observations is even greater, with models on average warming this atmospheric region by a factor of three times greater than in reality. Such a result re-enforces the implication above that the models have much improvement to undergo before we may have confidence they will provide information about what the climate may do in the future or even why the climate



varies as it does. For the issue at hand, estimates of how the global temperature might be affected by emission reductions from regulations would be exaggerated and not reliable.

### **(3) Climate Impact of Regulations (i.e. Paris) Will Not Be Attributable or Detectable**

No one knows the climate impact of the proposed carbon emission reductions agreed to in Paris. The main reason for this is that there is considerable latitude for countries to do as little or as much as they desire. Examining the history of global carbon emissions, it is clear that countries, especially developing countries, will continue to seek to expand energy use through carbon combustion because of their affordability in providing considerable positive benefits to their citizens.

In any case, impact on global temperature for current and proposed reductions in greenhouse gases will be tiny at best. To demonstrate this, let us assume, for example, that the total emissions from the United States were reduced to zero, as of last May 13<sup>th</sup>, 2015 (the date of a hearing at which I testified). In other words as of that day and going forward, there would be no industry, no cars, no utilities, no people – i.e. the United States would cease to exist as of that day. Regulations, of course, will only reduce emissions a small amount, but to make the point of how minuscule the regulatory impact will be, we shall simply go way beyond reality and cause the United States to vanish. With this we shall attempt to answer the question of climate change impact due to emissions reductions.

Using the U.N. IPCC impact tool known as Model for the Assessment of Greenhouse-gas Induced Climate Change or MAGICC, graduate student Rob Junod and I reduced the projected growth in total global emissions by U.S. emission contribution starting on this date and continuing on. We also used the value of the equilibrium climate sensitivity as determined from empirical techniques of 1.8 °C. After 50 years, the impact as determined by these model calculations would be only 0.05 to 0.08 °C – an amount less than that which the global temperature fluctuates from month to month. [These calculations used emission scenarios A1B-AIM and A1F-MI with U.S. emissions comprising 14 percent to 17 percent of the 2015 global emissions. There is evidence that the climate sensitivity is less than 1.8 °C, which would further lower these projections.]

As noted, the impact on global emission and global climate of the recent agreements in Paris regarding global emissions is not exactly quantifiable. Knowing how each country will behave regarding their emissions is essentially impossible to predict besides the added issue of not knowing how energy systems themselves will evolve over time.

Because halting the emissions of our entire country would have such a tiny calculated impact on global climate, it is obvious that fractional reductions in emissions through regulation would produce imperceptible results. In other words, there would be no evidence in the future to demonstrate that a particular climate impact was induced by the proposed and enacted regulations. Thus, the regulations will have no meaningful or useful consequence on the physical climate system – even if one believes climate models are useful tools for prediction.

### Summary

Climate change is a wide-ranging topic with many difficulties. Our basic knowledge about what the climate is doing (i.e. measurements) is plagued by uncertainties. In my testimony today I have given evidence that the bulk atmospheric temperature is measured well-enough to demonstrate that our understanding of how greenhouse gases affect the climate is significantly inadequate to explain the climate since 1979. In particular, the actual change of the fundamental metric of the greenhouse warming signature – the bulk atmospheric temperature where models indicate the most direct evidence for greenhouse warming should lie - is significantly misrepresented by the models. Though no dataset is perfect, the way in which surface datasets have been constructed leaves many unanswered questions, especially for the recent NOAA update which shows more warming than the others. Finally, regulations already enforced or being proposed, such as those from the Paris Agreement, will have virtually no impact on whatever the climate is going to do.

## Appendix A

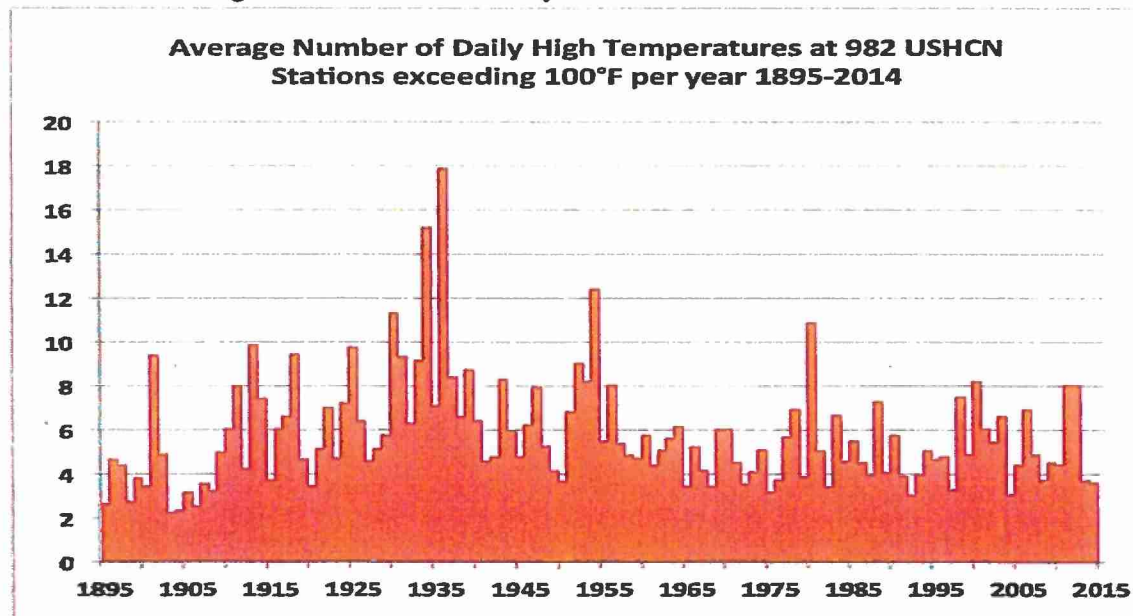
This appendix is an extract from my written testimony presented at the following Hearing:

U.S. Senate Committee on  
Commerce, Science, & Transportation  
Subcommittee on Space, Science and Competitiveness  
8 Dec 2015  
Testimony of John R. Christy  
University of Alabama in Huntsville.

### **Alleged impacts of human-induced climate changes regarding extreme events**

Much of the alarm related to increasing greenhouse gas concentrations shifted in the past decade from global temperature changes to changes in extreme events, i.e. those events which typically have a negative impact on the economy. These events may be heat waves, floods, hurricanes, etc.

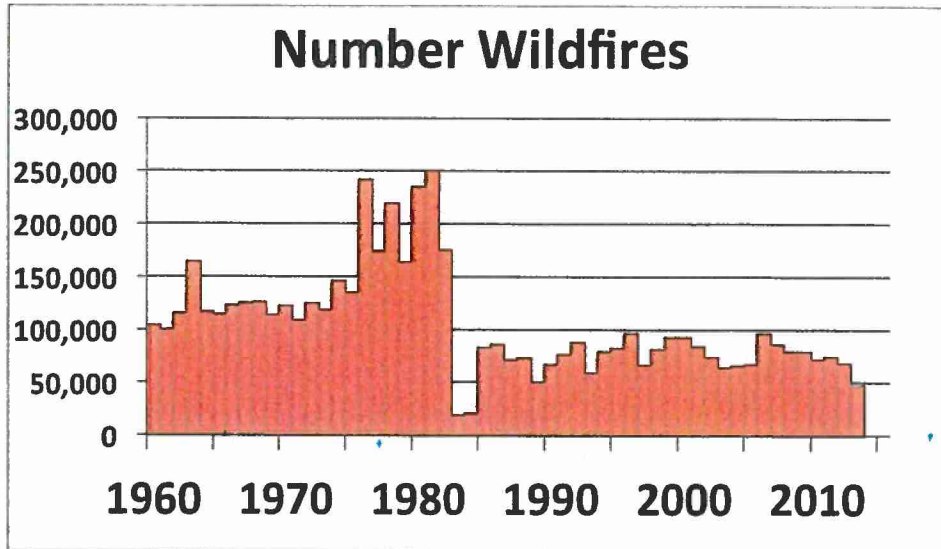
In terms of heat waves, below is the number of 100 °F days observed in the U.S. from a controlled set of weather stations. It is not only clear that hot days have not increased, but it is interesting that in the most recent years there has been a relative dearth of them.



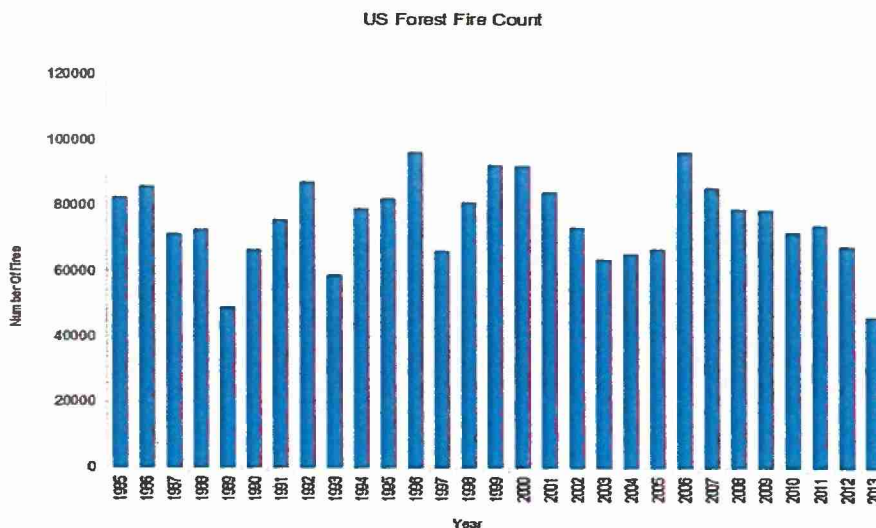
Above: Average number of days per-station in each year reaching or exceeding 100°F in 982 stations of the USHCN database (NOAA/NCEI, prepared by JRChristy).



Forest and wild fires are documented for the US. The evidence below indicates there has not been any change in frequency of wildfires. Acreage (not shown) shows little change as well.



Above: Number of U.S. wildfires. As the management of these events changes, and thus the number also changes, but the number of events since 1985 has remained constant. (National Interagency Fire Center <https://www.nifc.gov/fireInfo/nfn.htm>)

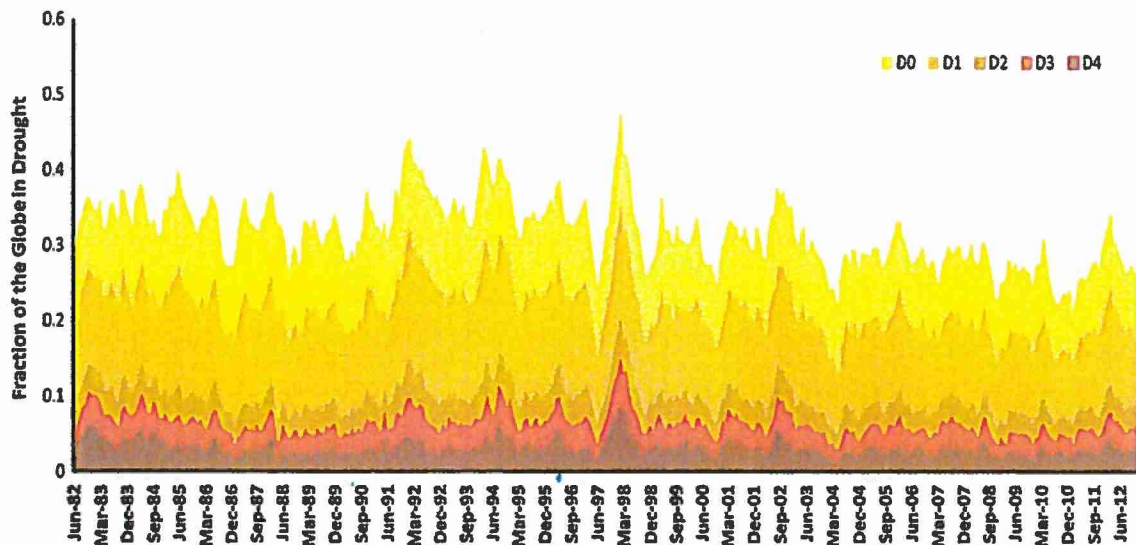


Above: Number of U.S. forest fires per year since 1965.

The two figures above demonstrate that fire events have not increased in frequency in the United States during the past several decades.

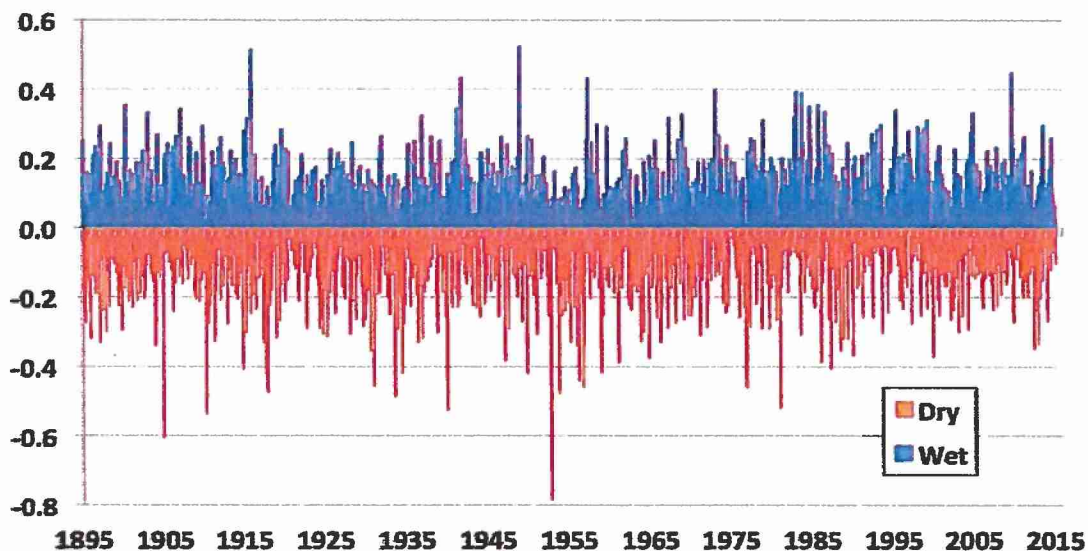


The claims that droughts and floods are increasing may be examined by the observational record as well.



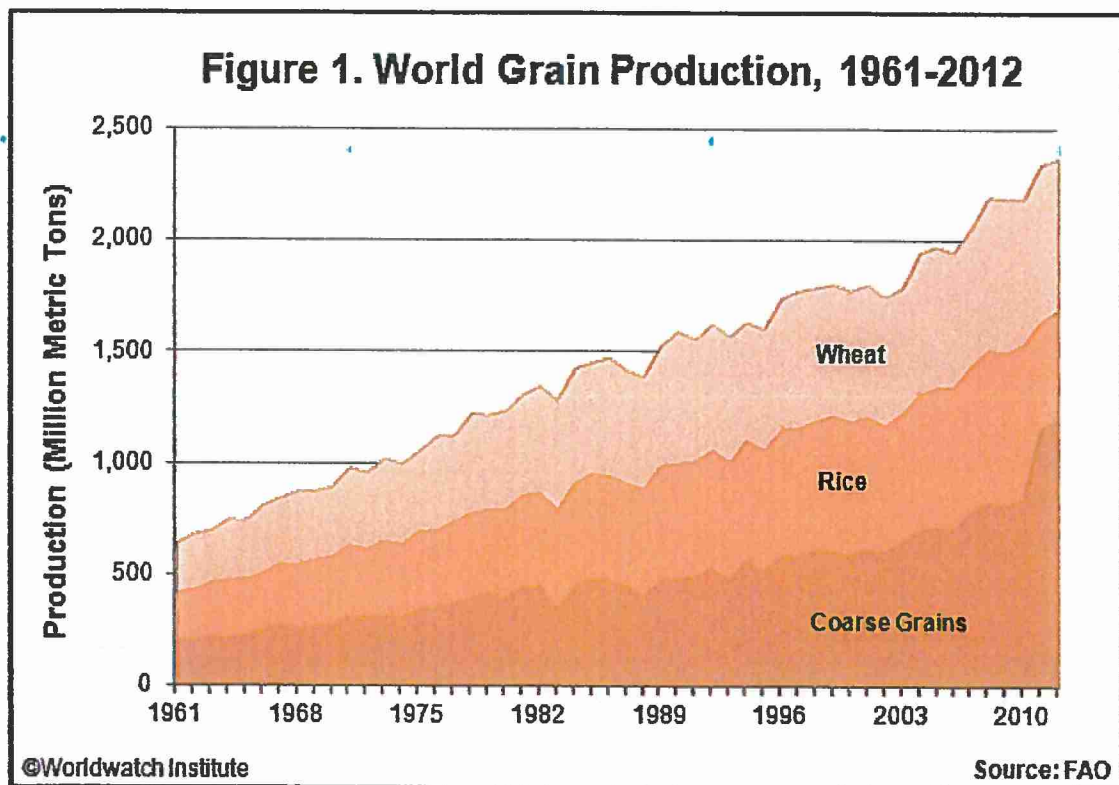
Above: Global areal extent of five levels of drought for 1982-2012 where dryness is indicated in percentile rankings with  $D0 < 30$ ,  $D1 < 20$ ,  $D2 < 10$ ,  $D3 < 5$  and  $D4 < 2$  percentile of average moisture availability. (Hao et al. 2014)

**Monthly Fraction of US with Very Wet (floods) or Very Dry (drought) Conditions**  
Jan 1895 – Feb 2015 NOAA/NCDC



Above: Areal fraction of conterminous U.S. under very wet (blue) or very dry (red) conditions. NOAA/NCEI.

The two figures above demonstrate that moisture conditions have not shown a tendency to have decreased (more drought) or increased (more large-scale wetness). Such information is rarely consulted when it is more convenient simply to make unsubstantiated claims that moisture extremes, i.e. droughts and floods (which have always occurred), are somehow becoming even more extreme. Over shorter periods and in certain locations, there is evidence that the heaviest precipitation events are tending to be greater. This is not a universal phenomenon and it has not been established that such changes may be due to changes in greenhouse gas concentrations as demonstrated earlier because the model projections are unable to reproduce the simplest of metrics.



Above: World grain production 1961-2012. U.N. Food and Agriculture Organization.

It is a simple matter to find documentation of the ever-rising production of grains. One wonders about the Federal Council on Environmental Quality's allegation that there has been "harm to agriculture" from human-induced climate change because when viewing the total growth in production, which appears to be accelerating, one would assume no "harm" has been done during a period of rising greenhouse gases.



With the evidence in these examples above, it is obviously difficult to establish the claims about worsening conditions due to human-caused climate change, or more generally that any change could be directly linked to increasing CO<sub>2</sub>. This point also relates to the issue of climate model capability noted earlier. It is clear that climate models fall short on some very basic issues of climate variability, being unable to reproduce “what” has happened regarding global temperature, and therefore not knowing “why” any of it happened. It is therefore premature to claim that one knows the causes for changes in various exotic measures of weather, such as rainfall intensity over short periods, which are not even explicitly generated in climate model output.

### **The Disappointing Scientific Process**

I have written much for previous congressional hearings and other venues about the failure of the scientific community to objectively approach the study of climate and climate change. (See Appendix) Climate science is a murky science with large uncertainties on many critical components such as cloud distributions and surface heat exchanges. As mentioned above, there is no objective instrumentation that can tell us “why” changes occur. That being the case, we are left with hypotheses (claims) to put forward and then to test. The information given above, in my view, is clear evidence that the current theoretical understanding of “why” the climate changes, as embodied in models (and on which current policy is based), fails such tests. Indeed, the theoretical (model) view as expressed in the IPCC AR5 in every case overestimated the bulk tropical atmospheric temperature response of extra greenhouse gases (see above and IPCC Supplementary Material Figure 10.SM.1) indicating the theoretical understanding of the climate response is too sensitive to greenhouse gases.

One problem with our science relates to the funding process for climate studies, the vast majority of which is provided through federal agencies. Funding decisions are decided by people, and people have biases. Our science has also seen the move toward “consensus” science where “agreement” between people and groups is elevated above determined, objective investigation. The sad progression of events here has even led to congressional investigations designed to silence (with some success) those whose voices, including my own, have challenged the politically-correct views on climate (i.e. congressional investigation by Rep. Grijalva, 22 Feb 2015, <http://www.scribd.com/doc/256811029/Letter-to-UAH-re-John-Christy>.)

Today, funding decisions are made by review panels. In this process, many proposals for funding are submitted to the agencies, but the agencies only have a fraction of the funds available to support the proposals, so only a few proposals can be funded and these are selected by panels. In the area of climate, it is clear the agencies are convinced of the

consensus view of dangerous climate change as indicated by their various statements and press releases on the issue. Therefore, when a contrarian proposal is submitted that seeks to discover other possible explanations besides greenhouse gases for the small changes we now see, or one that seeks to rigorously and objectively investigate climate model output, there is virtually no chance for funding. This occurs because the panel determines by majority vote whom to fund, and with tight competition, any bias by just a couple of panel members against a contrarian proposal is sufficient for rejection. Of course, the agencies will claim all is done in complete objectivity, but that would be precisely the expected response of someone already within the “consensus” and whose agency has stated its position on climate change. This brings me to “consensus science.”

The term “consensus science” will often be appealed to regarding arguments about climate change to bolster an assertion. This is a form of “argument from authority.” Consensus, however, is a political notion, not a scientific notion. As I testified to the Inter-Academy Council in June 2010, wrote in *Nature* that same year (Christy 2010), and documented in my written testimony for several congressional hearings (e.g., House Space, Science and Technology, 31 Mar 2011) the IPCC and other similar Assessments do not represent for me a consensus of much more than the consensus of those selected to agree with a particular consensus.

The content of these climate reports is actually under the control of a relatively small number of individuals - I often refer to them as the “climate establishment” – who through the years, in my opinion, came to act as *gatekeepers* of scientific opinion and information, rather than *brokers*. The voices of those of us who object to various statements and emphases in these assessments are by-in-large dismissed rather than accommodated. This establishment includes the same individuals who become the “experts” called on to promote IPCC claims in government reports such as the endangerment finding by the Environmental Protection Agency.

As outlined in my previous testimonies, these “experts” become the authors and evaluators of their own research relative to research which challenges their work. This becomes an obvious conflict of interest. But with the luxury of having the “last word” as “expert” authors of the reports, alternative views vanish. This is not a process that provides the best information to the peoples’ representatives. The U.S. Congress must have the full range of views on issues such as climate change which are (a) characterized by considerable ambiguity (see model results) (b) used to promote regulatory actions which will be economically detrimental to the American people and, most ironically, (c) will have no impact on whatever the climate will do.



I've often stated that climate science is a "murky" science. We do not have laboratory methods of testing our hypotheses as many other sciences do. As a result what passes for science includes, opinion, arguments-from-authority, dramatic press releases, and fuzzy notions of consensus generated by preselected groups. This is not science.

We know from Climategate emails and many other sources that the IPCC has had problems with those who take different positions on climate change than what the IPCC promotes. There is another way to deal with this however. Since the IPCC activity and climate research in general *is* funded by U.S. taxpayers, then I propose that five to ten percent of the funds be allocated to a group of well-credentialed scientists to produce an assessment that expresses legitimate, alternative hypotheses that have been (in their view) marginalized, misrepresented or ignored in previous IPCC reports (and thus the EPA Endangerment Finding and National Climate Assessments).

Such activities are often called "Red Team" reports and are widely used in government and industry. Decisions regarding funding for "Red Teams" should not be placed in the hands of the current "establishment" but in panels populated by credentialed scientists who have experience in examining these issues. Some efforts along this line have arisen from the private sector (i.e. *The Non-governmental International Panel on Climate Change* at <http://nipccreport.org/> and Michaels (2012) *ADDENDUM: Global Climate Change Impacts in the United States*). I believe policymakers, with the public's purse, should actively support the assembling all of the information that is vital to addressing this murky and wicked science, since the public will ultimately pay the cost of any legislation alleged to deal with climate.

Topics to be addressed in this "Red Team" assessment, for example, would include (a) evidence for a low climate sensitivity to increasing greenhouse gases, (b) the role and importance of natural, unforced variability, (c) a rigorous and independent evaluation of climate model output, (d) a thorough discussion of uncertainty, (e) a focus on metrics that most directly relate to the rate of accumulation of heat in the climate system, (f) analysis of the many consequences, including benefits, that result from CO<sub>2</sub> increases, and (g) the importance that affordable and accessible energy has to human health and welfare.

What this proposal seeks is to provide to the Congress and other policymakers a parallel, scientifically-based assessment regarding the state of climate science which addresses issues which here-to-for have been un- or under-represented by previous tax-payer funded, government-directed climate reports. In other words, our policymakers need to see the entire range of findings regarding climate change.


### **Summary of Extract**

The messages of the two points outlined in the extract above are: (1) the claims about increases in frequency and intensity of extreme events are generally not supported by actual observations and, (2) official information about climate science is largely controlled by agencies through (a) funding choices for research and (b) by the carefully-selected (i.e. biased) authorship of reports such as the EPA Endangerment Finding and the National Climate Assessment.



## Comment submitted by Orla E. Collier, Benesch Friedlander Coplan & Aronoff LLP on behalf of Murray Energy Corporation (Appendix D part 1 of 2)

The is a Comment on the **Environmental Protection Agency** (EPA) Proposed Rule: **Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Reopening of the Comment Period**

For related information, [Open Docket Folder](#) 

### Comment

Please see attached Part 1 of 2 of Appendix D to Murray Energy Corporation Comments. Part 2 of 2 of Appendix D will be sent under separate cover. Thank you.

### Attachments (1)



Appendix D Part 1 of 2

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# APPENDIX D



# Analysis of the Scientific Underpinnings of the EPA Endangerment Finding and Clean Power Plan

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By

Roy W. Spencer, Ph. D.

February 13, 2018

## Table of Contents

Education, Qualifications, and Work Experience .....	3
Executive Summary.....	4
1. The United Nations IPCC and Government Funded Climate Science: Desired Policy Outcomes In Search of Scientific Justification.....	5
2. Organization of this Document .....	7
3. Energy Balance: The Starting Point for any Climate Change Discussion.....	9
3.1 Radiative Forcing of Climate Change .....	10
3.2 Non-Radiative Forcing of Climate Change .....	11
4. The Four Classes of Scientific Claims Supporting the Endangerment Finding .....	14
4.1 "Observed Trends in Greenhouse Gas Emissions and Concentrations" (7 claims).....	14
4.2 "Observed Effects Associated with Global Elevated Concentrations of GHGs" (12 claims) .....	17
4.3 "Projections of Future Climate Change with Continued Increases in Elevated GHG Concentrations" (9 claims) .....	37
4.4 "Projected Risks and Impacts Associated with Future Climate Change" (19 claims) .....	43
5. Clouds, Water Vapor, and Climate Sensitivity .....	50
5.1 Cloud feedback.....	50
5.2 Precipitation efficiency and water vapor feedback .....	50
6. Final Comments and Conclusions .....	52
REFERENCES .....	54
Curriculum Vitae of Dr. Roy W. Spencer .....	58

## **Education, Qualifications, and Work Experience**

Roy W. Spencer is a Principal Research Scientist at the University of Alabama in Huntsville where he directs a variety of climate research projects. He received his Ph.D. in Meteorology from the University of Wisconsin in 1981, and was formerly a Senior Scientist for Climate Studies at NASA's Marshall Space Flight Center. Dr. Spencer is the U.S. Science Team Leader for the AMSR-E instrument flying on NASA's Aqua satellite, which monitors global sea ice conditions, sea surface temperatures, precipitation, and other climate variables. Together with Dr. John Christy, he is co-developer of the original satellite method for precise monitoring of global temperatures from Earth-orbiting satellites, for which he was awarded NASA's Medal for Exceptional Scientific Achievement, and the American Meteorological Society's Special Award. Spencer has testified in both houses of the U.S. Congress several times on global warming-related subjects. His climate-related publications have emphasized the measurement of precipitation and temperature from space, as well as methods for using satellites to diagnosis climate feedbacks for the purpose of estimating climate sensitivity, hurricane intensity, and extratropical storm strength.

## Executive Summary

The EPA's Endangerment Finding (EF) of 2009 was based upon a number of scientific claims as listed in the Executive Summary of the Technical Support Document entitled ***Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act***, dated December 7, 2009. These scientific claims allowed the Administrator, under the Clean Air Act (CAA), to conclude that U.S. greenhouse gas (GHG) emissions "*may reasonably be anticipated to endanger public health or welfare.*" The EF then paved the way for the EPA's Clean Power Plan (CPP) to reduce U.S. greenhouse gas (GHG) emissions from power generating facilities. In this report, those scientific claims underpinning the EF (and thus the CPP) are shown to be severely biased, and not supported by a significant body of peer reviewed and published evidence. Some of the claims verge on pure speculation, others are exaggerated, and overall a large body of published scientific work was simply ignored in their formulation. Additionally, newly published information since the EF was made also suggest a reassessment is in order. The history of the U.N. IPCC process, from which most of the claims are adapted, and U.S. government funding of climate change research reveals a concerted effort to use only those scientific opinions (and scientists) that supported the energy policy changes which bureaucrats and politicians have desired. The EF should be reconsidered in light of not only new evidence in the years since the most recent IPCC report (AR5), but also long-standing evidence which has been ignored by the IPCC and in the EPA's rulemaking process.



## 1. The United Nations IPCC and Government Funded Climate Science: Desired Policy Outcomes In Search of Scientific Justification

It is useful to first understand a little of the history of the UN Intergovernmental Panel on Climate Change (IPCC), which the EPA has largely relied upon for the scientific justification in its Endangerment Finding (EF) and the resulting Clean Power Plan (CPP). The IPCC is composed of a variety of bureaucrats from the world's nations who use like-minded scientists that support the IPCC's goal of reducing CO<sub>2</sub> emissions. Scientists who do not share in that goal are either not invited to participate in the IPCC process, or they quit participating when they realize that the IPCC is more policy-driven than science-driven (for example, UAH's John Christy; the National Hurricane Center's Chris Landsea). The collusion of some of the top IPCC scientists to achieve their ends was made public in the unauthorized release of thousands of e-mails during the so-called "Climategate" scandal (e.g. Montford, 2010).

As we will see, the IPCC devotes little effort to exploring alternative, natural explanations of climate change, addressing a few possibilities but largely ignoring the role of natural, internally-driven climate cycles. They seize upon any evidence which minimizes such natural climate variations, which is why the "Hockey Stick" reconstruction of temperatures over the last 1,000 to 2,000 years became the IPCC poster child for anthropogenic climate change, despite its bad methodology (e.g. McKittrick, 2014) that even some scientists in the IPCC community faulted (see Mark Steyn's 2015 book, *A Disgrace to the Profession*). A more recent book by Bernie Lewin, entitled *Searching for the Catastrophe Signal: The Origins of The Intergovernmental Panel on Climate Change*, analyzes the policy-driven process which results in the reports periodically produced by the IPCC.

In the early 1990's I visited Robert Watson at the U.S. White House Office of Science and Technology Policy (OSTP). Dr. Watson was instrumental in the 1973 Montreal Protocol to reduce the manufacture of the ozone-destroying chemicals called chlorofluorocarbons. Watson told me that the newly-formed IPCC was going to help regulate CO<sub>2</sub> in the same way that chlorofluorocarbons were regulated. In other words, the White House policy "cart" was being put before the scientific evidence "horse". Robert Watson was later made Chairman of the IPCC, from 1997 to 2002.

Since virtually all funding for climate change research in the U.S. comes from the government, the managers in the funding agencies (primarily NASA, NOAA, NSF, and DOE) knew that programs based upon the theory of anthropogenic global warming could receive substantial and extended funding from Congress to examine the issue. (Congress funds the study of problems, not non-problems). The scientific community, dependent upon the government for its livelihood, was more than willing to find evidence to support the theory. As a scientist myself, I have always said that scientists will tend to find evidence to support whatever they are paid to find. The U.S. Government could just have easily funded scientists to find natural causes of climate change, which before the 1980s was indeed a dominant theme of climate research in the U.S.

The anti-CO2 bias then extends to the review of research proposals to the government, as well as the review of research papers which might be critical of the anthropogenic explanation of climate change. Such proposals and papers are routinely rejected by the research community which has, at a minimum, blinders on when it comes to exploring causation. The community becomes a large, powerful, influential, and well-funded echo chamber of like-minded individuals portraying themselves as objective scientists.

I only mention this background to illustrate that much of the science supporting the Endangerment Finding in general, and the Clean Power Plan in particular, comes from organizations which have policymaking and financially biased interests.

Using a legal analogy, CO2 is being prosecuted for a crime with a marching army of well-funded lawyers and expert witnesses working for the prosecution, with little concern for whether anyone can mount a reasonable defense. And, as well shall see, it is not even obvious from the observed changes in the climate system that a crime has even been committed.

## 2. Organization of this Document

First, I will address the fundamental concepts of energy balance in temperature change, as well as the two different classes of energy imbalance which can cause climate change.

Then, I will address the claims contained in the EPA's Executive Summary of the Technical Support Document entitled ***Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act***, dated December 7, 2009. As admitted in the Executive Summary of that document,

*"The conclusions here and the information throughout this document are primarily drawn from the assessment reports of the Intergovernmental Panel on Climate Change (IPCC), the U.S. Climate Change Science Program (CCSP), the U.S. Global Change Research Program (USGCRP), and the National Research Council (NRC)".*

So, it should be kept in mind that many of the conclusions supporting the EF in the Executive Summary come from other sources, the primary one (the IPCC) being an international body organized by the United Nations. The EPA did little or no scientific research to make the following claims.

The Executive Summary had four classes of scientific claims, which I repeat verbatim here:

- 1) *"Observed Trends in Greenhouse Gas Emissions and Concentrations"* (7 claims)
- 2) *"Observed Effects Associated with Global Elevated Concentrations of GHGs"* (12 claims)
- 3) *"Projections of Future Climate Change with Continued Increases on Elevated GHG Concentrations"* (9 claims)
- 4) *"Projected Risks and Impacts Associated with Future Climate Change"* (19 claims)

I will address these in order, putting special emphasis on those of most importance to the EF and CPP. A few of the claims are not disputed here. We will see that there is some redundancy in my responses to the claims, allowing similar responses to multiple claims, since they heavily overlap.

Finally, we will see that most of the third class, (*Projections of Future Climate Change with Continued Increases on Elevated GHG Concentrations*), and all of the fourth class of claims, (*Projections of Future Climate Change with Continued Increases on Elevated GHG Concentrations*), there is no need to proceed with a point-by-point analysis because all remaining claims depend upon computerized climate models, which will be demonstrated through various lines of evidence to not have shown sufficient skill to be used for public policy.



### 3. Energy Balance: The Starting Point for any Climate Change Discussion

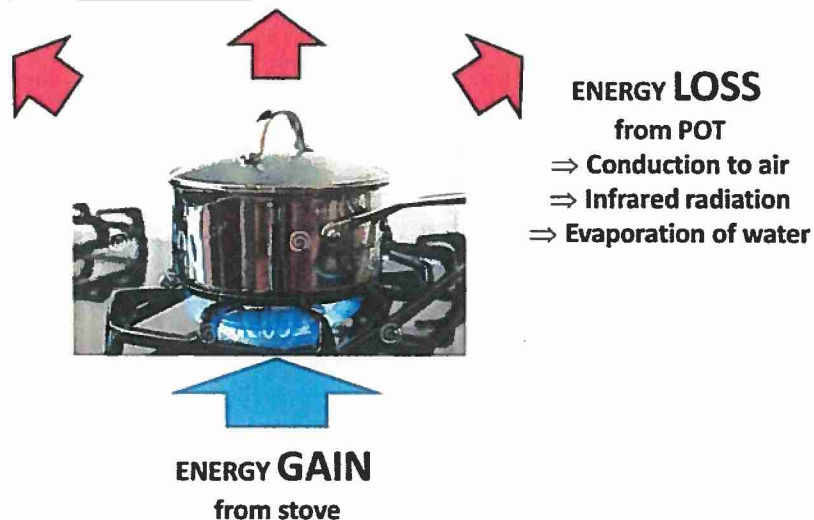
The starting point for the IPCC is the claim that increasing concentrations of GHGs in the atmosphere is causing a disruption in the global energy balance. Since the “energy balance” concept is so important, it is useful to provide some background that will make it understandable.

A temperature change in anything – a pot of water on the stove, the human body, a car engine, the climate system – is related to the rates of energy gain and energy loss. If those energy flows are in balance, the temperature will remain constant.

But if there is an imbalance between energy gain and energy loss, the temperature will change. For a pot of water on the stove (say, over a low gas flame), you can increase its temperature by either **increasing its rate of energy gain** (increasing the gas flame), or by **reducing its rate of energy loss** (say, by putting a lid on the pot).

#### Energy Conservation & Temperature Change: A Pot of Water on the Stove

- Temperature change is caused by an *imbalance* between energy gain and energy loss.



This is simply a statement of the 1<sup>st</sup> Law of Thermodynamics, also termed Conservation of Energy. Thus, when discussing temperature change, we can and should always be asking, “How has the energy balance changed?”

This issue is important because, as we shall see, *the energy imbalance associated with climate change is exceedingly small (around 1%) and not computable from physical first principles, not observable from even our best surface and satellite measurement systems, and capable of occurring through natural processes alone, thus causing natural climate change.*

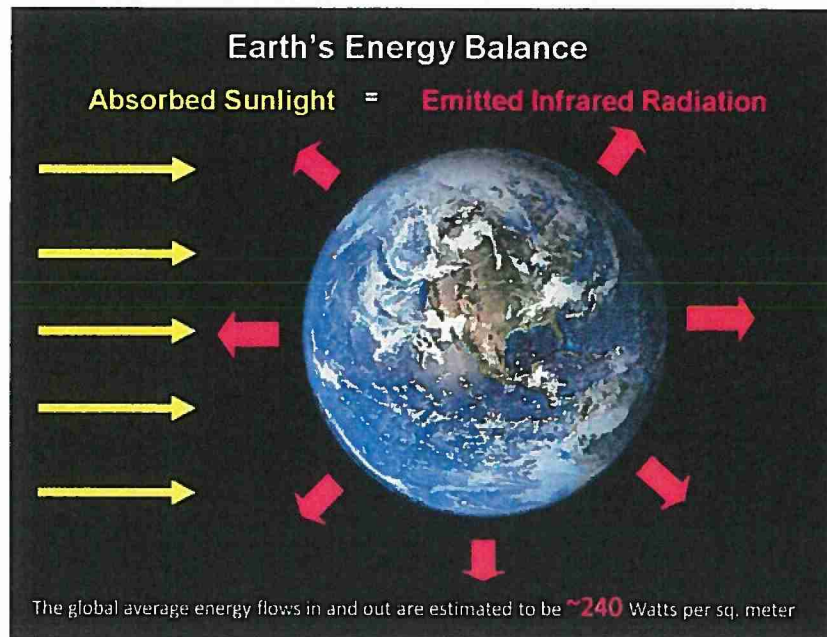
In regard to the climate system, there are two general classes of energy balance which affects the temperature changes we humans experience: radiative and non-radiative (e.g. Spencer & Braswell, 2014). *The former is the one the IPCC emphasizes, while the latter is one the IPCC largely ignores.*

An example of radiative energy balance is the balance between absorbed sunlight (the energy source for the climate system) and thermally-emitted infrared (heat) radiation, which is how the climate system loses energy and cools itself to outer space. The increase in atmospheric CO<sub>2</sub> is, at least theoretically, causing a radiative energy imbalance in the climate system.

In contrast, an example of non-radiative energy balance is the El Nino and La Nina phenomena, where the average rates of energy transport between the atmosphere and ocean are temporarily altered, and the lower atmosphere can either warm (El Nino) or cool (La Nina). Those energy transfers are largely non-radiative, and involve changes in the transports of heat between the atmosphere and ocean.

### 3.1 Radiative Forcing of Climate Change

The Earth, on average, absorbs about 240 Watts per square meter of solar energy, and emits about the same amount of energy to outer space in the form of infrared (heat) radiation (Trenberth *et al.*, 2009).



In the IPCC view, as long as these rates of energy gain and energy loss are equal, the climate system will not change its average temperature on time scales of several decades or longer. Any externally imposed imbalance in these two energy flows is referred to by the IPCC as “radiative forcing”, a concept that is useful, but as has been mentioned, incomplete.

By “external” radiative forcing, the IPCC means external to the normal operation of the climate system, such as cooling from volcanic aerosols, anthropogenic forcings (e.g. increasing CO<sub>2</sub>, pollution aerosols, land use changes, stratospheric ozone depletion). As we shall see, however, the climate system can undergo “internal” radiative forcing (Spencer and Braswell, 2014), which the IPCC includes in the class of “unforced natural variability”.

### **3.2 Non-Radiative Forcing of Climate Change**

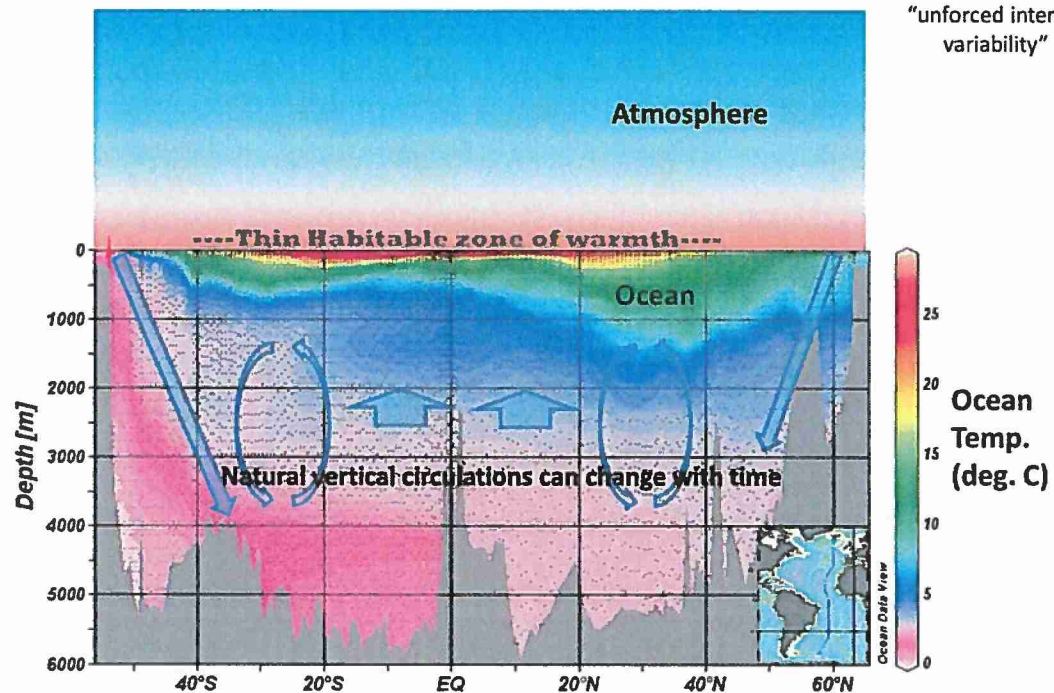
Much of life on Earth exists in a relatively thin warm zone, sandwiched between the cold upper atmosphere and the cold ocean depths (the global average ocean temperature throughout its entire volume is about 38 deg. F).



## Ignored in the “External Forcing” Paradigm of Climate Change: “Internal” Forcing\*

Humanity lives in a relatively thin zone of warmth between the cold upper atmosphere and the cold depths of the global ocean (38-39 deg. F average temperature)...

\*The IPCC calls this  
“unforced internal  
variability”



Because of the large difference in temperature between the ocean surface and the deep ocean, any change in the vertical circulation of the ocean can cause warming or cooling of the global-average lower atmosphere, which is where people live. Due to the extremely long time scales associated with the ocean circulation (centuries to millennia), the changes in climate could also be long, in human terms.

The extent to which climate change is affected by such internally-forced variations in the energy balance of the “warm habitable zone” is not well understood, but as we shall see, the changes in energy balance required are very small, around 1%. Since the coupled ocean-atmosphere climate system is what’s known as a nonlinear dynamical system, capable of its own chaotic variations (Lorenz, 1963), it is entirely plausible (and there is historic evidence to suggest) that much of climate change is simply “unforced internal variability” due to this non-radiative forcing. El Nino and La Nina are examples of this on a short time scale (several years),



and they represent a bifurcation in the average climate of the Earth during Northern Hemisphere winter. The Pacific Decadal Oscillation (PDO, e.g. Zhang et al., 1997) is a longer time scale phenomenon, one full cycle lasting about 60 years. Recent warming of the climate system, and especially the Arctic, that began around 1977 might well have been related to the PDO. If so, this confounds the attribution of recent warming to human GHG emissions.

I cannot overemphasize the importance of the three concepts addressed above: (1) energy balance is required to maintain a constant temperature, and climate change can be caused by either (2) radiatively forced energy imbalance (e.g. increasing CO<sub>2</sub>), or (3) non-radiatively forced energy imbalance (e.g. a natural change in the ocean vertical circulation associated with El Nino, La Nina, the Pacific Decadal Oscillation, etc.) These concepts encompass the paradigm within which we talk about climate change and its potential causes.

## 4. The Four Classes of Scientific Claims Supporting the Endangerment Finding

I will now address the Executive Summary scientific claims of the Technical Support Document entitled *Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act*. There are a total of 47 claims grouped in 4 classes, many of which are repeated verbatim, below. As mentioned above, not all claims are disputed, and some will have a common analysis response.

### 4.1 “Observed Trends in Greenhouse Gas Emissions and Concentrations” (7 claims)

**Claim #1.1:** Greenhouse gases, once emitted, can remain in the atmosphere for decades to centuries, meaning that 1) their concentrations become well-mixed throughout the global atmosphere regardless of emission origin, and 2) their effects on climate are long lasting. The primary long-lived GHGs directly emitted by human activities include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). Greenhouse gases have a warming effect by trapping heat in the atmosphere that would otherwise escape to space.

**Analysis:** I have no reason to disagree with these statements, but will point out they are qualitative in nature, implying no significant negative impacts, and ignore the large benefits of more CO<sub>2</sub> in the atmosphere, as will be discussed later.

**Claim #1.2:** In 2007, U.S. GHG emissions were 7,150 teragrams<sup>1</sup> of CO<sub>2</sub> equivalent<sup>2</sup> (TgCO<sub>2</sub>eq). The dominant gas emitted is CO<sub>2</sub>, mostly from fossil fuel combustion. Methane is the second largest component of U.S. emissions, followed by N<sub>2</sub>O and the fluorinated gases (HFCs, PFCs, and SF<sub>6</sub>). Electricity generation is the largest emitting sector (34% of total U.S. GHG emissions), followed by transportation (28%) and industry (19%).

**Analysis:** I have no reason to disagree with these points.

**Claim #1.3:** Transportation sources under Section 202 of the Clean Air Act (passenger cars, light duty trucks, other trucks and buses, motorcycles, and cooling) emitted 1,649 TgCO<sub>2</sub>eq in 2007, representing 23% of total U.S. GHG emissions.

**Analysis:** I have no reason to disagree with these points.

**Claim #1.4:** U.S. transportation sources under Section 202 made up 4.3% of total global GHG emissions in 2005, which, in addition to the United States as a whole, ranked only behind total GHG emissions from China, Russia, and India but ahead of Japan, Brazil, Germany, and the rest of the world's countries. In 2005, total U.S. GHG emissions were responsible for 18% of global emissions, ranking only behind China, which was responsible for 19% of global GHG emissions.

**Analysis:** I have no reason to disagree with these points, but will note that even if the U.S. transportation sector were to no longer produce CO<sub>2</sub> at all, there would then be only a 4.3% reduction in global GHG emissions, a factor to be kept in mind when evaluating the extent to which any EPA rulemaking regarding GHG emissions can impact the climate system.

**Claim #1.5:** U.S. emissions of sulfur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), direct particulates, and ozone precursors have decreased in recent decades, due to regulatory actions and improvements in technology. Sulfur dioxide (SO<sub>2</sub>) emissions in 2007 were 5.9 Tg of sulfur, primary fine particulate matter (PM<sub>2.5</sub>) emissions in 2005 were 5.0 Tg, NO<sub>x</sub> emissions in 2005 were 18.5 Tg, volatile organic compound (VOC) emissions in 2005 were 16.8 Tg, and ammonia emissions in 2005 were 3.7 Tg.

**Analysis:** I have no reason to disagree with these points.

**Claim #1.6:** The global atmospheric CO<sub>2</sub> concentration has increased about 38% from pre-industrial levels to 2009, and almost all of the increase is due to anthropogenic emissions. The global atmospheric concentration of CH<sub>4</sub> has increased by 149% since pre-industrial levels (through 2007); and the N<sub>2</sub>O concentration has increased by 23% (through 2007). The observed concentration increase in these gases can also be attributed primarily to anthropogenic emissions. The industrial fluorinated gases, HFCs, PFCs, and SF<sub>6</sub>, have relatively low atmospheric concentrations but the total radiative forcing due to these gases is increasing rapidly; these gases are almost entirely anthropogenic in origin.

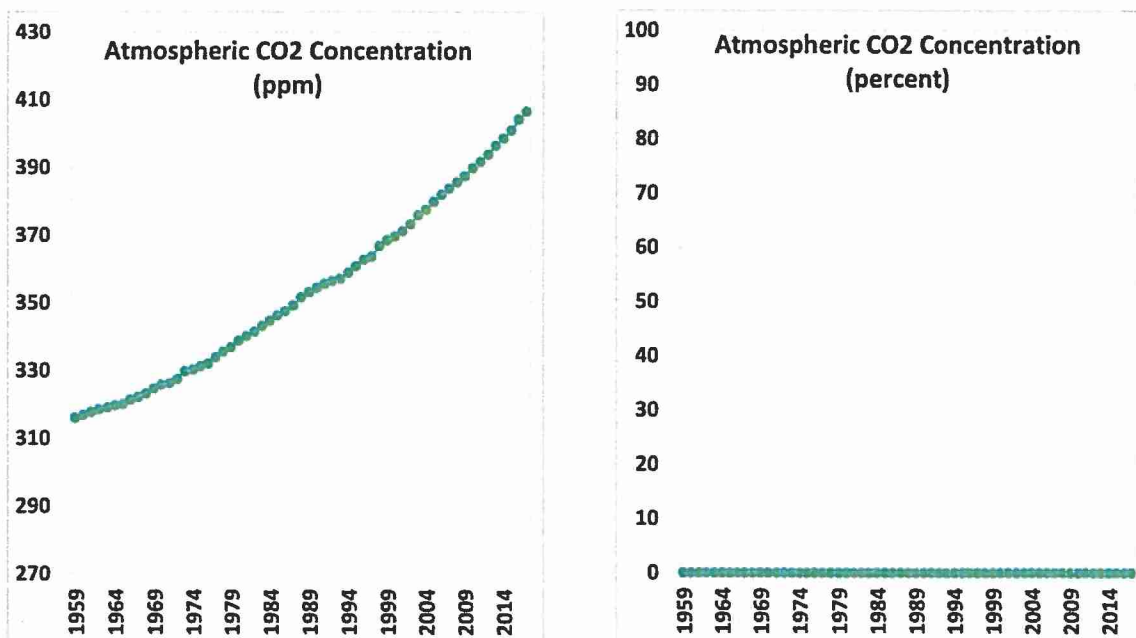
**Analysis:** I have no reason to disagree with these points.

**Claim #1.7:** Historic data show that current atmospheric concentrations of the two most important directly emitted, long-lived GHGs (CO<sub>2</sub> and CH<sub>4</sub>) are well above the natural range of atmospheric concentrations compared to at least the last 650,000 years. Atmospheric GHG concentrations have been increasing because anthropogenic emissions have been outpacing the rate at which GHGs are removed from the atmosphere by natural processes over timescales of decades to centuries.

**Analysis:** Even if we assume the claim of highest CO<sub>2</sub> levels in 650,000 years is true, it should be pointed out that CO<sub>2</sub> still makes up only a tiny fraction of the atmosphere, as seen in the right panel of the following figure (both panels are mutually consistent, CO<sub>2</sub> data available from [ftp://aftp.cmdl.noaa.gov/products/trends/co2/co2\\_annmean\\_mlo.txt](ftp://aftp.cmdl.noaa.gov/products/trends/co2/co2_annmean_mlo.txt)):



While the amount of CO<sub>2</sub> in the atmosphere has experienced a large increase in relative terms, in absolute terms it still occupies only a tiny fraction.



Only 4 out of every 10,000 molecules in the atmosphere are CO<sub>2</sub>, which is a very small proportion. Despite the seemingly large yearly emissions numbers EPA claim #1.2 (above), the resulting increase in atmospheric CO<sub>2</sub> concentration amounts to only 1 in 10,000 molecules of air over the last 100 years. This tiny component of the atmosphere (0.04%) is nevertheless necessary for life to exist on Earth, since photosynthesis on both land and in the ocean is necessary for the food chain. Furthermore, no matter how much CO<sub>2</sub> humanity produces, an average of 50% of it is removed by nature every year, much of which goes into increased photosynthetic activity. As we will see, below, the positive benefits of more CO<sub>2</sub> in the atmosphere are not insignificant.

Note that if these facts were mentioned, the Endangerment Finding would have had less support. By giving a biased presentation of facts, a maximum amount of alarm can be created. We will see that this is a common theme in the EPA's scientific claims, and in the IPCC's and



related organizations' statements: convey a maximum amount of alarm with selective wording, and do not list any positive benefits of GHG emissions which could stand in the way of an Endangerment Finding.

#### **4.2 "Observed Effects Associated with Global Elevated Concentrations of GHGs" (12 claims)**

***Claim #2.1: Current ambient air concentrations of CO<sub>2</sub> and other GHGs remain well below published exposure thresholds for any direct adverse health effects, such as respiratory or toxic effects.***

**Analysis:** I agree.

***Claim #2.2: The global average net effect of the increase in atmospheric GHG concentrations, plus other human activities (e.g., land-use change and aerosol emissions), on the global energy balance since 1750 has been one of warming. This total net heating effect, referred to as forcing, is estimated to be +1.6 (+0.6 to +2.4) watts per square meter (W/m<sup>2</sup>), with much of the range surrounding this estimate due to uncertainties about the cooling and warming effects of aerosols ... The combined radiative forcing due to the cumulative (i.e., 1750 to 2005) increase in atmospheric concentrations of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O is estimated to be +2.30 (+2.07 to +2.53) W/m<sup>2</sup>. The rate of increase in positive radiative forcing due to these three GHGs during the industrial era is very likely to have been unprecedented in more than 10,000 years.***

**Analysis:** Note that compared to the approximate 240 W/m<sup>2</sup> average rates of energy flows in and out of the climate system (Trenberth et al., 2009), the 0.6 to 2.4 W/m<sup>2</sup> imbalance amounts to 0.25% to 1% of the average flows. But even a 1% global radiative imbalance allegedly causing recent warming cannot be reproduced by climate models from physical first principles alone. Instead, all models must be "tuned" in order to produce global energy balance, and those tuning parameters are numerous and their values are not well constrained (Mauritsen et al., 2012).

Nor can the anthropogenic energy imbalance be measured from our best satellite energy budget instruments (CERES), as they have insufficient absolute accuracy (Loeb et al., 2018). It is a theoretical calculation which ignores the fact that a chaotic climate system can create its own energy imbalances. Even if we could accurately measure the Earth's radiative

energy imbalance, there would be no way to tell how much of it is due to anthropogenic versus natural forcings.

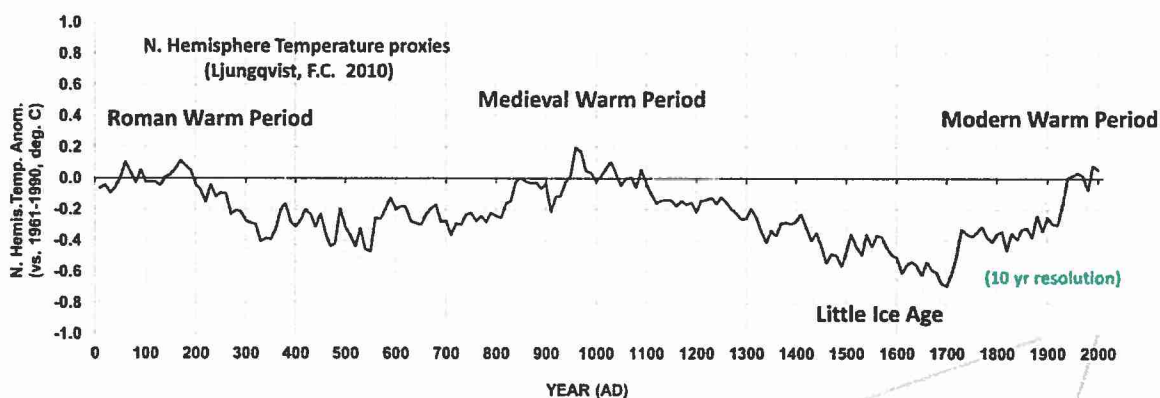
The claim that “*the rate of increase in positive radiative forcing due to these three GHGs during the industrial era is very likely to have been unprecedented in more than 10,000 years*” cannot be supported because we have no idea whether the climate system has been stable to less than 1% radiative energy imbalance in the past. This is purely a statement of faith based upon the assumption that the climate system never changes; it is an argument from ignorance.

As further evidence, warming of the global oceans since the 1950s, if the Argo floats’ measurements are believed, represent an energy imbalance of only 0.4 W/m<sup>2</sup>, which is only a 0.17% imbalance (about 1 part in 600) in the rates of energy flow in and out of the climate system (Levitus et al., 2012). The absolute accuracy of the Earth’s energy imbalance from the CERES satellite instruments is ten times worse than this (Loeb et al., 2018). While the deep-ocean warming more recently (since 2005) has been estimated to be equivalent to an energy input of 10<sup>23</sup> Joules (a very large number), what the Argo floats actually measure are temperature, and the heating of the oceans between 2005 and 2017 is based upon only a 0.04 deg. C average temperature increase in those 12 years, a 1 part in 260 energy imbalance (about 0.9 W/m<sup>2</sup>).

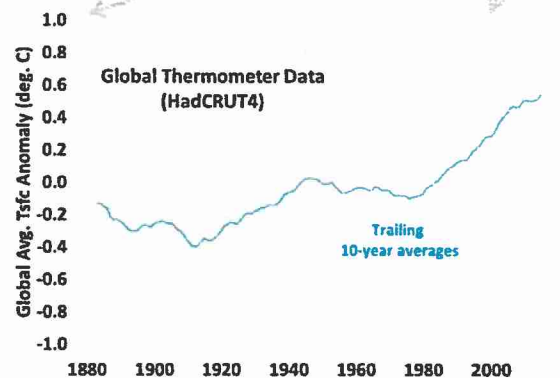
What this means in practical terms is that the theory of anthropogenic climate change remains just a theory, supported by models that are built upon the assumption that CO<sub>2</sub> is the main driving force of climate change. The warming of the oceans represents a smaller global energy imbalance than can be measured by satellite, modeled by climate models, or concluded to be larger than Mother Nature can generate just through chaotic changes in the ocean circulation.

***Claim #2.3: Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. Global mean surface temperatures have risen by  $1.3 \pm 0.32$  °F ( $0.74^{\circ}\text{C} \pm 0.18$  °C) over the last 100 years. Eight of the 10 warmest years on record have occurred since 2001. Global mean surface temperature was higher during the last few decades of the 20th century than during any comparable period during the preceding four centuries.***

**Analysis:** While warming has very likely occurred since the mid-20<sup>th</sup> Century, and we might even be warmer than “any comparable period during the preceding four centuries”, this is fully consistent with our emergence from the Little Ice Age of centuries past. There is temperature proxy evidence (30 proxies from around the Northern Hemisphere) of unusual cold in recent centuries, and that the most recent historical warming trend began in the 1700s, before increasing CO<sub>2</sub> could have been blamed (Ljungqvist, 2010):



**It is Not Obvious  
That Recent Warming  
Is Outside the Range  
Of Natural Temperature  
Variations of the Last  
2,000 Years**



Furthermore, once the climate system warms (or cools), because of the huge heat capacity of the oceans, a clustering of record warm (or record cold) years can be expected. Since we have very few actual thermometer measurements before the late 1800s, it is very uncertain just how warm or how cold previous centuries were. The proxy evidence in the above plot suggests past periods of both warm and cold.



Given the above chart, the fact that *“Global mean surface temperature was higher during the last few decades of the 20th century than during any comparable period during the preceding four centuries”* might even be viewed as a good thing, and with evidence of the Medieval Warm Period and Roman Warm Period, not that unexpected. It also does not rule out the possibility that most of the recent warming was due to natural, rather than anthropogenic, causes.

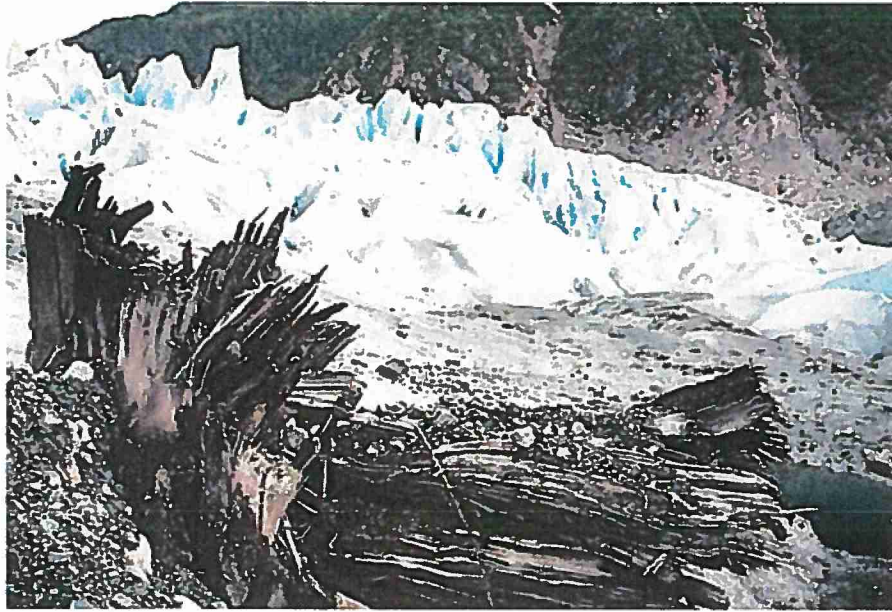
From the “energy balance” point of view, this means there were likely periods when the global energy balance was perturbed by maybe 1% or more, entirely through natural processes, possibly associated with the fact that the ocean and its vertical circulation is a nonlinear dynamical system, fully capable of producing its own unforced changes; or maybe through long-term changes in sunspot activity (e.g. Yamaguchi et al., 2010); or, multi-century time-scale variations in major volcanic eruptions.

To believe that a current anthropogenic energy imbalance approaching 1% has never been matched by nature in the last 10,000 years is, again, a statement of faith and an argument from ignorance. One need only examine the large tree stumps being uncovered by the receding Mendenhall Glacier in Alaska, carbon dated to 1,000-2,000 years old (Choy, 2013), to realize that past periods of warmth existed, and that climate changes naturally, even during the period of recorded human history:



### Warming In the Arctic: Evidence of Natural Climate Change

Tree stumps (dated to be 1,000-2,000 years old) at the terminus of receding Mendenhall Glacier (Alaska) reveal that glaciers change naturally on long time scales, and that there have been periods of Arctic warmth before.



**Claim #2.4:** *Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations. Climate model simulations suggest natural forcing alone (i.e., changes in solar irradiance) cannot explain the observed warming.*

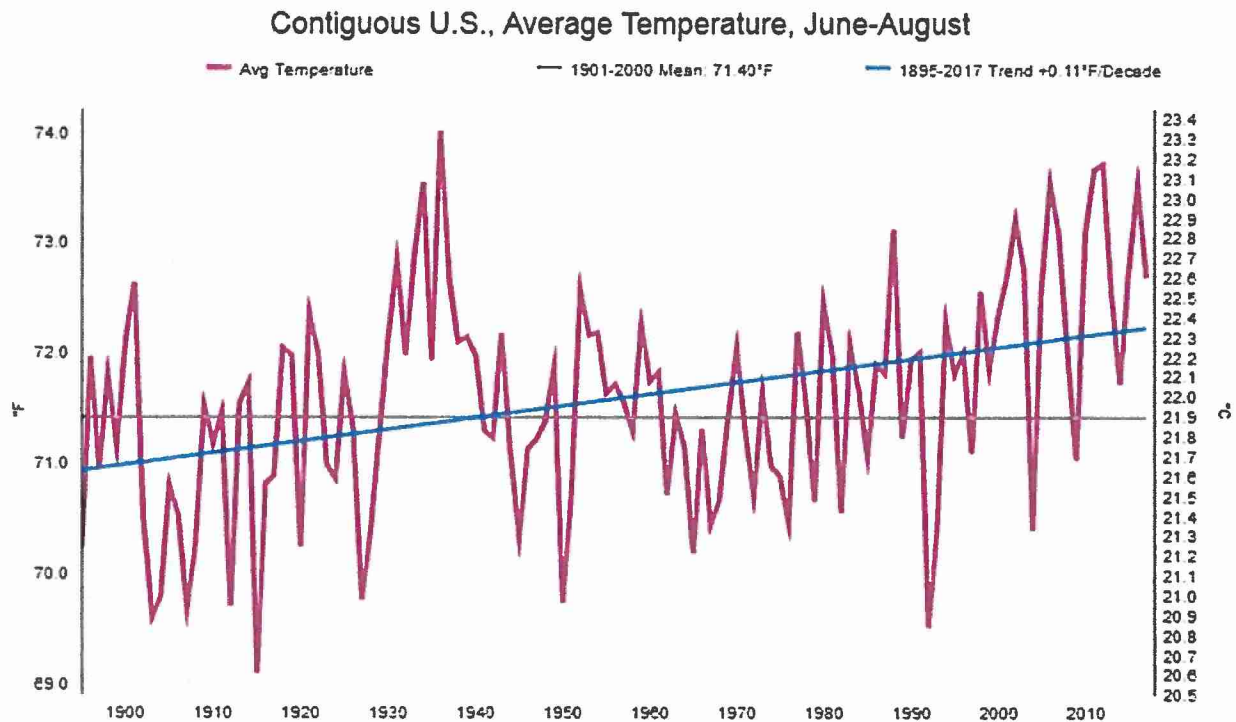
**Analysis:** Much of this claim has been addressed in the analysis of the previous claim (#2.3). There is no way to know just how much of recent warming was due to the observed increase at atmospheric CO<sub>2</sub>. The primary IPCC climate model simulations regarding natural forcing alone were with changes in total solar irradiance, stratospheric ozone depletion, and volcanoes. Clearly, this is insufficient; there are many more potential sources of natural climate change. For example, indirect solar effects on global cloudiness; natural, and especially unforced, (non-radiative) fluctuations in the climate system which can also change the global

energy balance. So, once again we are presented in the claim with a statement of faith, an argument from ignorance.

***Claim #2.5: U.S. temperatures also warmed during the 20<sup>th</sup> and into the 21<sup>st</sup> century; temperatures are now approximately 1.3°F (0.7°C) warmer than at the start of the 20<sup>th</sup> century, with an increased rate of warming over the past 30 years. Both the IPCC and the CCSP reports attributed recent North American warming to elevated GHG concentrations. In the CCSP (2008g) report, the authors find that for North America, "more than half of this warming [for the period 1951-2006] is likely the result of human-caused greenhouse gas forcing of climate change."***

**Analysis:** While the U.S. has likely warmed in recent decades, there is now evidence that as much as half of the warming could be spurious, due to the Urban Heat Island (UHI, e.g. Oke, 1995) effect. When only the most pristine stations in the U.S. are analyzed -- that is, those with the least amount of manmade structures and spurious heat sources encroaching upon the thermometer sites -- the rate of warming is considerably reduced compared to official NOAA estimates (Watts et al., 2015). This also raises questions about warming trends reported in other land areas of the globe as well.

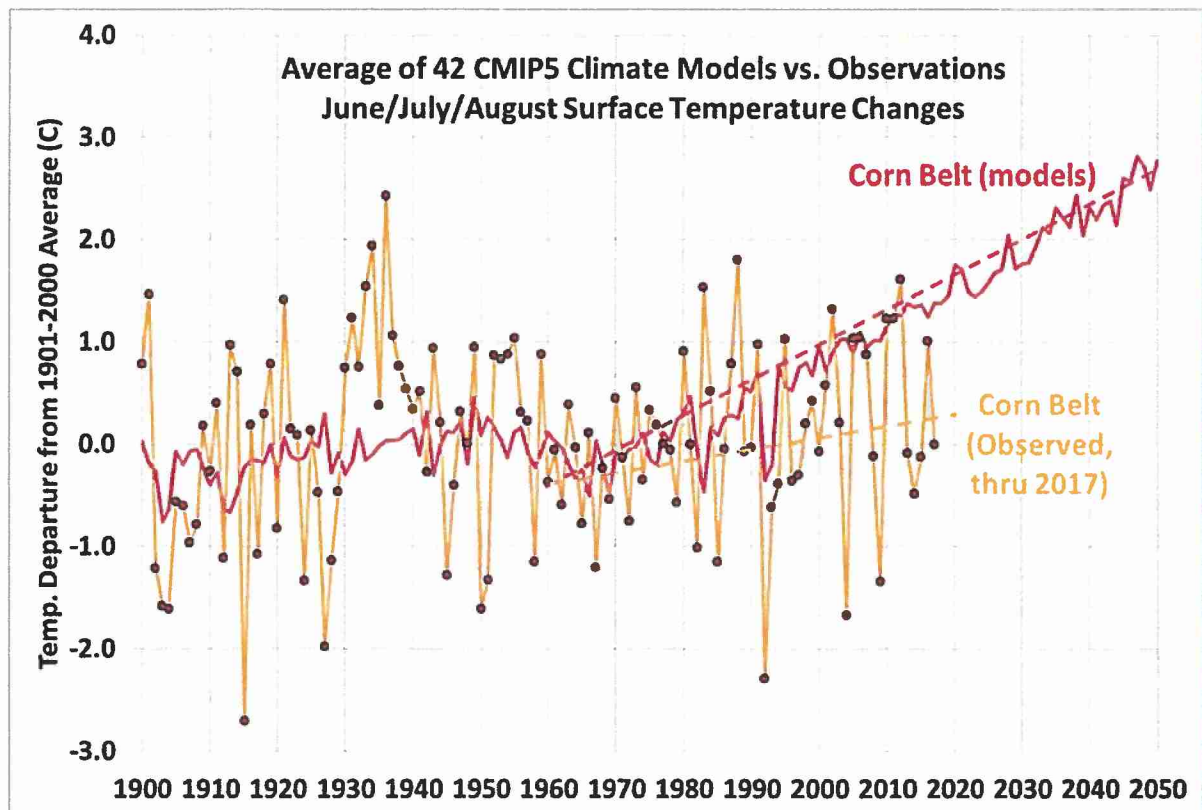
Furthermore, unstated in the claim is that most of the concern for human activities and agriculture would be warming during the summer months (June-July-August), not winter. As can be seen in official NOAA data, warming during the summer in the U.S. has been weaker than in the annual average temperatures, with a warming trend of only +0.11 deg. F/decade (+0.06 deg. C/decade):



The natural variability in summer average temperatures in the U.S. is routinely 10 times as large as this trend, and recent warmth is still not outside the realm of past natural variability.

If we further examine the 12-state Corn Belt of the U.S. Midwest and compare the warming trend there to the average AR5 climate model projections, we see that observed warming has not been nearly as strong as the climate models say it should have been (official NOAA observational data available from <https://www.ncdc.noaa.gov/cag/>; average climate model projections from [https://climexp.knmi.nl/plot\\_atlas\\_form.py](https://climexp.knmi.nl/plot_atlas_form.py)):





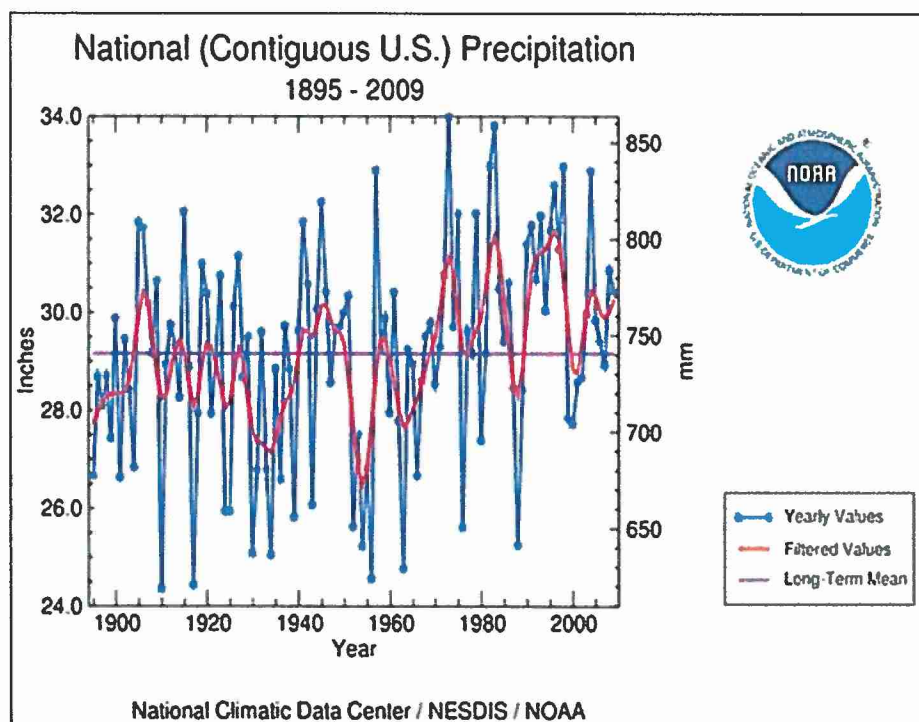
In fact, the 42 climate model average (upon which the EF and CPP are mostly based) has been warming at over 2.5 times the rate of the observations since 1960. If the observations themselves also have twice as much warming due to incomplete removal of the UHI effect, this means that the models could be warming as much as 5 times the observed rate. This is the first evidence (we will see more later) that the models underpinning the EF and CPP have serious biases and are unfit for the purpose of projecting future climate states, and thus for guiding energy policy.

So, the claim that more than half the U.S. warming was likely due to GHG forcing is (1) a statement of faith since we have no idea how much of recent warming might be natural, and (2) rather unremarkable because of the weak amount of warming which has been observed, especially when compared to climate models, and to past temperature reconstructions.



**Claim #2.6:** *Observations show that changes are occurring in the amount, intensity, frequency and type of precipitation. Over the contiguous United States, total annual precipitation increased by 6.1% from 1901 to 2008. It is likely that there have been increases in the number of heavy precipitation events within many land regions, even in those where there has been a reduction in total precipitation amount, consistent with a warming climate.*

**Analysis:** To the extent that some warming has occurred – no matter the cause – one would expect an increase in both rates of evaporation and precipitation. I will not dispute the finding of an average increase in precipitation during the 20<sup>th</sup> Century, but it should be pointed out that there is huge variability in annual rainfall, even when one averages over multiple years.

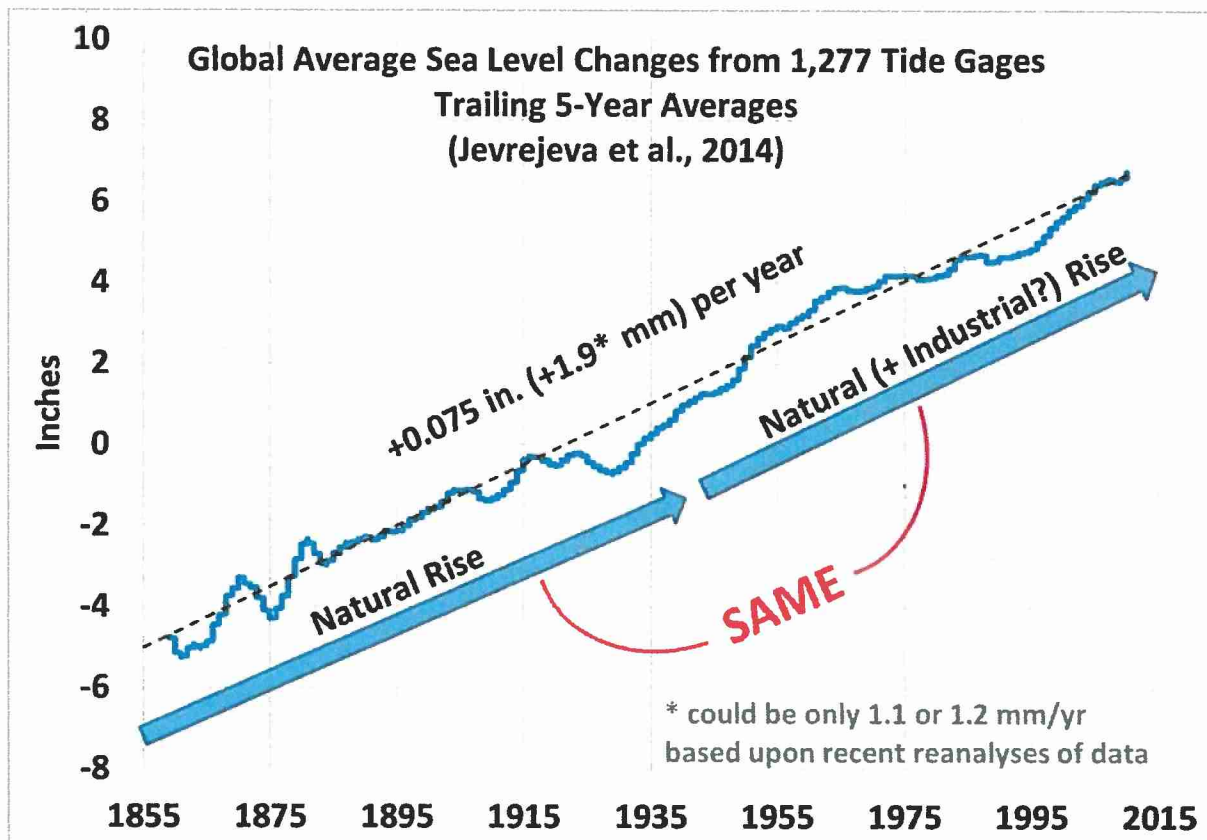


Thus, U.S. residents must cope with very large year-to-year variations in rainfall, and the increase in average precipitation is rather unremarkable when compared to the natural year-to-year variability in annual precipitation. Of course, the reason for the warming-induced precipitation increase is also debatable, because while consistent with warming, it says nothing about the cause of warming.

**Claim #2.7:** *There is strong evidence that global sea level gradually rose in the 20<sup>th</sup> century and is currently rising at an increased rate. It is not clear whether the increasing rate of sea level rise is a reflection of short-term variability or an increase in the longer-term trend. Nearly all of the Atlantic*

Ocean shows sea level rise during the last 50 years with the rate of rise reaching a maximum (over 2 millimeters [mm] per year) in a band along the U.S. east coast running east-northeast.

**Analysis:** There are a number of points which must be made regarding sea level rise. The first is that, based upon global tide gage data produced by Jevrejeva et al. (2014), sea level has been rising since well before human-caused GHG emissions could be blamed (data from <http://www.psmsl.org/products/reconstructions/gslGPChange2014.txt>):



Thus, the claim deceptively excludes the possibility that recent sea level rise is mostly natural.

Importantly, there has been no obvious acceleration of sea level rise during the period of greatest greenhouse gas emissions (generally after the 1940s), as might be expected. In other words, as far as we know, sea level has been rising as we have been coming out of the Little Ice Age.

A more recent study attempted to make more accurate adjustments to the tide gauge data (Dangendorf et al., 2017), and the key figure from that study (modified below with an arrow and text) supports the same conclusion, that sea level rise before most CO<sub>2</sub> was emitted (pre-1940) was not substantially different than after:

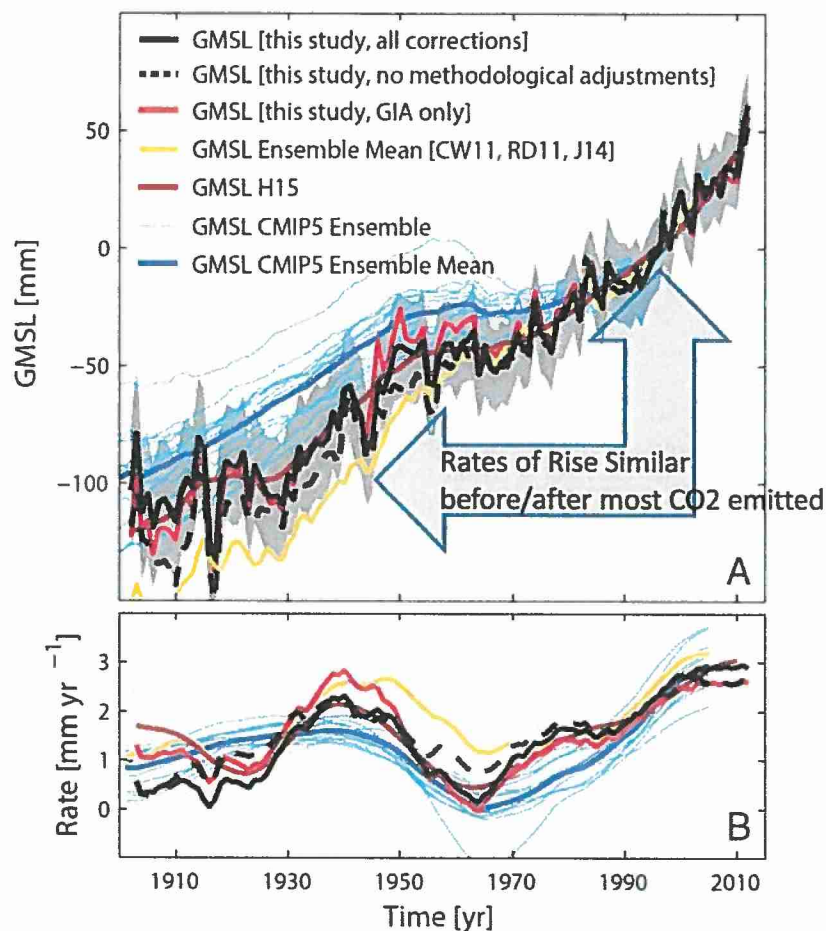


Fig. 1. Time series and rates of GMSL during the period 1902–2012. (A) Revised GMSL reconstruction based on 322 tide gauges in comparison with previous estimates (CW11 = ref. 1; RD11 = ref. 2; J14 = ref. 5; H15 = ref. 6) and modeling attempts based on historical CMIP5 models (12). The gray shading marks the 1σ errors of the final reconstruction. The dotted black line represents a GMSL reconstruction with all VLM and geoid corrections, but without methodological adjustments such as area weighting and the use of a common mean. (B) The corresponding rates calculated with a singular spectrum analysis using an embedding dimension of 15 y.

While the authors curiously claim the revised observational data (black line in the above figure) shows evidence of a recent acceleration of sea level rise, the blue arrow points to pre-1950 rise that looks the same as the post-1990 rise.



The components of sea level rise (the sea level budget) are still not known well enough to explain the recent rise; for example Rietbroek et al., 2016 compared the satellite-measured rise during 2002-2014 to the components from thermal expansion, glacier changes, and the hydrologic inputs and losses (rivers, precipitation, evaporation), and found that satellite-observed sea level is rising faster than can be explained. Until the observations and our physical understanding of them improve, it is doubtful that we can trust future model projections of sea level rise.

In summary, we do not know just how much of recent sea level rise is natural versus human-caused. This is analogous to the situation with recent global average temperature rise. The EPA's emphasis on only human causation shows clear scientific bias. The implied claim that sea level rise is human-caused is deceptive without acknowledgement that sea level was rising well before humans could be blamed. At least the claim regarding recent acceleration in sea level rise is admitted to be uncertain as to the cause, since similar episodes of acceleration have occurred before.

**Claim #2.8:** *Satellite data since 1979 show that annual average Arctic sea ice extent has shrunk by 4.1% per decade. The size and speed of recent Arctic summer sea ice loss is highly anomalous relative to the previous few thousands of years.*

**Analysis:** While the Arctic sea ice extent since satellite monitoring began in 1979 has indeed shrunk, once again we have no idea how much of this is due to natural factors versus human-caused. The claim of the shrinking be "anomalous relative to the previous few thousand years" is totally speculative.

We have evidence of past climate change, especially warm periods, in the Arctic. Here are excerpts from the 1943 book *Arctic Ice* by the original expert on Arctic sea ice, N.N. Zubov:

*"...in late years a most interesting phenomenon has been observed – a warming of the Arctic, as evidence by a gradual and universal decrease in ice abundance. The main evidence of this general warming of the Arctic are:*

*"Receding of glaciers and "melting away" of islands... Ahlman terms the rapid receding of the Spitzbergen glaciers "catastrophic".*



*"Rise of air temperature. (Over the last 20 years) the average temperature of the winter months has steadily increased...*

*"Rise in temperature of Atlantic water which enters the Arctic Basin...the temperature of surface water and of Gulf Stream water has steadily risen...*

*"Decrease in ice abundance....15% to 20% (over 20 years)...*

*"Change in cyclone routes. There is no doubt that the increase in air temperatures, increase in Atlantic water temperatures, intensification of ice drift, etc., are closely connected with an intensification of atmospheric circulation, and in particular with a change in cyclonic activity at high latitudes.*

*"Biological signs of warming of the Arctic. ...fish have ranged further and further to the north...cod in large quantities have appeared along the shores of Spitzbergen and Novaya Zemlya...also mackerel, dolphin where formerly were not found...during recent years fishing has gradually shifted into the Arctic waters, and this unquestionably must be ascribed in considerable degree to the warming of these waters....*

*"Ship navigation. ...a number of ship voyages (were made) which could hardly have been accomplished in the preceding cold period.*

*"Still more remarkable is the fact that the warming of the Arctic is not confined to any particular region."*


These comments sound like they could have come from recent news reports of warming in the Arctic, and suggest that natural changes in Arctic climate and sea ice on multi-decadal time scales are indeed possible, and have occurred in the recent past, before we had satellites to monitor this remote area (before 1979).

In fact, there is considerable evidence to suggest that satellites began monitoring sea ice at the end of an unusually cold period, possible hundreds of years, during which Arctic sea ice cover slowly grew, and that in the near-40 year period since we might be seeing a return to more "normal" conditions. A number of published studies have presented evidence of this. I will highlight only the most recent one (Moffa-Sanchez & Hall, 2017). A 3,000 year reconstruction of Arctic sea ice from ocean sediment records of past ocean salinity variations (which are a proxy for water temperature) suggest that Arctic sea ice peaked during the 1800s, after a lengthy Little Ice Age lasting at least 300 years:



## Comment submitted by Orla E. Collier, Benesch Friedlander Coplan & Aronoff LLP on behalf of Murray Energy Corporation (Appendix D part 2 of 2)

The is a Comment on the **Environmental Protection Agency** (EPA) Proposed Rule: **Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Reopening of the Comment Period**

For related information, [Open Docket Folder](#) 

### Comment

Please see attached Part 2 of 2 of Appendix D to Murray Energy Corporation Comments. Thank you.

### Attachments (1)



Appendix D Part 2 of 2

View Attachment: 

ID: EPA-HQ-OAR-2017-0355-20984

Tracking Number: 1k2-92se-upba



### Document Information

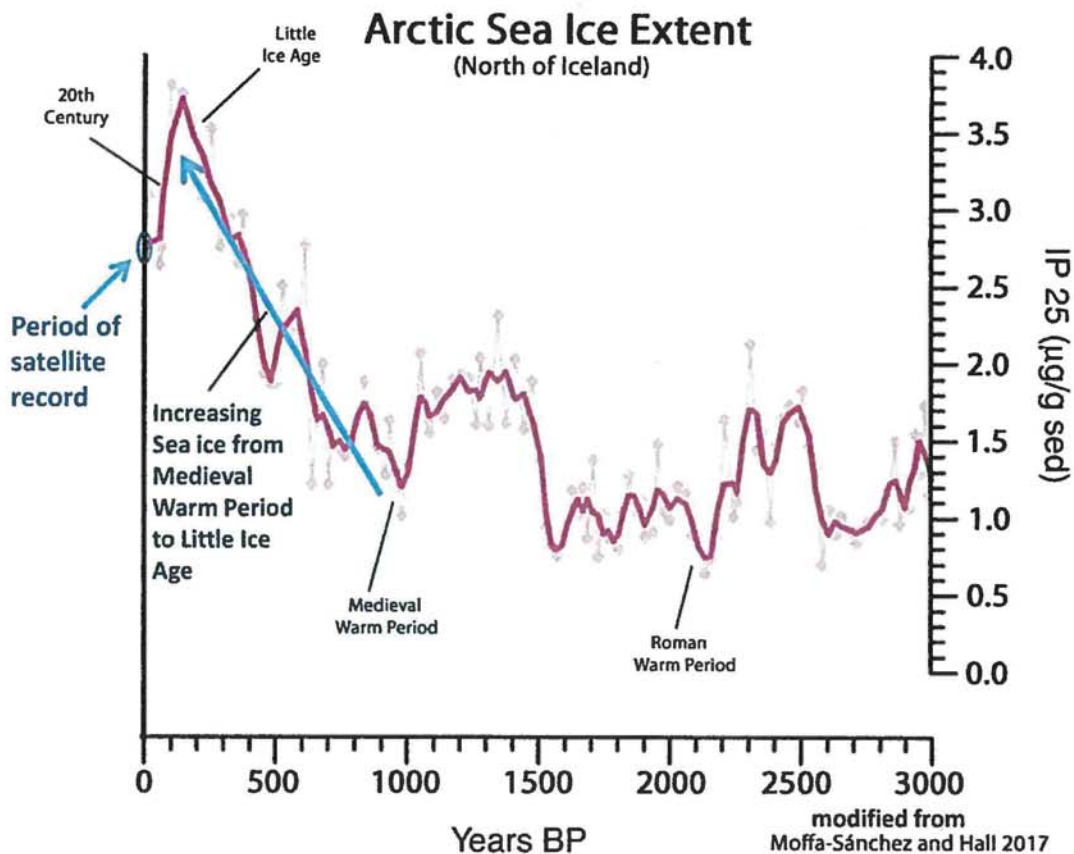
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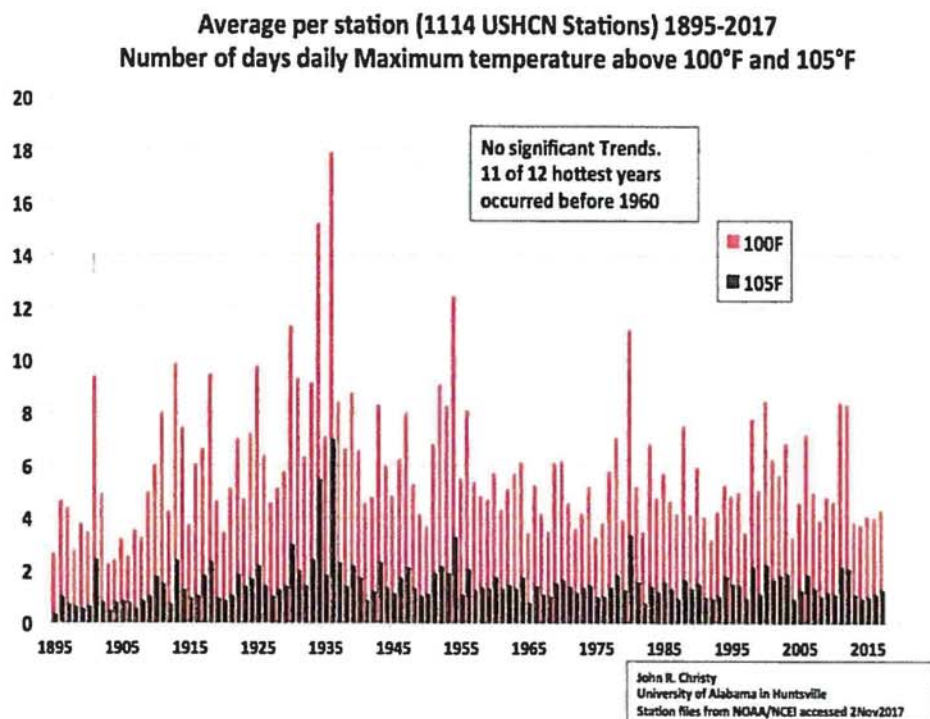


Note that “today” is at the left end of the graph, and progressing to the right goes back in time. The ocean sediment data suggests that the Little Ice Age experienced cooling of the Arctic unmatched in the previous 3,000 years. The implied increase in sea ice began to subside with the warming of the 20<sup>th</sup> Century. The authors attribute the changes to natural fluctuations in ocean currents.

In its claim regarding sea ice, the EPA makes no mention of published research work which would contradict its claim that recent Arctic sea ice decreases are unusual in the context of the last few thousand years, when such evidence indeed exists. While the above evidence from ocean sediment data is too recent to have been included in the EPA’s analysis, it shows how scientific knowledge can change as more information becomes available, and points out the need to revisit the science claims underpinning the Endangerment Finding.

***Claim #2.9: Widespread changes in extreme temperatures have been observed in the last 50 years across all world regions, including the United States. Cold days, cold nights, and frost have become less frequent, while hot days, hot nights, and heat waves have become more frequent.***

**Analysis:** At a minimum, the claim is a gross exaggeration. Regarding the U.S., the main concern would be excessive heat (since less excessive cold would be a welcome thing). For 1,114 USHCN stations in the United States, here are the average numbers of days each year that a station exceeded 100 deg. F and 105 deg. F temperatures, from 1895 through 2017, as tabulated from official NOAA data by John Christy (UAH):

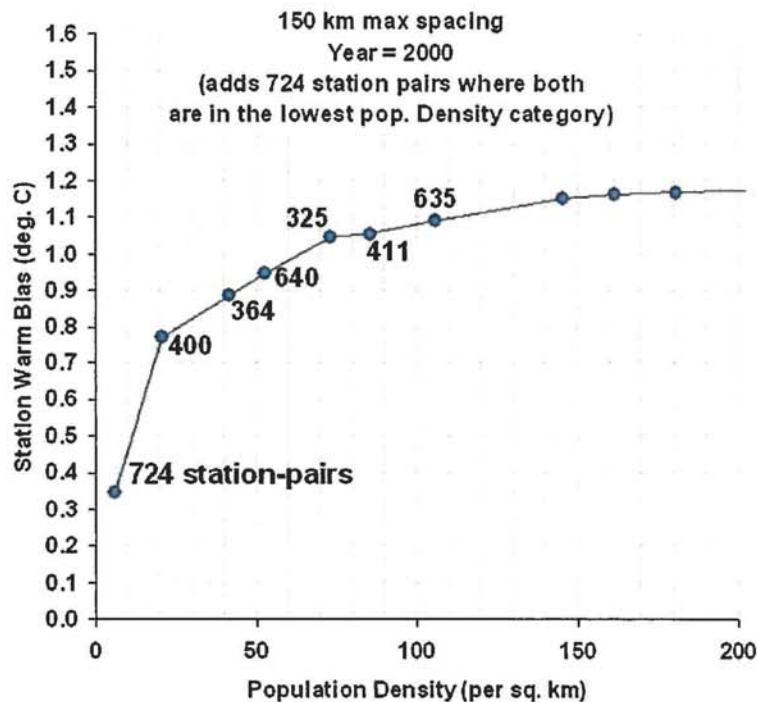


As can be seen, there is no obvious trends in very hot days, which would be the main concern. In fact, 11 of the 12 years with the largest number of very hot days occurred before 1960.

As previously explained, I have concern that all land-based thermometer data have spurious warming effects from manmade structures replacing natural vegetation, and active heat sources, leading to an Urban Heat Island (UHI) effect. It is not clear how well this has been adjusted for, and there is evidence that in the U.S. warming in recent decades has been exaggerated by as much as a factor of 2 (Watts et al., 2010). That urban areas are warmer than rural areas is a common everyday experience. To demonstrate the point, I quantified this effect



using pairs of temperature reporting stations around the world that were within 150 km of each other and had different population densities. The results from the year 2000 show what others have found: that spurious warming at a thermometer site rapidly increases at the lowest population densities:



Half of the stations used in this analysis had population densities below 100 persons per sq. km, and spurious warming hit a maximum of 2.2 deg. C for a population density of 7,000 persons per km. Interestingly, even at only 20 persons per sq. km, the average UHI effect was almost 0.8 deg. C of spurious warming.

There is no easy way to remove this effect from the thermometer data. Unfortunately, the character of the UHI effect looks just like global warming: a gradual warming with time. Population density is a convenient, but imperfect, proxy for the UHI effect, because even with the same population density, wealth increases over time causing still further warming due to addition of more and larger buildings, roads, parking lots, and an increase in active heat sources such as air conditioning exhaust, jet engine activity at airports, etc. Using the above chart, and knowing that world population has increased by a factor of 5 since the late 1800s when

thermometer records began, we can roughly estimate that the global land thermometer network has experienced about 0.5 deg. C of spurious warming over the last century or so. It is doubtful that this effect has been removed from the data used by the IPCC and thus the EPA. Given the difficulty, the best methodology would probably be to simply throw away all data with substantial UHI effects, and limit land data analyses to those stations which have remained relatively rural. Instead, the NOAA methodology (upon which the IPCC and EPA claims for the U.S. are based) uses a convoluted “homogenization” technique which, in my opinion, is correcting rural data to look like urban data, rather than the other way around as desired.

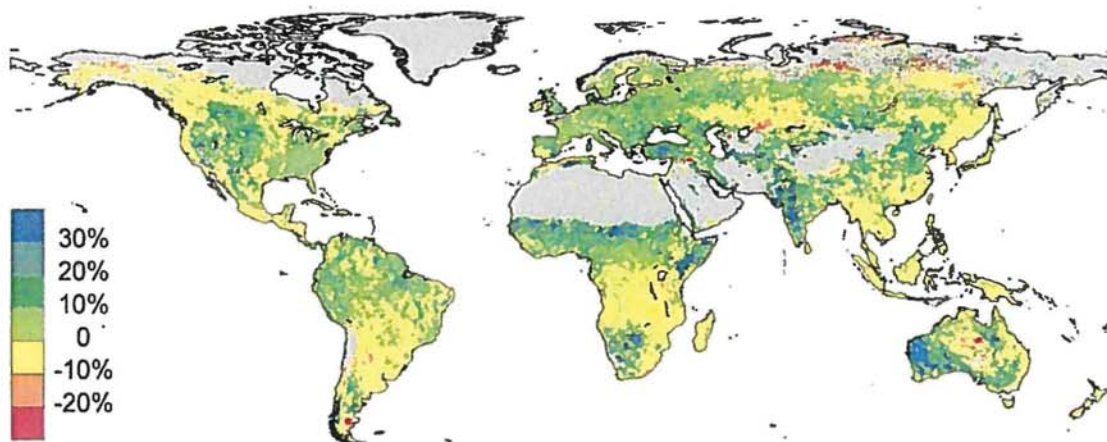
Until a detailed analysis of the UHI effect on global land temperature trends is made, it is not clear that any claims can be seriously defended about record high temperatures or whether heat waves have increased.

And, as we have seen, even using NOAA’s own data the case can be made that there has been no long-term trend in the number of very hot days in the U.S.

Finally, even if warming has occurred, it remains very uncertain just how much of it was due to human versus natural influences.

**Claim #2.10:** Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases. However, directly attributing specific regional changes in climate to emissions of GHGs from human activities is difficult, especially for precipitation.

**Analysis:** At least for this claim, the EPA has acknowledged little confidence in the claim regarding the effects of GHG emissions on natural systems (e.g. forests, croplands). This is wise, because multiple studies using several decades of satellite data have now established a “global greening” has occurred, most likely the result of the positive benefits of increased CO<sub>2</sub> levels on plant growth (Donohue et al., 2013):



Thus, in contrast to the alleged negative effects of temperature increases and precipitation changes made in the EPA's claim, it appears that the direct benefits of CO<sub>2</sub> enrichment on plant growth, drought tolerance, and water use efficiency have outweighed the negative effects. Literally hundreds of published scientific studies supporting this are tabulated at <http://co2science.org>. The fact that the EPA ignored this evidence reveals once again a bias toward science supporting a chosen policy outcome.

**Claim #2.11:** Ocean CO<sub>2</sub> uptake has lowered the average ocean pH (increased acidity) level by approximately 0.1 since 1750. Consequences for marine ecosystems can include reduced calcification by shell-forming organisms, and in the longer term, the dissolution of carbonate sediments.

**Analysis:** First of all, the wording "increased acidity" is deceptive since the oceans are solidly basic or alkaline (currently pH=8.1) and there is no forecast that they will ever become acidic. The oceans are believed to have become slightly less basic, from an estimated preindustrial value of pH = 8.2.

Secondly, the negative effect of this small decrease in pH on marine life has mixed results in the scientific literature, as the extra CO<sub>2</sub> dissolved in seawater (like on land) promotes photosynthesis of phytoplankton at the beginning of the marine food chain. Studies of reduced pH on marine life are often done with very abrupt (hours to days) changes in pH, and with much larger magnitudes than will ever be experienced, even if we burn all known and suspected fossil fuel reserves. This does not allow the marine organisms to adapt to the changes, which biases the results in the direction of damage to the organisms.



Craig Idso, Ph. D., has surveyed the literature on the subject for decades, and his summary of the published results (<http://www.co2science.org/data/acidification/results.php>), although now somewhat out of date, suggests that the net effect of more CO<sub>2</sub> dissolved in seawater will have a net benefit on sea life, including corals. He recently made the following statement to me, *"there is no scientific basis to support claims of impending marine life catastrophe due to ocean acidification. Rather, the predicted decline in oceanic pH (if it occurs) will have little to no lasting negative impacts on the bulk of marine life."*

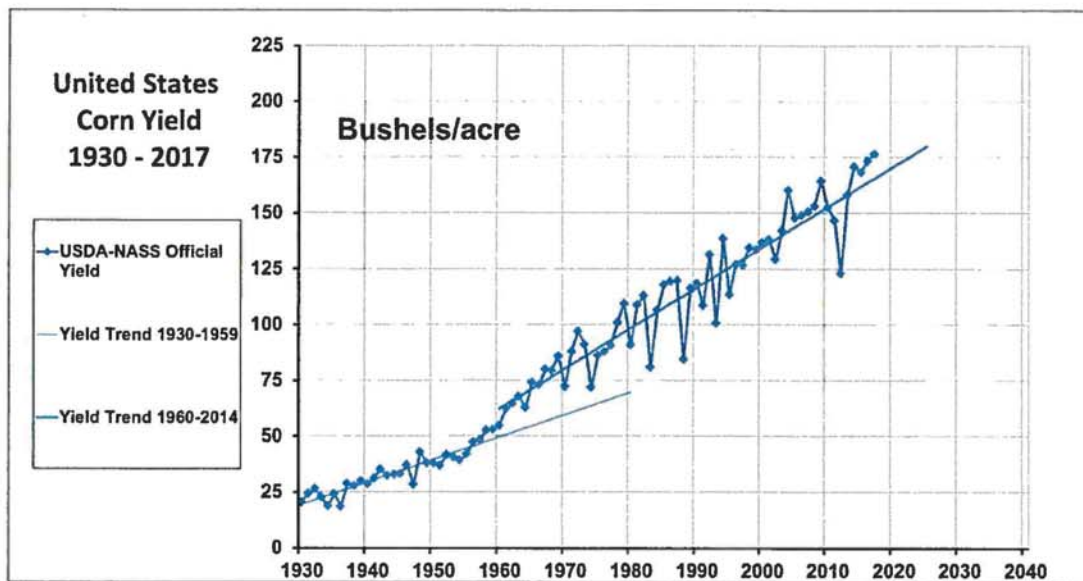
So, while I do not qualify as an expert on this subject, "ocean acidification" is one more area where the science needs to be revisited in a more balanced way.

***Claim #2.12: Observations show that climate change is currently affecting U.S. physical and biological systems in significant ways. The consistency of these observed changes in physical and biological systems and the observed significant warming likely cannot be explained entirely due to natural variability or other confounding non-climate factors.***

***Analysis:*** This claim is similar to Claim #10, and much of that analysis applies here. The claim that *"the observed significant warming likely cannot be explained entirely due to natural variability or other confounding non-climate factors"* is not much more than a faith-based assertion, arguing from ignorance, since the EPA and the IPCC have no idea just how much of recent warming is human-caused versus natural, since natural sources of climate change (e.g. our emergence from the Little Ice Age) are poorly understood. In any event, the claim does not say whether the changes are positive or negative...what are we to assume?

Also, we have already established under Claim #10 that there has been a net greening of the United States in response to the direct positive effects CO<sub>2</sub> has on vegetation. Furthermore, it is likely that these benefits are at least partly responsible for increasing corn yields in the United States, which have been on the same upward trend since approximately 1960, with all four of the most recent growing seasons (2014, 2015, 2016, 2017) experiencing higher corn yields than in any previous year (corn yield data are available from a wide variety of sources):





Even if some areas of the United States are experiencing negative changes, it would be difficult establish causation since ecosystems are continually changing in response to changes in regional weather patterns, and (as discussed under Claims #5, 6, and 9) the natural temperature and precipitation changes in the United States can be large.

The best example of this is the Dust Bowl of the 1930s, which occurred well before GHGs could be blamed, and is generally considered to be the result of natural changes in the circulation of the Pacific Ocean; the NOAA Drought Task Force Assessment Report has a list of many publications (<http://ocp.ldeo.columbia.edu/res/div/ocp/drought/publications.shtml>), the majority of which deal with natural factors, rather than human-related, as the cause of North American drought episodes.

On a global scale, Idso (2013) estimated the global increase in agricultural productivity due to the direct effects of increasing CO<sub>2</sub> on plant growth, and arrived at a net benefit of US\$3.5 Trillion. Thus, the direct benefits of increasing CO<sub>2</sub> associated with climate change were deceptively left out of this claim by the EPA.

### 4.3 “Projections of Future Climate Change with Continued Increases in Elevated GHG Concentrations” (9 claims)

In this class of claims, we move from observational evidence (or lack thereof) of climate change with assertions of causation of those changes, to projections of future climate states based upon computerized climate models that assume various future atmospheric increases in GHGs, human-caused aerosol pollution, land use changes, etc. The primary driver of climate change in the models is the assumed increases in atmospheric CO<sub>2</sub>, which indeed should have (at least based upon theory) some warming effect.

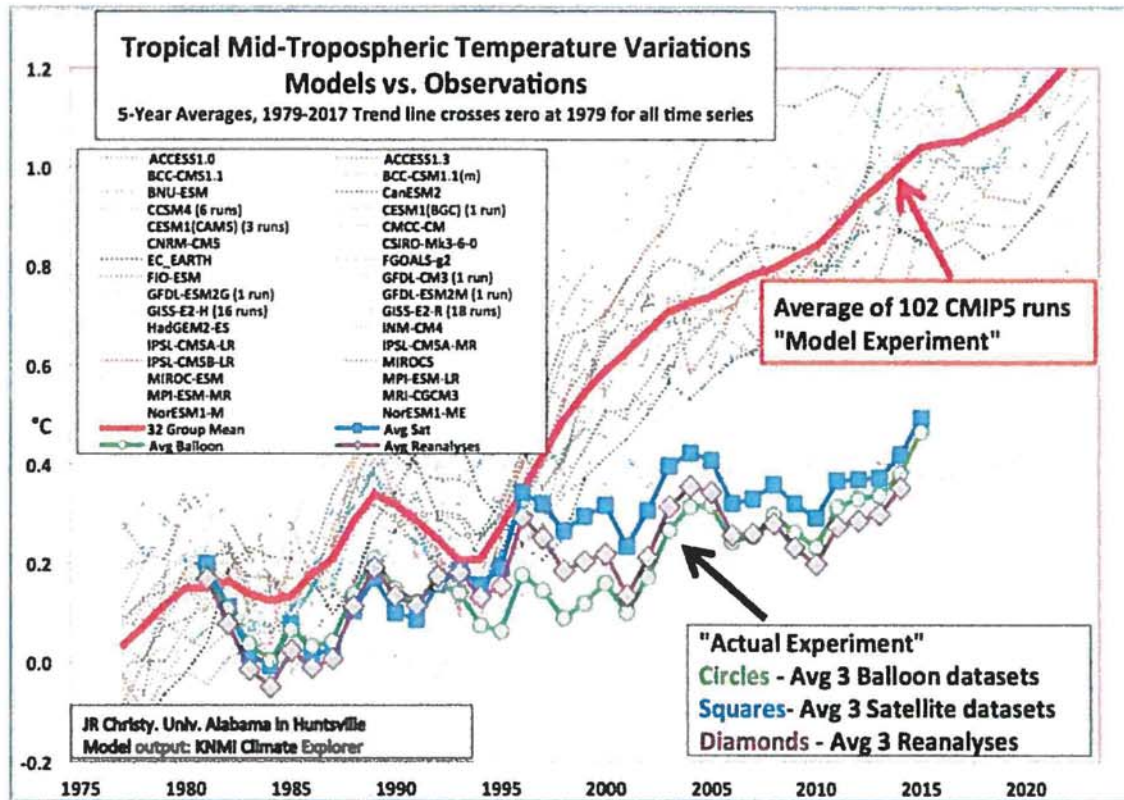
***Claim #3.1: Most future scenarios that assume no explicit GHG mitigation actions (beyond those already enacted) project increasing global GHG emissions over the century, with climbing GHG concentrations. Carbon dioxide is expected to remain the dominant anthropogenic GHG over the course of the 21<sup>st</sup> century. The radiative forcing associated with the non-CO<sub>2</sub> GHGs is still significant and increasing over time.***

**Analysis:** The claim is basically that CO<sub>2</sub> concentrations in the atmosphere are expected to slowly increase, and so will the radiative forcing from the extra CO<sub>2</sub>. I have no objection to this statement.

***Claim #3.2: Future warming over the course of the 21<sup>st</sup> century, even under scenarios of low-emission growth, is very likely to be greater than observed warming over the past century.*** According to climate model simulations summarized by the IPCC, through about 2030, the global warming rate is affected little by the choice of different future emissions scenarios. By the end of the 21<sup>st</sup> century, projected average global warming (compared to average temperature around 1990) varies significantly depending on the emission scenario and climate sensitivity assumptions, ranging from 3.2 to 7.2 deg F (1.8 to 4.0 deg. C), with an uncertainty range of 2.0 to 11.5 deg. F (1.1 to 6.4 deg. C).

**Analysis:** There is now a great deal of published evidence that the amount of future warming projected by the models will be too large. The claim, rephrased, is that warming in the 21<sup>st</sup> Century will accelerate, that is, the rate of warming will be greater than in the 20<sup>th</sup> Century.

But, to date, the models have produced approximately twice the amount of atmospheric warming as has been observed since 1979, which is when we have had our first capability to monitoring the tropospheric temperature over virtually the entire Earth:



Out of 102 IPCC model experiments (upon which the EPA's Endangerment Finding depends), only one model came close to the observations (whether satellites, weather balloons, or global reanalysis datasets), with almost all others warming significantly more than the observations. This is an apples-to-apples comparison, with the model (and all observations) vertical temperature structures averaged in the same way that the satellite senses the atmosphere. Each time series is placed vertically on the graph so that their linear trends intersect at "0" in 1979, which is the most meaningful way to compare these various measures in a climate change context.

How can the models' future projections for the rest of the 21<sup>st</sup> Century be trusted, when they have failed to reproduce what has already occurred?

The potential reasons for this large discrepancy between models and observations are several:



**1) The climate models are too sensitive to CO<sub>2</sub>.** The sensitivity of the climate system from observations is usually estimated to be less than 2 deg. C, considerably lower than what models exhibit (refs). The sensitivity is the net result of feedbacks in the models, a few of which are very important yet poorly known.

**2) The radiative forcing assumed by the models has been too high.** This is unlikely because (1) the radiative forcing from anthropogenic GHGs is fairly well known, and (2) the very uncertain radiative forcing (cooling) effect of human-caused aerosol pollution has recently been revised to be weaker than is generally assumed (Gordon et al., 2016); if the models used those revised estimates of aerosol forcing, they would produce even more warming than they have already, and would then be even more in error compared to observations.

**3) There has been a multi-decadal natural cooling event in progress that we do not understand, which has delayed the GHG warming and the models will eventually be proved correct.** If this is indeed the case, then the IPCC science community will have to admit that natural climate fluctuations are indeed large. And if they have been large over the last 40 years, who knows what kind of natural climate variations are possible in centuries past?

Of these possibilities, I am of the opinion that climate models are too sensitive to the CO<sub>2</sub> concentration in the atmosphere, and that their projections of future warming, sea level rise, change in storminess and ecosystems must now be called into question.

**NOTE:**

Since I have demonstrated that the climate models have greatly exaggerated climate change on both global and regional scales, this then negates all of the remaining claims of future climate change and its negative impacts (7 more claims in this class of claims, and most of the 19 claims in the fourth class of claims). Nevertheless, for completeness, I will briefly address each.

**Claim #3.3:** All of the United States is very likely to warm during this century, and most areas of the United States are expected to warm by more than the global average. The largest warming is projected to occur in winter over northern parts of Alaska. In western, central and eastern regions of North America, the projected warming has less seasonal variation and is not as large, especially near the coast, consistent with less warming over the oceans.

**Analysis:** As in my analysis of Claim #2.5, the warming of most concern – during the warm season – has been weak, and its causation is debatable. As shown under Claim #2.9, there has been no long-term increase in hot days (over 100 deg. F). And as discussed under Claim #3.2, the climate models have produced twice as much warming as observed. So, while



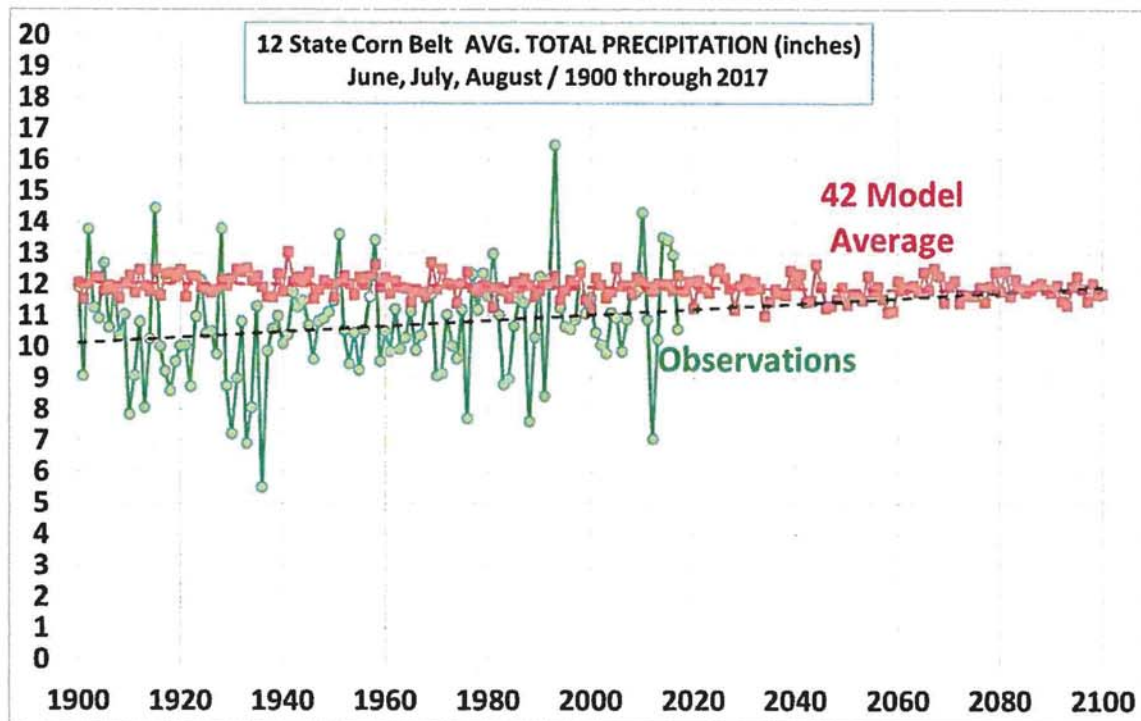
the prediction might turn out to be qualitatively true, it is of little practical consequence, and the causation of warming remains debatable.

**Claim #3.4:** It is very likely that heat waves will become more intense, more frequent, and longer lasting in a future warm climate, whereas cold episodes are projected to decrease significantly.

**Analysis:** See the analysis of Claim #3.3. Also, since cold weather reportedly kills twenty times as many people as does hot weather (Gasparrini et al., 2015), fewer cold events would be welcome.

**Claim #3.5:** Increases in the amount of precipitation are very likely in higher latitudes, while decreases are likely in most subtropical latitudes and the southwestern United States, continuing observed patterns. The mid-continental area is expected to experience drying during summer, indicating a greater risk of drought.

**Analysis:** The projections are largely speculative. Regarding warm-season precipitation in the “mid-continent area”, NOAA’s precipitation data for the 12-state U.S. Corn Belt shows, if anything, an observed increase in precipitation from 1900 to 2017, while the models show an almost imperceptible decrease late in the 21<sup>st</sup> Century. Thus, the claim is not only speculative; it is contrary to existing trends and the models themselves:



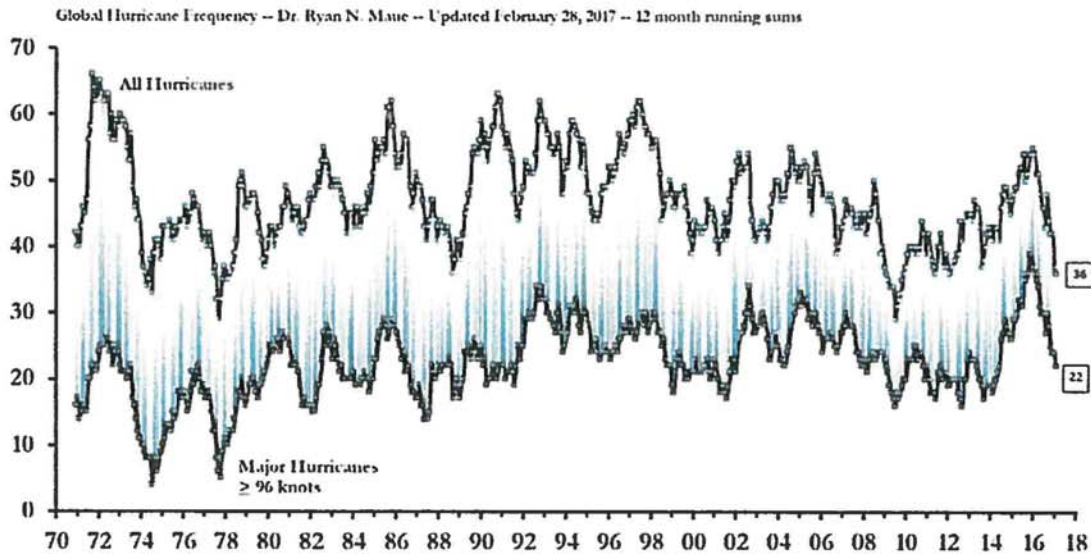
**Claim #3.6:** Intensity of precipitation events is projected to increase in the United States and other regions of the world. More intense precipitation is expected to increase the risk of flooding and result in greater runoff and erosion that has the potential for adverse water quality effects.

**Analysis:** To the extent that warming occurs, then, yes, precipitation intensity would be expected to increase. But this depends upon the projections of substantial future warming being correct, which is doubtful (see the analyses of claims 3.3 and 3.4, above).

**Claim #3.7:** It is likely that hurricanes will become more intense, with stronger peak winds and more heavy precipitation associated with ongoing increases of tropical sea surface temperatures. Frequency changes in hurricanes are currently too uncertain for confident projections.

**Analysis:** Again, to the extent that warming occurs, precipitation intensity in hurricanes could be expected to increase. But the intensity of hurricanes depends upon many factors – such a vertical wind shear – changes in which are largely unknown in a warmer world. To date, there is no evidence of any long-term increase in global tropical cyclone intensity with recent warming:

The total wind energy contained in tropical cyclones, on a global basis shows large variability 1971-2017, but little indication in a long term trend, despite recent warming.



**Claim #3.8:** By the end of the century, global average sea level is projected by IPCC to rise between 7.1 and 23 inches (18 and 59 centimeter [cm]), relative to around 1990, in the absence of increased dynamic ice sheet loss. Recent rapid changes at the edges of the Greenland and West Antarctic ice sheets show acceleration of flow and thinning. While an understanding of these ice sheet processes is incomplete, their inclusion in models would likely lead to increased sea level projections for the end of the 21<sup>st</sup> century.

**Analysis:** As discussed in the analysis of Claim #2.7, it is not known how much of recent sea level rise is due to natural versus human-caused warming. Sea levels have been rising at least since the mid-1800s at about the same rate as today, with some evidence it might be accelerating, but it is unknown whether this trend will continue or is just temporary. The components of sea level rise (the sea level budget) are still not known well enough to explain the recent rise. The claims of a potential acceleration due to rapid loss of ice from the Greenland and West Antarctic ice sheets are extremely speculative. As addressed in the analysis



of claim #2.3, glacier retreat in Alaska reveals an ancient forest grew there 1,000 to 2,000 years ago, indicating century-time scale changes in glacier input to sea level rise can occur naturally.

**Claim #3.9:** Sea ice extent is projected to shrink in the Arctic under all IPCC emissions scenarios.

**Analysis:** This claim, once again, entirely depends upon demonstrably flawed climate model predictions. As discussed in the analysis of claim 2.8, there is abundant evidence of warm Arctic conditions 1,000-2,000 years ago, as well as early in the 20<sup>th</sup> Century. Until such natural climate fluctuations are understood and predicted, there is no way to know how much of Arctic sea ice change is natural, or how much will occur in the future.

#### 4.4 “Projected Risks and Impacts Associated with Future Climate Change” (19 claims)

**Claim #4.1:** Risk to society, ecosystems, and many natural Earth processes increase with increases in both the rate and magnitude of climate change. Climate warming may increase the possibility of large, abrupt regional or global climatic events (e.g., disintegration of the Greenland Ice Sheet or collapse of the West Antarctic Ice Sheet). The partial deglaciation of Greenland (and possibly West Antarctica) could be triggered by a sustained temperature increase of 2 to 7 deg. F (1 to 4 deg. C) above 1990 levels. Such warming would cause a 13 to 20 feet (4 to 6 meter) rise in sea level, which would occur over a time period of centuries to millennia.

**Analysis:** Taken literally, this claim says that a 1 deg. C sustained temperature above 1990 levels could cause a 4 to 6 meter rise in sea level. The claim of such a catastrophic response to only a 1 deg. C change is, in my opinion, wildly speculative, alarmist, and scientifically irresponsible.

**Claims #4.2, 4.3, 4.4:** CCSP reports that climate change has the potential to accentuate the disparities already evident in the American health care system, as many of the expected health effects are likely to fall disproportionately on the poor, the elderly, the disabled, and the uninsured. IPCC states with very high confidence that climate change impacts on human health in U.S. cities will be compounded by population growth and an aging population.

**Severe heat waves are projected to intensify in magnitude and duration over the portions of the United States where these events already occur**, with potential increases in mortality and morbidity, especially among the elderly, young, and frail.

**Some reduction in the risk of death related to extreme cold is expected.** It is not clear whether reduced mortality from cold will be greater or less than increased heat-related mortality in the United



States due to climate change.

**Analysis:** The climate change portion of these claims are inconsistent with more recent research that shows cold weather kills twenty times as many people as does hot weather (Gasparrini et al., 2015).

**Claim #4.5:** Increases in regional ozone pollution relative to ozone levels without climate change are expected due to higher temperatures and weaker circulation in the United States and other world cities relative to air quality levels without climate change. Climate change is expected to increase regional ozone pollution, with associated risks in respiratory illnesses and premature death. In addition to human health effects, tropospheric ozone has significant adverse effects on crop yields, pasture and forest growth, and species composition. The directional effect of climate change on ambient particulate matter levels remains uncertain.

**Analysis:** Since I do not follow ozone chemistry research, I have no expert opinion on this claim.

**Claim #4.6:** Within settlements experiencing climate change, certain parts of the population may be especially vulnerable; these include the poor, the elderly, those already in poor health, the disabled, those living alone, and/or indigenous populations dependent on one or a few resources. Thus, the potential impacts of climate change raise environmental justice issues.

**Analysis:** Since this claim has nothing to do with science, so I have no expert opinion.

**Claim #4.7, 4.8, 4.9:** CCSP concludes that, with increased CO<sub>2</sub> and temperature, the life cycle of grain and oilseed crops will likely progress more rapidly. But, as temperature rises, these crops will increasingly begin to experience failure, especially if climate variability increases and precipitation lessens or becomes more variable. Furthermore, the marketable yield of many horticultural crops (e.g., tomatoes, onions, fruits) is very likely to be more sensitive to climate change than grain and oilseed crops.

Higher temperatures will very likely reduce livestock production during the summer season in some areas, but these losses will very likely be partially offset by warmer temperatures during the winter season.

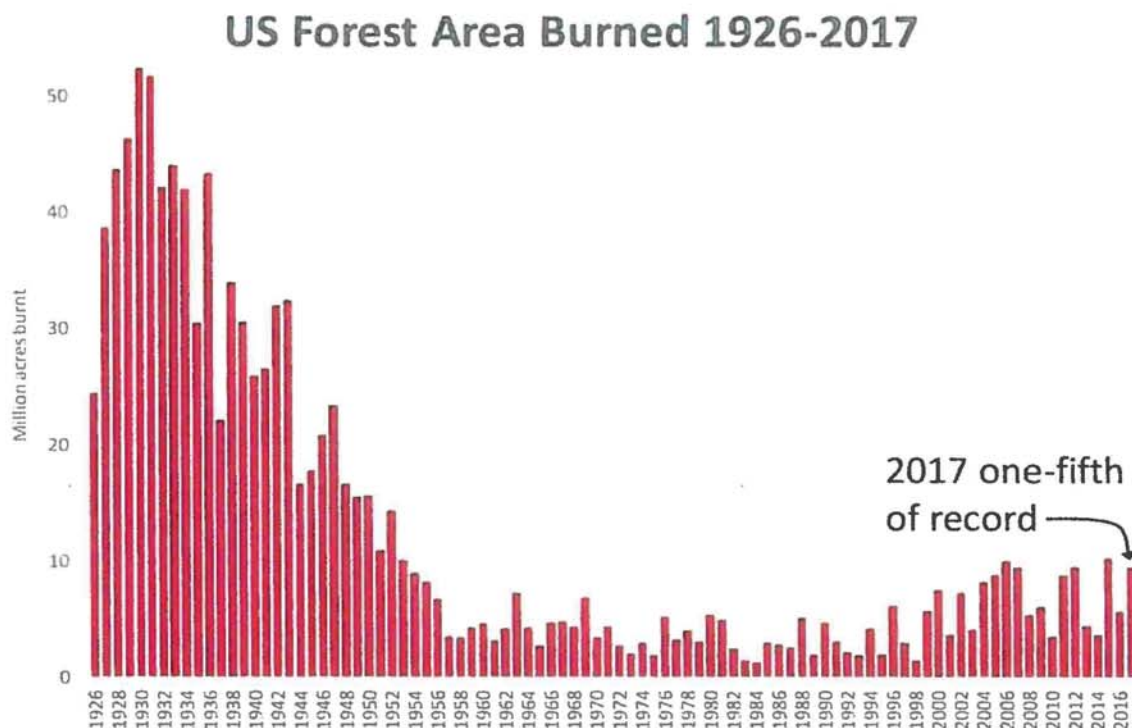
Cold-water fisheries will likely be negatively affected; warm-water fisheries will generally benefit; and the results for cool-water fisheries will be mixed, with gains in the northern and losses in the southern portions of ranges.

**Analysis:** I have no expertise to critique these claims.

**Claim #4.10:** Climate change has very likely increased the size and number of forest fires, insect outbreaks, and tree mortality in the interior West, the Southwest, and Alaska, and will continue to do so. Over North America, forest growth and productivity have been observed to increase since the middle of the 20<sup>th</sup> century, in part due to observed climate change. Rising CO<sub>2</sub> will very likely increase photosynthesis for forests, but the increased photosynthesis will likely only increase wood production in young forests on fertile soils. The combined effects of expected increased temperature, CO<sub>2</sub>, nitrogen deposition, ozone, and forest disturbance on soil processes and soil carbon storage remain unclear.

**Analysis:** It is interesting that the positive effects of CO<sub>2</sub> on photosynthesis are emphasized here, in the case of wildfires, where more wood production would result in more fuel for wildfires. Why were the positive benefits of increased photosynthesis on agriculture not mentioned, say under claim 2.12? This shows a clear bias towards only negative effects, while ignoring positive effects, of GHG emissions.

The long-term trend in U.S. wildfires is greatly affected by land use practices, as can be seen in these data from the National Interagency Fire Center:



During the early part of the 20<sup>th</sup> Century, we started extinguishing wildfires due to the threat they posed to human settlements. Then, in 1972, a “let burn” policy was started as a way for natural wildfires (especially in national park areas) ignited by dry lightning strikes to burn the excess woody fuel which had built up over several decades. This led to the catastrophic Yellowstone fire during the drought of 1988, during which the “let burn” policy was temporarily rescinded by President Reagan. In any event, it can be seen from the above figure that the natural state of forests in the U.S. is to burn more than is currently allowed. As long as we put out wildfires, we allow more fuel to build up, and later fires to become worse. This is a land use policy issue, not a climate change issue.

**Claim #4.11:** Coastal communities and habitats will be increasingly stressed by climate change impacts interacting with development and pollution. Sea level is rising along much of the U.S. coast, and the rate of change will very likely increase in the future, exacerbating the impacts of progressive inundation, storm-surge flooding, and shoreline erosion. Storm impacts are likely to be more severe, especially along the Gulf and Atlantic coasts. Salt marshes, other coastal habitats, and dependent species are threatened by sea level rise, fixed structures blocking landward migration, and changes in vegetation. Population growth and rising value of infrastructure in coastal areas increases vulnerability to climate variability and future climate change.

**Analysis:** Again, the claim implies that sea level rise is human-caused, and thus controllable through EPA rulemaking. But as has been addressed above, global sea level has been rising naturally since before it could have been due to GHG emissions (prior to about 1940). No mention is made of the natural process of land subsidence in some coastal areas (e.g. Norfolk, VA; Miami Beach, FL) which makes coastal sea level rise even worse. Neglecting these issues makes the claim deceptive from the standpoint of supporting the Endangerment Finding.

**Claim #4.12:** Climate change will likely further constrain already overallocated water resources in some regions of the United States, increasing competition among agricultural, municipal, industrial, and ecological uses. Although water management practices in the United States are generally advanced, particularly in the West, the reliance on past conditions as the basis for current and future planning may no longer be appropriate, as climate change increasingly creates conditions well outside of historical observations. Rising temperatures will diminish snowpack and increase evaporation, affecting seasonal availability of water. In the Great Lakes and major river systems, lower water levels are likely to exacerbate challenges relating to water quality, navigation, recreation, hydropower generation, water transfers, and binational relationships. Decreased water supply and lower water levels are likely to exacerbate challenges relating to aquatic navigation in the United States.

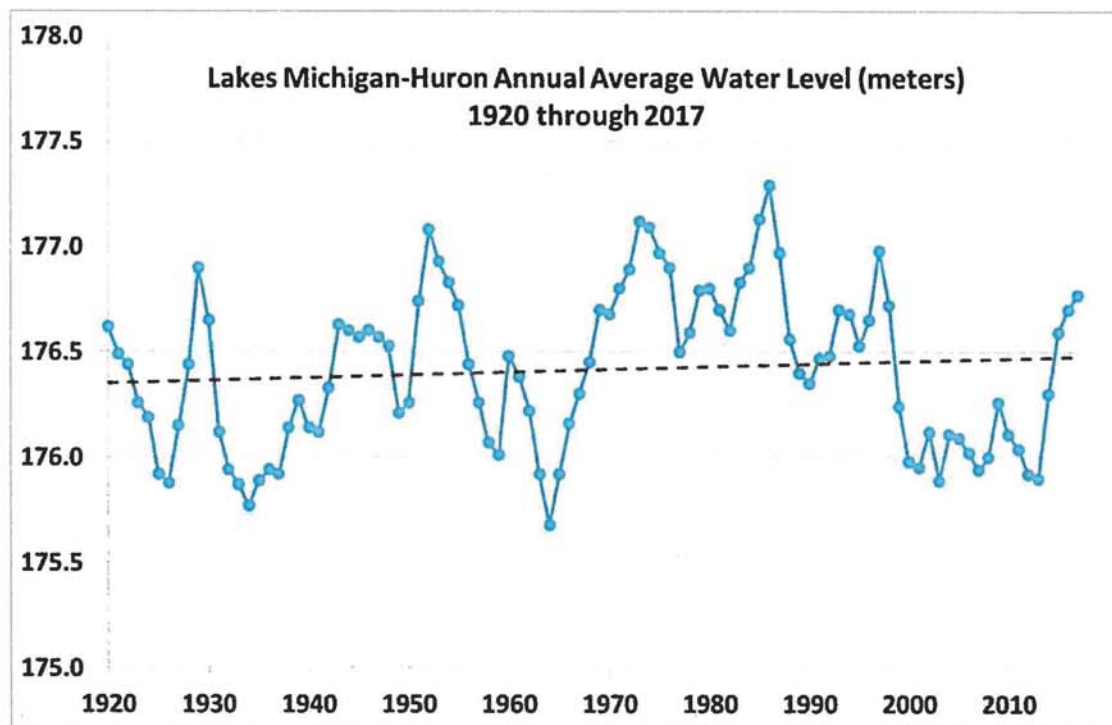


**Analysis:** It is not known to what extent precipitation changes in the U.S. will occur. As discussed in the analysis of Claim #2.6, the observed trend in U.S. precipitation has been upward, not downward, and expert discussions of drought in North America (e.g. the 1930s Dust Bowl) focus on natural causation, such as the Pacific Decadal Oscillation. Regarding the Great Lakes, data from the Great Lakes Environmental Research Lab

([https://www.glerl.noaa.gov/data/dashboard/data/levels/1918\\_PRES/](https://www.glerl.noaa.gov/data/dashboard/data/levels/1918_PRES/))

reveals there has been no decline in water levels over the last century:

### Great Lakes Water Levels Show No Signs of a Decline



Thus most of what is stated in this claim is highly speculative with little evidence any of it has begun to happen.

**Claim #4.13:** Higher water temperatures, increased precipitation intensity, and longer periods of low flows will exacerbate many forms of water pollution, potentially making attainment of water quality goals more difficult. As waters become warmer, the aquatic life they now support will be replaced



by other species better adapted to warmer water. In the long term, warmer water and changing flow may result in deterioration of aquatic ecosystems.

**Analysis:** This claim depends upon the predictions of future warming, which has already been covered.

**Claim #4.14:** Ocean acidification is projected to continue, resulting in the reduced biological production of marine calcifiers, including corals.

**Analysis:** This claim has been covered under claim #2.11.

**Claim #4.15:** Climate change is likely to affect U.S. energy use and energy production and physical and institutional infrastructures. It will also likely interact with and possibly exacerbate ongoing environmental change and environmental pressures in settlements, particularly in Alaska where indigenous communities are facing major environmental and cultural impacts. The U.S. energy sector, which relies heavily on water for hydropower and cooling capacity, may be adversely impacted by changes to water supply and quality in reservoirs and other water bodies. Water infrastructure, including drinking water and wastewater treatment plants, and sewer and stormwater management systems, will be at greater risk of flooding, sea level rise and storm surge, low flows, and other factors that could impair performance.

**Analysis:** The lack of evidence for human-caused changes in precipitation and sea level rise has already been addressed.

**Claim #4.16:** Disturbances such as wildfires and insect outbreaks are increasing in the United States and are likely to intensify in a warmer future with warmer winters, drier soils, and longer growing seasons. Although recent climate trends have increased vegetation growth, continuing increases in disturbances are likely to limit carbon storage, facilitate invasive species, and disrupt ecosystem services.

**Analysis:** This is a partial repeat of what was contained in claim #4.11, and shows a lack of sufficient editing by the document's authors.

**Claim #4.17:** Over the 21<sup>st</sup> century, changes in climate will cause species to shift north and to higher elevations and fundamentally rearrange U.S. ecosystems. Differential capacities for range shifts and constraints from development, habitat fragmentation, invasive species, and broken ecological connections will alter ecosystem structure, function, and services, and

**Claim #4.18: Climate change impacts will vary in nature and magnitude across different regions of the United States.**

- Sustained high summer temperatures, heat waves, and declining air quality are projected in the **Northeast, Southeast, Southwest, and Midwest**. Projected climate change would continue to cause loss of sea ice, glacier retreat, permafrost thawing, and coastal erosion in **Alaska**.
- Reduced snowpack, earlier spring snowmelt, and increased likelihood of seasonal summer droughts are projected in the **Northeast, Northwest, and Alaska**. More severe, sustained droughts and water scarcity are projected in the **Southeast, Great Plains, and Southwest**.
- The **Southeast, Midwest, and Northwest** in particular are expected to be impacted by an increased frequency of heavy downpours and greater flood risk.
- Ecosystems of the **Southeast, Midwest, Great Plains, Southwest, Northwest, and Alaska** are expected to experience altered distribution of native species (including local extinctions), more frequent and intense wildfires, and an increase in insect pest outbreaks and invasive species.
- Sea level rise is expected to increase storm surge height and strength, flooding, erosion, and wetland loss along the coasts, particularly in the **Northeast, Southeast, and islands**.
- Warmer water temperatures and ocean acidification are expected to degrade important aquatic resources of **islands** and coasts such as coral reefs and fisheries.
- A longer growing season, low levels of warming, and fertilization effects of carbon dioxide may benefit certain crop species and forests, particularly in the **Northeast and Alaska**. Projected summer rainfall increases in the Pacific **islands** may augment limited freshwater supplies. Cold-related mortality is projected to decrease, especially in the **Southeast**. In the **Midwest** in particular, heating oil demand and snow-related traffic accidents are expected to decrease.

**Analysis:** Again, these claims depend upon climate models projections of warming and precipitation changes, which we have already seen are seriously biased and need to be re-evaluated by the EPA.

**Claim #4.19: Climate change impacts in certain regions of the world may exacerbate problems that raise humanitarian, trade, and national security issues for the United States.** The IPCC identifies the most vulnerable world regions as the Arctic, because of the effects of high rates of projected warming on natural systems; Africa, especially the sub-Saharan region, because of current low adaptive capacity as well as climate change; small islands, due to high exposure of population and infrastructure to risk of sea level rise and increased storm surge; and Asian mega-deltas, such as the Ganges-Brahmaputra and the Zhujiang, due to large populations and high exposure to sea level rise, storm surge and river flooding. Climate change has been described as a potential threat multiplier with regard to national security issues.

**Analysis:** Again, the projected geopolitical impacts of climate change are speculative, and depend upon the assumption that climate change will continue as projected and is largely human-caused. These claims and assumptions have already been addressed.



## 5. Clouds, Water Vapor, and Climate Sensitivity

Given the importance of climate models to the Endangerment Finding and CPP, it is important to cover a couple issues not discussed in detail, above.

The modelers themselves admit that models must be “tuned” to the observations because there are portions of the physics which are not that well understood (Mauritsen et al., 2012). *These tunings of adjustable parameters can dominated the amount of climate change the model produces.* Model deficiencies in one area sometimes have to be adjusted for in an *ad hoc* manner by tuning other uncertain parameters in the models. So, while much of the physics contained in climate models is well understood, there is very poor understanding of some of the key processes associated with climate change, for example how clouds or precipitation efficiency (and thus the Earth’s greenhouse effect) will change with an imposed warming tendency.

### 5.1 Cloud feedback

How clouds will change in response to the weak direct warming influence of increasing CO<sub>2</sub> (cloud feedback) is still very uncertain. It is possible that cloud feedbacks are negative, and will reduce future warming. As demonstrated by Spencer & Braswell, 2011, in the presence of natural climate fluctuations which have a radiative forcing component, cloud feedback diagnosed from satellite observations can look like they are weakly positive when in fact they are strongly negative. (Most climate models exhibit positive cloud feedback.) This is a large source of uncertainty in climate model projections.

### 5.2 Precipitation efficiency and water vapor feedback

Another example of such an uncertainty is the greenhouse effect of water vapor, which is the atmosphere’s main greenhouse gas. While global warming would likely lead to more atmospheric water vapor in total, this does not mean that water vapor feedback is necessarily positive (Spencer & Braswell, 1997). The greenhouse effect of water vapor is mostly controlled by the very small amounts of water vapor well above the relatively humid near-surface boundary layer where most water vapor resides. That “free tropospheric” vapor in turn depends upon the fraction of cloud water that precipitation systems remove as precipitation. The fraction is called “precipitation efficiency”, and we do not even understand the processes

which control it, leading to huge uncertainty about whether climate models can be relied upon at all to forecast future climate states (Renno et al., 1994; Zhao et al., 2016). In some models, the fraction is simply set to a constant, even though we have no idea what the true value should be, or whether it even is a constant.

The lack of a tropical “hotspot” in the upper troposphere is, in my opinion, evidence that water vapor feedback is not nearly as strong in nature as in models. In the annual AMS Summary of the Climate in 2016 (Blunden & Arndt, 2017), this figure reveals the current discrepancy between models and observations for temperature trends (1979-2016) as a function of height in the troposphere.

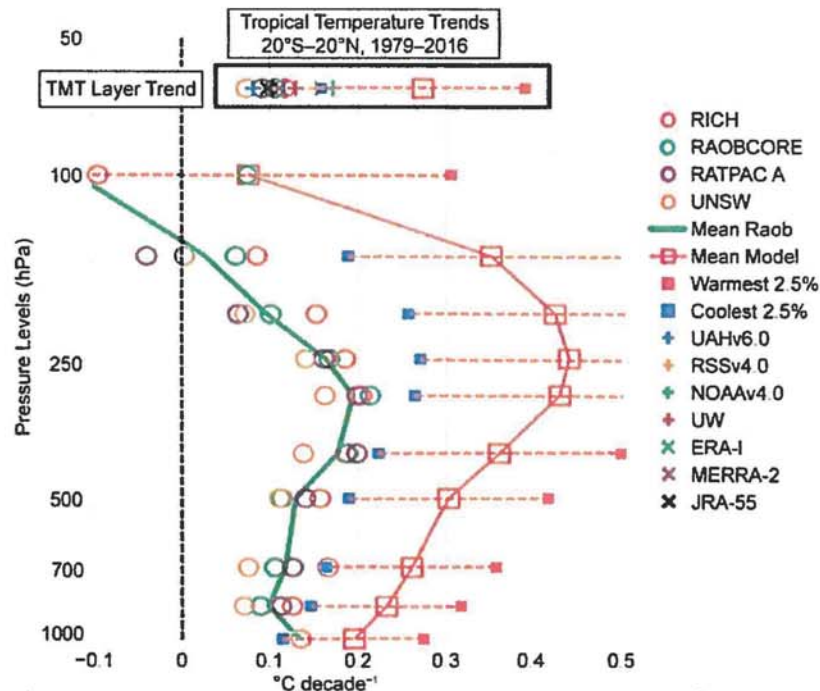


FIG. S2.10. Temperature trends ( $^{\circ}\text{C decade}^{-1}$ ) for the tropics at various tropospheric levels for 1979–2016. The top box indicates trends for the tropical atmospheric layer known as the midtroposphere (TMT) and includes satellite observations. The CMIP-5 (rcp4.5) model output of 102 runs was used for the mean and range of model trends. The horizontal dashed lines represent the range within which 95% of the model trends occurred.

This plot shows that the climate models, on average, predict that a “hotspot” of warming should have evolved in the tropical upper troposphere, but compared to observations they exaggerate it by a factor of 2 to 3, depending on altitude. The connection to water vapor



feedback is this: The IPCC has noted (e.g. [https://www.ipcc.ch/publications\\_and\\_data/ar4/wg1/en/ch8s8-6-3-1.html](https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch8s8-6-3-1.html)) that those models with the weakest upper tropospheric warming (weakest “negative lapse rate feedback”) also have the weakest positive water vapor feedback. Thus, we might reasonably conclude that the lack of a tropical “hotspot” of warming is also evidence of weaker positive water vapor feedback than the models contain. Since water vapor feedback approximately doubles the weak amount of direct warming from CO<sub>2</sub> in most climate models, this is a significant issue.

These uncertainties are routinely ignored by the climate model community, or at least generally not reflected in their most-publicized findings. There has been increasing evidence since the Endangerment Finding was issued that observational estimates of climate sensitivity are generally below (sometimes well below) the average climate model projections (e.g. Otto et al., 2003; Lewis & Curry, 2014); it might even be below the 2.0 deg. C goal many advocacy groups propose as the upper limit for total anthropogenic warming.

## 6. Final Comments and Conclusions

One can reasonably ask the question: Why does the IPCC (and thus the EPA) continue to rely on models almost all of which are known to produce too much warming when compared to observations? There is at least one model (from Russia) that is much more in line with the observations. Why is that model not used for future projections? This is a legitimate question to ask. Clearly, if it was used, the need for an Endangerment Finding (and the CPP) would be much less than portrayed by the EPA, because a model predicting little warming will also exhibit little change in precipitation, droughts, storms, sea ice, etc.

In conclusion, given:

- (1) the lack of clear evidence that recent climate system changes, to the extent they exist, are outside the realm of natural variability;
- (2) evidence that increasing levels of atmospheric CO<sub>2</sub> benefit global photosynthesis and crop productivity;

(3) the inability of climate models to reproduce the recent weak levels of atmospheric warming since 1979;

(4) the inability of climate models to approach energy balance without *ad hoc* tunings;

(5) the current lack of understanding of key physical processes necessary to predict climate changes with models (e.g. cloud feedbacks, changes in precipitation efficiency);

and (6) the demonstrably biased, alarmist, and misleading ways in which the science claims underpinning the Endangerment Finding were made in the Technical Support Document, I conclude that there is sufficient reason for the EPA revisit the Endangerment Finding, and to not replace the Clean Power Plan until such a time that a much more balanced analysis of all of the available scientific evidence, including the potential benefits of more atmospheric CO<sub>2</sub> and modest warming, is undertaken.

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## Curriculum Vitae of Dr. Roy W. Spencer

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#### RESEARCH AREAS:

Satellite information retrieval techniques, passive microwave remote sensing, satellite precipitation retrieval, global temperature monitoring, space sensor definition, satellite meteorology, climate feedbacks.

#### EDUCATION:

1981: Ph.D. Meteorology, U. Wisconsin - Madison  
1979: M.S. Meteorology, U. Wisconsin - Madison  
1978: B.S. Atmospheric and Oceanic Science, U. Michigan - Ann Arbor

#### PROFESSIONAL EXPERIENCE:

8/01 - present: Principal Research Scientist  
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Expert Witness, Senate Environment and Public Works Committee, (7/19/2013)  
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U.S. Science Team Leader, Advanced Microwave Scanning Radiometer-E, 1996-present  
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U.S. Science Team Leader, Multichannel Microwave Imaging Radiometer Team, 1992-1996.  
Member, TOVS Pathfinder Working Group, 1991-1994.  
Member, NASA HQ Earth Science and Applications Advisory Subcommittee, 1990-1992.  
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Principal Investigator, High Resolution Microwave Spectrometer Sounder for the Polar Platform, 1988-1990.  
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Principal Investigator, Global Precipitation Studies with the Nimbus-7 SMMR and DMSP SSM/I, 1984-present.  
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 Chairman, Hydrology Subgroup, Earth System Science Geostationary Platform Committee, 1978-1990.  
 Executive Committee Member, WetNet - An Earth Science and Applications and Data System Prototype, 1987-1992.  
 Member, Science Steering Group for the Tropical Rain Measuring Mission (TRMM), 1986-1989  
 Member, TRMM Space Station Accommodations Analysis Study Team, 1987-1991.  
 Member, Earth System Science Committee (ESSC) Subcommittee on Precipitation and Winds, 1986.  
 Technical Advisor, World Meteorological Organization Global Precipitation Climatology Project, 1986-1992.

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**AWARDS:**

- 1996: AMS Special Award "for developing a global, precise record of earth's temperature from operational polar-orbiting satellites, fundamentally advancing our ability to monitor climate."
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- 1990: Alabama House of Representatives Resolution #624
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