Selected, Edited, and with Issue Framing Material by:
Thomas A. Easton, *Thomas College*

ISSUE

Is Anthropogenic Global Warming Real and Dangerous?

YES: AAAS Climate Science Panel, from "What We Know: The Reality, Risks and Response to Climate Change," AAAS (2014)

NO: Steve Goreham, from *The Mad, Mad, Mad World of Climatism,* New Lenox Books (2013)

Learning Outcomes

After reading this issue, you will be able to:

- Explain how much confidence climate scientists have in their projections of global warming and climate change.
- Explain why climate scientists consider the evidence for human-caused climate change "overwhelming."
- Describe how climate change puts human society and ecosystems at risk.
- Describe what is meant by "climatism."

ISSUE SUMMARY

YES: The AAAS Climate Science Panel argues that warming of the world's climate system is unequivocal, and many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased. Warming can be expected to continue for centuries with profound effects on the environment and on human well-being. Yet there is much we can do to limit future risks.

NO: Steve Goreham argues that the scientific data do not support the IPCC's projections of catastrophe, vast amounts of money are being wasted, and "the theory of man-made global warming" will soon be seen to be completely false. After all, carbon dioxide is not a pollutant—it is an essential plant nutrient!

The idea that the heat-trapping ability of infrared-absorbing gases in the atmosphere is similar to that of the glass panes in a greenhouse (hence the "greenhouse effect") was first proposed by the French mathematical physicist Jean-Baptiste-Joseph Fourier in 1827. In 1896, the Swedish chemist Svante Arrhenius, who later won the 1903 Nobel prize in chemistry, predicted that if atmospheric carbon dioxide (CO_2) levels doubled due to the burning of fossil fuels, the resulting increase in the average temperature at the Earth's surface would amount to four to six degrees Celsius (seven to ten degrees Fahrenheit).

The Arrhenius prediction about global warming was all but forgotten for more than half a century until direct observations and historical data demonstrated that by 1960, atmospheric CO_2 levels had risen to 315 ppm from the preindustrial level of 280 ppm. Careful measurements since then have shown that the CO_2 level is now above 400 ppm, and rising (http://www.esrl.noaa.gov/gmd/ccgg/trends/). The Arrhenius prediction that the average temperature on Earth will rise more than four degrees Celsius may well come true before the end of the twenty-first century if present fossil fuel use and forest destruction trends continue. Most atmospheric scientists agree that

such a warming will be accompanied by changes in the world's weather patterns and a significant increase in sea levels. The data on which these conclusions are based, as well as the conclusions themselves, have been vigorously debated for years.

In 1988, due to concern about the potentially serious disruptive effects that would result from significant, short-term changes in world climate, the United Nations Environment Programme joined with the World Meteorological Organization to establish the Intergovernmental Panel on Climate Change (IPCC) to assess the available scientific, technical, and socioeconomic information regarding greenhouse gas-induced climate change. Thousands of meteorologists and other atmospheric and climate scientists have participated in periodic reviews of the data. The Fifth Assessment Report of the IPCC appeared in 2013–2014. It is very clear that global climate change is real, it is caused by human activities, and its impacts on ecosystems and human well-being (especially in developing nations) will be serious. The report outlined the steps that must be taken to prevent, ease, or cope with these impacts. Other reports (see Nicholas Stern, *Stern Review: The Economics of Climate Change*, Executive Summary, October 30, 2006 [http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm]) make it clear that although taking steps now to limit future impacts of global warming would be very expensive, "the benefits of strong, early action considerably outweigh the costs. . . . Ignoring climate change will eventually damage economic growth. . . . Tackling climate change is the pro-growth strategy for the longer term, and it can be done in a way that does not cap the aspirations for growth of rich or poor countries. The earlier effective action is taken, the less costly it will be."

Exactly what will global warming do to the world and its people? Projections for the future have grown steadily worse; see Eli Kintisch, "Projections of Climate Change Go from Bad to Worse, Scientists Report," *Science* (March 20, 2009). Effects include rising sea level, more extreme weather events, reduced global harvests (Constance Holden, "Higher Temperatures Seen Reducing Global Harvests," *Science*, January 9, 2009), reduced nutrient levels of crops (Mary Macvean, "Rising Carbon Dioxide Levels Affect Nutrients in Crops, Study Says," *Los Angeles Times*, May 7, 2014; http://www.latimes.com/science/sciencenow/la-sci-sn-carbon-dioxide-crops-20140507-story.html), and threats to the economies and security of nations (Michael T. Klare, "Global Warming Battlefields: How Climate Change Threatens Security," *Current History*, November 2007; and Scott G. Bergerson, "Arctic Meltdown: The Economic and Security Implications of Global Warming," *Foreign Affairs*, March/April 2008). As rainfall patterns change and the seas rise, millions of people will flee their homelands; see Alex de Sherbinin, Koko Warner, and Charles Erhart, "Casualties of Climate Change," *Scientific American* (January 2011). Safa Motesharrei, Jorge Rivas, and Eugenia Kalnay, "A Minimal Model for Human and Nature Interaction," *Ecological Economics* (in press), argue that the combination of unsustainable resource use (including fossil fuel use, with resulting global warming) and inequitable wealth distribution threatens the very survival of industrial civilization. The potential for conflict is emphasized in the IPCC's Fifth Assessment Report.

It seems clear that something must be done, but what? How urgently? And with what aim? Should we be trying to reduce or prevent human suffering? Or to avoid political conflicts? Or to protect the global economy—meaning standards of living, jobs, and businesses? The humanitarian and economic approaches are obviously connected, for protecting jobs certainly has much to do with easing or preventing suffering. However, these approaches can also conflict. In October 2009, the Government Accountability Office (GAO) released "Climate Change Adaptation: Strategic Federal Planning Could Help Government Officials Make More Informed Decisions" (GAO-10-113; http://www.gao.gov/products/GAO-10-113), which noted the need for multiagency coordination and strategic (long-term) planning, both of which are often resisted by bureaucrats and politicians. Robert Engelman, *Population, Climate Change, and Women's Lives* (Worldwatch Institute, 2010), notes that addressing population size and growth would help but "Despite its key contribution to climate change, population plays little role in current discussions on how to address this serious challenge."

U.S. President Barack Obama indicated that his Administration would take global warming more seriously than did his predecessors. In June 2009, the U.S. House of Representatives passed an Energy and Climate bill that promised to cap carbon emissions and stimulate use of renewable energy. The Senate version of the bill failed to pass; see Daniel Stone, "Who Killed the Climate and Energy Bill?" *Newsweek* (September 15, 2010). The Obama Administration also said it was committed to negotiating seriously at the Copenhagen Climate Change Conference in December 2009. Unfortunately, the Copenhagen meeting ended with little accomplished except agreements to limit global temperature increases to two degrees Celsius by 2100, but only through voluntary cuts in carbon emissions; to have developed nations report their cuts; to have developed nations fund mitigation and adaptation in developing nations; and to continue talking about the problem (see Elizabeth Finkel, "Senate Looms as Bigger

Hurdle after Copenhagen," *Science*, January 1, 2010). There were few signs that the world is ready to take the extensive actions deemed necessary by many; see, e.g., Janet L. Sawin and William R. Moomaw, "Renewing the Future and Protecting the Climate," *World Watch* (July/August 2010). According to David Rotman, "Climate Change: The Moral Choices," *Technology Review* (April 11, 2013) (http://www.technologyreview.com/review/513526/climate-change-the-moral-choices/), ethicists are only now addressing the question of what ethical behavior means in the global warming context. Is it right to value present benefits (such as cheap, convenient energy) more than benefits to future generations (such as freedom from the consequences of global warming)?

In May 2010, the National Research Council released three books, *Advancing the Science of Climate Change* (http://www.nap.edu/catalog.php?record_id=12782), *Limiting the Magnitude of Future Climate Change* (http://www.nap.edu/catalog.php?record_id=12785), and *Adapting to the Impacts of Climate Change* (http://www.nap.edu/catalog.php?record_id=12783). Together, they stress the reality of the problem, the need for immediate action to keep the problem from getting worse, and the need for advance planning and preparation to deal with the impacts. Computer simulations suggest that since 1980, climate changes have reduced maize and wheat harvests by 3.8–5.5 percent; see D. B. Lobell, W. Schlenker, and J. Costa-Roberts, "Climate Trends and Global Crop Production Since 1980," *Science* (published online May 5, 2011). At a meeting of the International Emissions Trading Association, Christiana Figueres, executive secretary of the United Nations framework convention on climate change, said that the situation is urgent and the world must immediately agree to change its goal from limiting global warming to 2.0°C to limiting it to 1.5°C, or "we are in big trouble"; see Fiona Harvey, "UN Chief Challenges World to Agree to Tougher Target for Climate Change," *The Guardian* (June 1, 2011). In May 2014, the U.S. Global Change Research Program released the National Climate Assessment (http://nca2014.globalchange.gov/), which stresses that global warming is real, serious (with effects varying by region), and primarily due to human activities, chiefly the burning of fossil fuels. In the same month, NASA released "A new study [currently in press with *Geophysical Research Letters*] by researchers at NASA and the University of California, Irvine, [that] finds a rapidly melting section of the West Antarctic Ice Sheet appears to be in an irreversible state of decline, with nothing to stop the glaciers in this area from melting into the sea. . . . These glaciers . . . contain enough ice to raise global sea level by 4 feet (1.2 meters) and are melting faster than most scientists had expected. . . . [T]hese findings will require an upward revision to current predictions of sea level rise" (http://www.nasa.gov/press/2014/may/nasa-uci-study-indicates-loss-of-west-antarctic-glaciers-appears-unstoppable/).

However, there remains resistance to the idea that global climate change is real, is caused by human activities, or poses any threat to the environment or human well-being. Most of the remaining critics of the reality of global warming are either employed by or funded by industries and nations that have a financial stake in resisting proposals for significant reductions in the release of greenhouse gases. Some fossil-fuel–industry funding is funneled through conservative organizations such as the Heartland Institute (http://heartland.org/), which in 2013 made news by spreading disinformation about scientific acceptance of global warming; see Phil Plait, "The Heartland Institute and the American Meteorological Society," *Slate* (December 10, 2013) (http://www.slate.com/blogs/bad_astronomy/2013/12/10/heartland_institute_sowing_global_warming_doubt.html?wpisrc=burger_bar). Earlier in 2013, it mailed copies of Steve Goreham's *The Mad, Mad, Mad World of Climatism* to college professors all over the country.

In the YES selection, The AAAS Climate Science Panel argues that warming of the world's climate system is unequivocal, and many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased. Warming can be expected to continue for centuries with profound effects on the environment and on human well-being. Yet there is much we can do to limit future risks. The NO selection is taken from Steve Goreham's *The Mad, Mad, Mad World of Climatism*, which argues that the scientific data do not support projections of catastrophe, vast amounts of money are being wasted, and "the theory of man-made global warming" will soon be seen to be completely false. After all, carbon dioxide is not a pollutant—it is an essential plant nutrient!

YES

AAAS Climate Science Panel

What We Know: The Reality, Risks and Response to Climate Change

The AAAS Climate Science Panel

Mario Molina (Chair)
University of California, San Diego and Scripps Institution of Oceanography

James McCarthy (Co-chair)
Harvard University

Diana Wall (Co-chair)
Colorado State University

Richard Alley
Pennsylvania State University

Kim Cobb
Georgia Institute of Technology

Julia Cole
University of Arizona

Sarah Das
Woods Hole Oceanographic Institution

Noah Diffenbaugh
Stanford University

Kerry Emanuel
Massachusetts Institute of Technology

Howard Frumkin
University of Washington

Katharine Hayhoe
Texas Tech University

Camille Parmesan
University of Texas, Austin and University of Plymouth, UK

Marshall Shepherd
University of Georgia

The overwhelming evidence of human-caused climate change documents both current impacts with significant costs and extraordinary future risks to society and natural systems. The scientific community has convened conferences, published reports, spoken out at forums, and proclaimed, through statements by virtually every national scientific academy and relevant major scientific organization—including the American Association for the Advancement of Science (AAAS)—that climate change puts the well-being of people of all nations at risk.

Surveys show that many Americans think climate change is still a topic of significant scientific disagreement.[1] Thus, it is important and increasingly urgent for the public to know there is now a high degree of agreement among climate scientists that human-caused climate change is real. Moreover, although the public is becoming aware that climate change increases the likelihood of certain local disasters, many people do not yet understand that there is a small but real chance of abrupt, unpredictable, and potentially irreversible changes with highly damaging impacts on people in the United States and around the world.

It is not the purpose of this paper to explain why this disconnect between scientific knowledge and public perception has occurred. Nor are we seeking to provide yet another extensive review of the scientific evidence for climate change. Instead, we present three key messages for every American about climate change:

1. Climate scientists agree: Climate change is happening here and now.

Based on well-established evidence, about 97% of climate scientists have concluded that human-caused climate change is happening. This agreement is documented not just by a single study, but by a converging stream of evidence over the past two decades from surveys of scientists, content analyses of peer-reviewed studies, and public statements issued by virtually every membership organization of experts in this field. Average global temperature has increased by about 1.4°F over the past 100 years. Sea level is rising, and some types of extreme events—such as heat waves and heavy precipitation events—are happening more frequently. Recent scientific findings indicate that climate change is likely responsible for the increase in the intensity of many of these events in recent years.

2. We are at risk of pushing our climate system toward abrupt, unpredictable, and potentially irreversible changes with highly damaging impacts.

Earth's climate is on a path to warm beyond the range of what has been experienced over the past millions of

years.[2] The range of uncertainty for the warming along the current emissions path is wide enough to encompass massively disruptive consequences to societies and ecosystems: As global temperatures rise, there is a real risk, however small, that one or more critical parts of the Earth's climate system will experience abrupt, unpredictable, and potentially irreversible changes. Disturbingly, scientists do not know how much warming is required to trigger such changes to the climate system.

3. The sooner we act, the lower the risk and cost. And there is much we can do.

Waiting to take action will inevitably increase costs, escalate risk, and foreclose options to address the risk. The CO_2 we produce accumulates in Earth's atmosphere for decades, centuries, and longer. It is not like pollution from smog or wastes in our lakes and rivers, where levels respond quickly to the effects of targeted policies. The effects of CO_2 emissions cannot be reversed from one generation to the next until there is a large-scale, cost-effective way to scrub carbon dioxide from the atmosphere. Moreover, as emissions continue and warming increases, the risk increases.

By making informed choices now, we can reduce risks for future generations and ourselves, and help communities adapt to climate change. People have responded successfully to other major environmental challenges such as acid rain and the ozone hole with benefits greater than costs, and scientists working with economists believe there are ways to manage the risks of climate change while balancing current and future economic prosperity.

As scientists, it is not our role to tell people what they should do or must believe about the rising threat of climate change. But we consider it to be our responsibility as professionals to ensure, to the best of our ability, that people understand what we know: Human-caused climate change is happening; we face risks of abrupt, unpredictable, and potentially irreversible changes; and responding now will lower the risk and cost of taking action.

I. Climate Reality

A. Climate Scientists Agree: Humans Are Driving Climate Change

In 2013, only 42% of American adults understood that "most scientists think global warming is happening" and 33% said, ". . . there is a lot of disagreement among scientists about whether or not global warming is happening." Twenty percent said they "don't know enough to say."[1]

Even Americans who have come to recognize that climate change is occurring know there are limits to their ability to make this judgment from their own experiences. It might appear as if it's raining more or less often, that it's hotter than usual, or that there are more storms than in the past. But is this true climate change or just natural variation? Does a particularly cold or snowy winter, such as the one the eastern United States experienced in 2013 and 2014, or variations in the rate of global surface temperature change call global warming into question? If the climate is changing, are human activities responsible, or is it being caused by natural factors?

Americans look to experts for guidance. If people believe the experts are in doubt about whether global warming is happening, it is no surprise that they will have less confidence in their own beliefs. Perceived expert disagreement has other consequences for the American people. Research shows that Americans who think the scientific experts disagree about human-caused climate change are less likely to believe that it might have serious consequences. Failure to appreciate the scientific consensus reduces support for a broad societal response to the challenges and risks that climate change presents.[3]

So let us be clear: Based on well-established evidence, about 97% of climate scientists conclude that humans are changing the climate.

This widespread agreement is documented not by a single study but by a converging stream of evidence over the past two decades from polls of scientists,[4,5] content analyses of peer-reviewed literature,[3,6] and from public statements issued by virtually every expert scientific membership organization on this topic.[7] The evidence is overwhelming: Levels of greenhouse gases in the atmosphere are rising. Temperatures are going up. Springs are arriving earlier. Ice sheets are melting. Sea level is rising. The patterns of rainfall and drought are changing. Heat waves are getting worse, as is extreme precipitation. The oceans are acidifying.

The science linking human activities to climate change is analogous to the science linking smoking to lung and cardiovascular diseases. Physicians, cardiovascular scientists, public health experts, and others all agree smoking causes cancer. And this consensus among the health community has convinced most Americans that the health risks from smoking are real. A similar consensus now exists among climate scientists, a consensus that maintains that climate change is happening and that human activity is the cause. The National Academy of Sciences, for example, says that "the Earth system is warming and that much of this warming is very likely due to human activities."[8]

B. Climate Change Is Happening Now. And It's Going to Get Worse

No matter where they live, Americans are experiencing the effects of climate change. Of course, extreme weather events of varied intensity have always occurred. Family photo albums, community lore, and history books recount the big storms, droughts, and floods that communities have borne. Against this backdrop of natural variation, however, something different is happening. Greenhouse gases from manmade sources such as smokestacks and tailpipes have altered our climate system. Greenhouse gases have supercharged the climate, just as steroids supercharged hitting in Major League Baseball. Over the course of a baseball season in the steroid era, we witnessed more—and longer—home runs, even though we cannot attribute any specific homer to steroids. Similarly, even though we cannot attribute any particular weather event to climate change, some types of extreme events such as heat waves are now more frequent.

Extreme weather is not just an abstract concept. It is a reality that affects people across the country. In 2013, two out of three Americans said weather in the United States has been worse over the past several years, up twelve percentage points since spring 2012. Many (51%) say weather in their local area has been worse over the past several years. Not surprisingly, then, the gap between what we know as scientists (that global warming impacts are here and now) and what Americans perceive is narrowing: About six in ten Americans already say, "Global warming is affecting weather in the U.S."[9]

The Core Science of Global Warming

After remaining relatively stable at around 280 parts per million (ppm) for millennia, carbon dioxide (CO_2) began to rise in the nineteenth century as people burned fossil fuels in ever-increasing amounts. This upward trend continues today with concentrations breaking the 400 ppm mark just last year. The rate of increase during the past 100 to 150 years has been much more rapid than in other periods of the Earth's history. The warming effect of CO_2 and other heat-trapping gases is well established and can be demonstrated with simple science experiments and satellite observations. Without the natural "greenhouse" effect from gases in our atmosphere, Earth would be a frozen planet.

In addition to greenhouse gases, many other forces can cause changes in the Earth's climate—including the creation and destruction of the Earth's crust, the planet's wobbly path around (and tilt toward) the sun, variation in the sun's energy output, volcanic eruptions, shifting ocean currents, and natural changes in CO_2 and other greenhouse gases. These factors have driven the planet through eras of blazing heat and mile-thick ice sheets. But decades of human-generated greenhouse gases are now the major force driving the direction of climate change, overwhelming the effects of these other factors. Many studies show that the combined effects of natural drivers of climate cannot explain the temperature increase that has been observed over the past half century.

Since the late nineteenth century, Earth's global average temperature has risen by about 1.4°F. Although this may appear to be a small change, the temperature has remained nearly as stable as that of the human body over the course of Western civilization. Just as a 1.4°F fever would be seen as significant in a child's body, a similar change in our Earth's temperature is also a concern for human society.

The difference was about 9°F between the last Ice Age, when half of North America was covered in a mile-thick ice sheet, and today. However, whereas that warming occurred over thousands of years, today's atmosphere has already warmed by 1.4°F in just over 100 years. The projected rate of temperature change for this century is greater than that of any extended global warming period over the past 65 million years. The Intergovernmental Panel on Climate Change states that continuing on a path of rapid increase in atmospheric CO_2 could cause another 4 to 8°F warming before the year 2100.[10]

Some the impacts of climate change that are already occurring and will increase over the coming years:

Sea Ice

Arctic sea ice has been shrinking dramatically, and the rate of loss is accelerating.[11] In September 2012, Arctic summer sea ice fell to a new record low at half the historical average—a loss in area nearly twice the size of Alaska.[12]

Ice Sheets and Glaciers

The melting of the Greenland and Antarctica ice sheets has also accelerated notably.[13] Glaciers continue to melt rapidly, contributing to sea-level rise and also affecting water supplies for as many as a billion people around the world.[14]

Ocean Acidification

The oceans are absorbing much of the CO_2 that smokestacks and tailpipes emit into the atmosphere. As a result, the oceans are rapidly acidifying, with early impacts on shelled organisms such as oysters already documented. The current acidification rate is likely the fastest in 300 million years.[15]

Ecological Impacts

As the world has gotten hotter, many of the world's plants and animals, on land and in the oceans, have begun

moving toward the poles. Where possible, some terrestrial species are moving up mountainsides, and marine species are moving to deeper depths and higher latitudes. These changes are happening on every continent and in every ocean.[16,17,18] In some places, seasonal behaviors are occurring two or three weeks earlier than they did just a few decades ago.[19] The organisms that cannot adapt to the new climate conditions—because they cannot move fast enough or run out of room—will be worse off.

Extinctions are likely to increase as climate change combines with other human-related environmental pressures. Moreover, the impacts of climate change on ecosystem processes such as decomposition, plant production, and nutrient cycling—processes that determine how much fossil fuel–derived CO_2 the land and ocean will continue to sequester in coming decades—remain largely unknown.

Sea Level Rise

Sea level rise has also accelerated, making storm surges higher and pushing salt water into the aquifers that coastal communities depend on for fresh water, and increasing the extent of coastal flooding. Over the past two decades, sea levels have risen almost twice as fast as the average during the twentieth century.[20] Salt-water intrusion can be witnessed in southern Florida, where sea level rise is contributing to salt-water infiltration of coastal wells.[21]

Floods, Heat Waves, and Droughts

Global warming has changed the pattern of precipitation worldwide.[22] Flooding in the northern half of the eastern United States, the Great Plains, and over much of the Midwest has been increasing, especially over the past several decades. These regional flooding trends in the Northeast and upper Midwest are linked to increases in extreme precipitation and are consistent with the global trends driven by climate change.[23] At the same time, areas such as the U.S. Southwest are witnessing more droughts, and these too are consistent with global climate change patterns projected by climate models as a consequence of rising CO_2 levels.[24]

Since 1950, heat waves worldwide have become longer and more frequent.[25] One study indicates that the global area hit by extremely hot summertime temperatures has increased fifty-fold,[26] and the fingerprint of global warming has been firmly identified in these trends.[27] In the United States, new record high temperatures now regularly outnumber new record lows by a ratio of 2:1.[28]

Wildfires

Climate change has amplified the threat of wildfires in many places. In the western United States, both the area burned by wildfires and the length of the fire season have increased substantially in recent decades. Earlier spring snowmelt and higher spring and summer temperatures contribute to this change.[29] Climate change has increased the threat of "megafires"—large fires that burn proportionately greater areas.[30] Warming has also led to wildfires encroaching on some regions where they have been absent in recent history.[31]

Effects on Health and Well-Being

Climate disruption is already affecting human health and well-being in many ways, and health threats are expected to intensify.[32] Some of the well-understood impacts include the direct effects of heat and the effects of other weather conditions such as droughts, floods, and severe storms. Heat waves cause deaths and illness, with urban dwellers, the elderly, the poor, and certain other especially vulnerable groups.[33] While heat-related deaths and illnesses have diminished in recent decades, thanks to better forecasting, early warning systems, and/or increased air conditioning, factors such as the aging of the population are expected to increase vulnerability.[34] Storms and floods can injure and kill victims in the short term, while lingering consequences may range from mold growth in flooded buildings (aggravating asthma) to contaminated drinking water supplies to post-traumatic stress and other mental health disorders.[35,36] Some air pollutants increase with climate change, with the potential to aggravate heart and respiratory diseases. Some plant products such as ragweed pollen reach higher concentrations for longer stretches each year, affecting people with allergies.[37,38,39,40]

Scientists have extensively studied the impact of climate change on the risk of infectious diseases.[41] Climate change affects the life cycle and distribution of disease-carrying "vectors"—mosquitoes, ticks, and rodents, which transmit diseases such as West Nile virus, equine encephalitis, Lyme disease, Rocky Mountain spotted fever, and Hantavirus Pulmonary Syndrome.[42] There is uncertainty about how climate change will affect infectious disease risk, because many factors other than climate affect the spread of disease. The role of climate change on the ranges of vector-borne diseases in the United States, such as Lyme disease, West Nile virus, and dengue, is an active area of research.[43]

Climate Change and National Security

Recent reports from U.S. Department of Defense (DOD) and National Academy of Sciences studies have called attention to the implications of current and probable future climate change for U.S. national security.[44] They identify obvious coastal concerns relating to sea level rise, and others linked to storms, freshwater availability, and agricultural productivity around the globe. For example:

"Climate change could have significant geopolitical impacts around the world, contributing to poverty, environmental degradation, and the further weakening of fragile governments. Climate change will contribute to food and water scarcity, will increase the spread of disease, and may spur or exacerbate mass migration."[45] In the context of other global dynamics that give rise to political instability and societal tensions, changes in climate are considered as potential threat multipliers or instability accelerants, according to the CNA Military Advisory Board—a panel of our nation's highest-ranking retired military leaders.[46] Further, national security assets are often global first responders to humanitarian needs associated with natural disasters including typhoons, hurricanes, and flooding.

Climate change can influence resource competition and place new burdens on economies, societies, and governance institutions. The reports call attention to the fact that these burdens can trigger violence. There is a growing recognition that the displacement of large numbers of people because of water scarcity and agricultural failure, as in the recent history of Syria, can exacerbate tensions that lead to civil unrest. Senior officers and officials in the U.S. DOD are now regularly speaking publicly about how an unabated rise in greenhouse gas emissions could add additional burdens to the infrastructure and mission capacity of our military forces.[47]

II. Climate Risks

We manage risk every day, often without thinking about it. We buckle our seat belts, latch our kids into car seats, and buy insurance for a host of unlikely but serious possibilities such as losing our homes or belongings to theft, fire, or flood. We don't think these things will happen, but we cannot be sure they won't. Uncertainty means risk. Much of our day-to-day risk management is to lessen the danger directly. For example, we purchase cars with the latest safety devices and use these. But another form of risk management is to spread the risk, as with insurance. This helps with recovery if the unthinkable happens.

When we take the long view on climate change, we face these same uncertainties and risks. Climate projections for the year 2100 (when many children born this year will still be living) give a range of plausible temperatures. We are uncertain whether we will experience the high or low end of the range, but the risks of bad outcomes increase greatly at the high end of warming scenarios. By analogy, we are acting like people who take risks with their health (e.g., with behaviors such as smoking and poor food choices) but still hoping to live long lives free of serious illness.

To make decisions about managing a risk, we consider the likelihood that a particular event will happen, the consequences if it did, and the cost of effective actions to prevent it. These are the same steps that go into making decisions about climate change. The process starts with an understanding of the risks. What is the likelihood that extreme climate changes will occur—and if they do, what consequences will we face? How much will it cost to prevent the risk?

A. High-Risk Scenarios: The High-Side Projections

Where there is a range of uncertainty, the high-side projections represent tail risk, a common concept in the world of finance. As most people understand, no investment is a sure thing. There is a range of possibilities about how that investment will fare. You could lose all you invested or make many times what you paid, but the most likely result is closer to the middle of these extremes. Although the chance of a very bad outcome—or tail risk—is small, it cannot be ignored. That is why advisors often recommend against investing any more than you can afford to lose.

With our future health and well-being at stake, it is common sense to consider the tail risks of climate change as a part of future plans. Consider the example of a seaside community in Florida. There are three futures to consider. Even under the most optimistic scenario (very aggressive greenhouse gas reductions and minimal melting), sea level is projected to rise about 1 foot this century.[49] The middle-of-the-road projection for the current pathway is about 2 feet. This is a fairly likely possibility. The Intergovernmental Panel on Climate Change estimates the probability of a sea level rise of 2 to 3 feet to be more than 60%.[50] But the tail risk projection as forecast by the U.S. National Climate Assessment sees the community contending with a sea level rise of nearly 7 feet.[51]

Below are some of the high-side projections and tail risks we incur by following the current path for CO_2 and other greenhouse gas emissions. Most of these projections derive from computer simulations of Earth and its climate system. These models apply the best understanding that science has to offer about how our climate works and how it will change in the future. Many such models exist, and all of them have been validated to varying degrees by their ability to replicate past climate changes.

Global Temperature

According to the IPCC, given the current pathway for carbon emissions the high end of the "likely" range for the expected increase in global temperature is about 8°F by the end of the century.[52] This is similar to the roughly 9°F warming that ended the last ice age. It is important to remember that temperature change due to CO_2 emissions

is essentially irreversible for several hundred years because this CO_2 is removed from the atmosphere only very slowly by natural processes.[53]

Floods, Heat Waves, and Droughts

Globally, if human society follows the high-end scenario, extreme heat events that currently occur only once every twenty years are projected to occur annually.[54] Global warming will also lead to shifting precipitation patterns and concentration of precipitation into heavier downpours—critical risk factors for flooding and drought.

Sea Level Rise

Sea level rise projections over the next century vary considerably, with the high-end scenarios yielding a rise of up to 6 or 7 feet by 2100.[55,56] About 7 to 8 million people in the United States live within 6 feet of the local high-tide line, and storm surge can extend flooding far beyond the high-tide line, as witnessed in Superstorm Sandy.[57] Coastal flooding events that currently occur once every hundred years will occur much more frequently, possibly as often as yearly for many locations, rendering many cities and communities uninhabitable as is.[58]

Current greenhouse gas emissions would have considerable impact on sea level rise beyond the year 2100. In addition to driving sea level rise in the twenty-first century, current emissions might lead to dramatically higher sea level rise in the distant future, possibly beyond 16 feet, which is higher than the elevation of many major cities around the world. There is a slight risk that such large rise could occur faster than expected (see below).[59]

B. Abrupt Climate Change

Most projections of climate change presume that future changes—greenhouse gas emissions, temperature increases, and effects such as sea level rise—will happen incrementally. A given amount of emission will lead to a given amount of temperature increase that will lead to a given amount of smooth incremental sea level rise. However, the geological record for the climate reflects instances where a relatively small change in one element of climate led to abrupt changes in the system as a whole. In other words, pushing global temperatures past certain thresholds could trigger abrupt, unpredictable, and potentially irreversible changes that have massively disruptive and large-scale impacts. At that point, even if we do not add any additional CO_2 to the atmosphere, potentially unstoppable processes are set in motion. We can think of this as sudden climate brake and steering failure, where the problem and its consequences are no longer something we can control. In climate terms, abrupt change means change occurring over periods as short as decades or even years.[60]

The risk of abrupt climate change is particularly challenging because, although it is plausible, we have few historical measurements to guide our judgment of likelihood. The financial meltdown of 2008 was a good example of this kind of risk. We had no history of intertwined real estate and financial markets to draw on, and few experts recognized the risk indicators that led to enormous and rapid economic consequences. It is no surprise that we use a metaphor of bursting bubbles for such highly damaging financial events. We do not recognize we are in one—things seem stable, until suddenly they are not.

If human emissions cause temperatures to increase toward the high end of our projections, we increase the risk that we will push parts of our climate system past certain thresholds that lead to abrupt, unpredictable, and potentially irreversible changes to our planet and impacts for Americans and people worldwide.

Some of the planetary climate-related systems—both physical and biological—that could trigger such abrupt changes for the planet, if pushed past their limits, include: large-scale ice sheet collapse, collapse of part of the Gulf Stream, dieback of the Amazon rainforest, and coral reef die-off. Disturbingly, there is low confidence in the estimates of the temperature thresholds that would trigger such changes. Although some scenarios—such as the disruption of the Gulf Stream/Atlantic Meridional Overturning Circulation (AMOC) and rapid methane release from the sea floor—are considered very unlikely based on the latest research, this does not mean their likelihood has gone to zero.[61] Given the complexity of these systems and uncertainties in how they will respond to high-end warming, there may be surprises that we are not yet aware of. As per the National Academy of Sciences Report on Abrupt Impacts of Climate Change: "...'dragons' in the climate system still may exist."[62]

Some Potential Climate Change Scenarios Include: Ecosystem Collapse

Climate change threatens the collapse of some ecosystems and amplifies extinction pressures on species, which have already elevated extinction rates well above natural background rates.[63,64,65] The rate of climate change now may be as fast as any extended warming period over the past 65 million years, and it is projected to accelerate in the coming decades.[66] When rapid climate change is added to other sources of extinction pressure such as ocean acidification, land use, invasive species, and/or exploitation, the resulting rates of extinction are likely to place our era among a handful of severe biodiversity crises in the Earth's geological record.

Arctic Sea Ice Collapse

Warmer Arctic temperatures have caused Arctic summer sea ice to shrink rapidly over the past decade, with potentially large consequences including shifts in climate and weather around the northern hemisphere. Projections suggest that late-summer sea ice may disappear entirely in the coming decades.[67] The loss of Arctic sea ice has serious consequences for the Earth's climate system. Arctic sea ice covers an important portion of the planet's surface and reflects sunlight back into space that would otherwise warm the ocean. The loss of Arctic sea ice creates a feedback loop, as lost ice leads to additional ocean warming. The ice loss has major effects on the Arctic, and may have effects on weather patterns extending into the lower latitudes.[68,69]

Large-Scale Ice Sheet Collapse

Large-scale melting of both the Greenland and Antarctic Ice Sheets include large-scale losses of ice, potentially leading to tens of feet of sea level rise. Although most of these losses are projected as being unlikely to occur before 2100, we may pass the point where these losses will be set in motion in the coming decades, with at least a slight chance that we have already done so.[70]

In Antarctica, marine ice/ice sheet instability threatens abrupt and large losses from both the West Antarctic Ice Sheet (WAIS) and portions of the East Antarctic Ice Sheet. Any significant ice loss likely would be irreversible for thousands of years. Simulations of warming and ice loss during earlier warm periods of the past 5 million years indicate these areas can contribute 23 feet of sea level rise.[71]

Some studies indicate that abrupt and irreversible ice loss from WAIS is possible, yet uncertainty regarding the threshold is such that it is not possible to say what temperature rise is necessary to trigger collapse.[72,73] An abrupt change in the WAIS this century is deemed plausible, with an unknown but probably low probability.[74] Recently an acceleration of ice loss from the WAIS has been observed, and it is not possible to dismiss or confirm that these changes are associated with destabilization of the WAIS.[75]

Destabilizing of Sea Floor Methane

Frozen methane in the shallow shelves of the Arctic Ocean represents an unlikely but potentially strong feedback loop in a warming climate. Methane is a short-lived but potent greenhouse gas. Although the release of these deposits due to global warming is likely to be slow and mitigated by dissolution into the sea, the deposits are large and vulnerable to warming expected on the higher emission pathway.[76] The release of Arctic methane hydrates into the atmosphere would further increase—perhaps substantially—the rate of global warming.[77]

Permafrost Melt

The release of CO_2 and methane from thawing Arctic permafrost represents another critical feedback loop triggered by global warming.

The amount of carbon stored in the permafrost is the largest reservoir of readily accessible organic carbon on land.[78] However, the positive feedback warming due to the loss of carbon from frozen soils is generally missing from the major climate change models.[79] Not surprisingly, methane and carbon dioxide emissions from thawing permafrost are thus regarded as a key uncertainty in climate change projections.

Disturbingly, there is low confidence in the estimates of expected emissions from thawing permafrost.[80] Although an abrupt release on the timescale of a few decades is judged unlikely, this conclusion is based on immature science and sparse monitoring capabilities.[81] The high end of the best estimate range for the total carbon released from thawed permafrost by 2100 is 250 GtC on the higher pathway. Other individual estimates are far higher.[82]

III. Climate Response

A. The Sooner We Act, the Lower the Risk and Cost

What steps society takes to meet the challenge of climate change—the questions of when, how, and to what extent we respond—are a matter on which all Americans must decide. We urge that these decisions be guided by two inescapable facts: First, the effects of any additional CO_2 emissions will last for centuries. Second, there is a risk of abrupt, unpredictable, and potentially irreversible changes in the Earth's climate system with massively disruptive impacts.

Emissions of greenhouse gases today commit the planet to unavoidable warming and other impacts in the future. As we continue to increase greenhouse gas emissions, we accelerate and compound the effects and risks of climate change into the future. Conversely, the sooner we make a concerted effort to curtail the burning of fossil fuels as our primary energy source and releasing the CO_2 into the air, the lower our risk and cost will be.

B. There Is Much We Can Do

The United States is one of the most resourceful and innovative societies in the world. We are a nation of

problem solvers. When scientists identified the grave environmental threats posed by acid rain and the ozone hole, they worked together with other stakeholders—consumers, industry, and government—to develop solutions that would successfully reduce the threat while minimizing short- and long-term economic impacts. As we hope this paper has made clear, however, successfully responding to climate change will test our resolve and ingenuity in ways unlike any other environmental challenge we have faced.

Many of our major cities—New York, Seattle, Boston, and Chicago are just a few—have assessed the scientific evidence, and decided to reduce greenhouse gas emissions and prepare for the impacts of climate change.

We believe that our responsibility as scientists is to ensure, to the best of our ability, that people fully understand the climate realities and risks we face. Prior experience shows that we and future generations will be better off when science effectively informs decision-making and action. Armed with scientific understanding about the gravity of certain environmental problems, our nation has successfully used innovative approaches to address these challenges.

In summary, responding effectively to the challenge of climate change requires a full understanding that there is now a high degree of agreement among climate scientists about the fact that climate change is happening now, because of human activities, and that the risks—including the possibility of abrupt and disruptive changes—will increase the longer greenhouse gas emissions continue.

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American Association for the Advancement of Science (AAAS) is the world's largest nongovernment general science membership organization. It publishes *Science*, a leading scientific journal. To produce the "What We Know" report, it convened a group of prominent experts, the AAAS Climate Science Panel, in climate science to summarize the state of scientific knowledge pertaining to global warming and climate change.

Steve Goreham

NO

The Mad, Mad, Mad World of Climatism: Mankind and Climate Change Mania

Introduction

I'll bet I know your thoughts about the climate. For years you've heard about how Earth is warming up. How people are the cause of global warming. How the polar bears are threatened with extinction. How we each must change our lifestyle for the good of the planet.

Television specials show calving glaciers and raging torrents from an ice melt in Greenland and voice concern over greenhouse gas emissions. Scientists report from Antarctica about pending disasters. A news story says that the flood in Pakistan is due to global warming. And wasn't Hurricane Katrina caused by climate change?

If you listen to the news, your national leaders promote new policies to fight climate change. Your nation must embrace renewable energy and reduce greenhouse gas emissions. There is talk about new taxes and regulations that will require sacrifices, but these are necessary to solve the climate crisis.

Of course, as a good citizen, you try to follow the lead. You've purchased some of the new compact fluorescent lights. They're a little expensive and it takes a while for them to get bright. They contain mercury—so you don't want to break one. Is it true that you can't buy any of the old incandescent bulbs anymore?

You're told that electric cars are the hot new technology. But they seem a little small and are said to have only a 40-mile range. Will they be available as a minivan or a pickup truck? If you buy one, where can you charge it?

You might have a new Vice President of Sustainability at your company. Purchases of expensive green energy and estimating the carbon dioxide output from processes are new policies. It's politically incorrect to question these policies, so you remain silent.

Your high school student comes home with concerns about climate change. It seems she has just seen Al Gore's movie in class. She asks if your family is doing enough to help save the planet.

A group of wind turbines was recently constructed in the next county. They look majestic, towering above fields and grazing livestock. But when you drive past them, many seem to be standing idle.

Yes, the world is certainly a greener place in response to all these changes. Yet, something deep down in your gut says that all this alarm about global warming just doesn't ring true. Maybe you've heard the demands for change, but they don't make sense in your daily life. Maybe you remember the 1970s, when scientists were concerned about global cooling and a pending ice age. But friends tell you now that your memory is faulty—there was no fear of an ice age back then.

You've been told that our air is being filled with "dangerous carbon pollution." But, you don't see any evidence of this. You recall the smog in our cities and foul-smelling polluted air when you were a child. Somehow it seems like the quality of air has improved during the last 30 years, despite the alarms from the news media.

Maybe you've just been through a tough winter, with mountainous drifts of snow and cold temperatures. Didn't the seasonal forecast call for a warm, dry winter? And what about Climategate—something about a scandal over temperature data at a university in Britain?

Well, your intuition about global warming is right. There is no direct scientific evidence that man-made greenhouse gases are causing catastrophic global warming. Instead, the world has been captured by the ideology of Climatism—the belief that man-made greenhouse gases are destroying Earth's climate. Most of the leaders in government, at universities, in scientific organizations, and in business say they believe in Climatism.

The astonishing thing is that CO_2 *is green!* Rather than being a pollutant, carbon dioxide makes plants grow! In a world turned upside down, every community and every company measures their "carbon footprint" and tries to reduce emissions of a harmless, invisible gas that is essential for photosynthesis and the growth of plants.

Don't misunderstand me. There are real pollutants that we need to control. For more than 25 years, I've had the joy of kayaking many of the great white water rivers of North America. From Texas to Idaho to Quebec, rivers have been a love of my life. I've paddled creeks on the Cumberland Plateau in Tennessee, Al Gore's home turf. Rivers are highlights of this amazing and beautiful world. We all want our water to be pure and our air to be clean. We're all environmentalists. But we must use sound science to determine man-made impacts on our climate. Sensible economics should drive our energy policy, not unfounded fears about global warming.

This book will take a common-sense look at global warming mania. We'll provide a down-to-earth discussion of the science, which increasingly shows that natural cycles of Earth are the dominant cause of climate change—not man-made greenhouse gas emissions. We'll discuss how climate science has been corrupted and look at the money and special interests that continue to drive the dogma of Climatism forward. We'll discuss renewable energy, which is proposed as a primary solution to stop climate change.

The arguments of this book are not just opinions, but are based on the work of hundreds of scientists across the world who challenge the theory of man-made global warming. Graphs and scientific data from peer-reviewed papers are used to show that man-made influences are actually only a very small part of Earth's climate. The evidence is available for all to see.

Chapters 1–2 discuss how our leaders have been captured by the false ideology of Climatism and the remedies proposed to change the life of every person on Earth. Climate science is discussed in Chapters 3–5. I encourage you to read the down-to-earth science in these chapters, but of course feel free to skip these if you're just interested in how the world has been smitten by climate madness. Chapters 6–7 discuss alarming claims about Earth's icecaps and weather, and show that these claims are not supported by scientific data. Chapter 8 exposes some of the biggest whoppers of global warming mania. Chapters 9–10 discuss bad science and the powerful role that money plays in this whole affair. Chapter 11 discusses the continuing shortcomings of renewable energy, despite many decades of media hype and promotion by governments. Don't miss Chapter 12, "You Can't Make This Stuff Up!"

Climate change is a serious topic. Government policies are proposed or already in place that will affect the light bulbs you buy, the construction of your house, the car or appliance you purchase, the price of your energy, your workplace, what your children are taught in school, and almost every aspect of your life. This book will help you sort fact from fiction in the global warming debate. It will remove the fear and paranoia that you and your family may be feeling from daily bombardment of climate change nonsense from work, school, and community.

Along the way, we'll have some fun. We'll discuss the wackiness of mankind turned on its head by global warming alarmism. This whole charade has moved from the serious to the absurd. Beware the sidebars, since a few of these are spoofs. But the rest are true headlines or quotes from our mad, mad, mad world of Climatism. Enjoy and, as the great Paul Harvey used to say, learn "the rest of the story" about climate change.

Climatism—Headed for a Crash

"It ain't what you don't know that gets you into trouble. It's what you know for sure that just ain't so."

—Mark Twain

For more than 20 years, the Intergovernmental Panel on Climate Change (IPCC) and the supporting scientific community, led by climate computer modelers, have successfully promoted the theory of man-made global warming. Almost every nation has accepted prophesies of disaster, responding with bizarre programs of every kind. Researchers at universities and government laboratories have cried "Alarm! Alarm!," gathering billions in funding to "solve" the climate crisis. Vast sums have been spent on dilute, intermittent, and expensive renewable energy projects—money that could be used instead to solve the real pressing problems of mankind. Businesses both large and small promote sustainability and sell green products, trusting that they are helping the environment. But as we discussed in Chapters 4 and 5, climate change is due to natural processes, probably driven by the sun, and man-made emissions play only a very small part. So the world is living in climate madness, certain of a pending climate catastrophe that isn't going to happen.

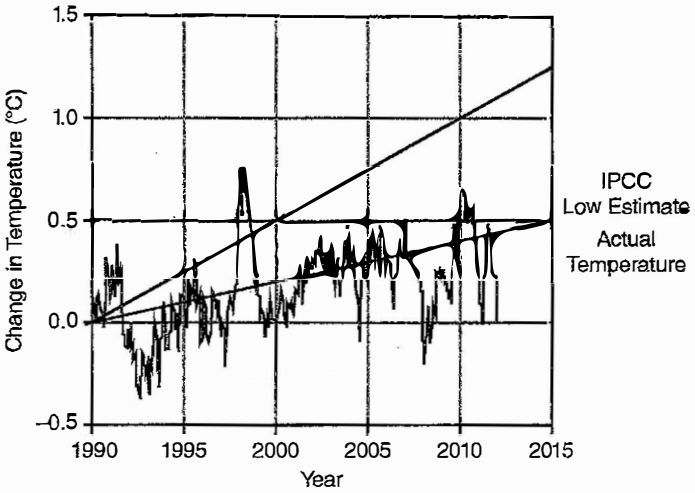
Climatism is headed for a fall. Recent trends in scientific data indicate the IPCC projections of catastrophe appear more and more far-fetched. Political leaders, once marching down the road of Climatism, are no longer certain of the right path. The renewable energy revolution is now threatened by the hard realities of economics and a new abundance of hydrocarbon energy. And citizens are questioning the scary scenario of man-made global warming. The coming disaster will not be about Earth's climate, but will instead be the destruction of the theory of man-made global warming.

Trends Show That the Models Are Wrong

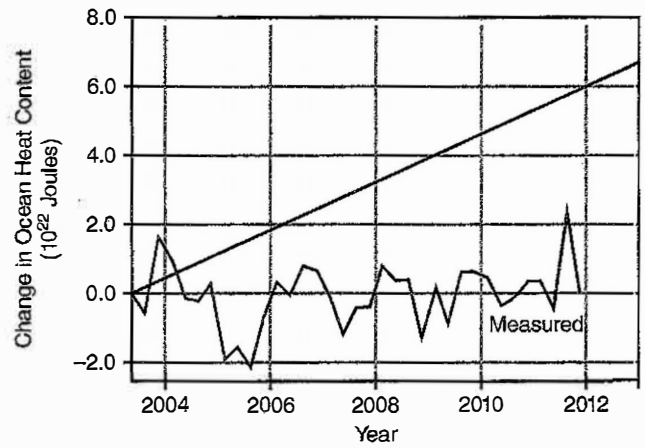
We've now had 20 years to assess IPCC projections, and the projections are found wanting. Based on climate model simulations, the IPCC 1990 First Assessment Report told the world to expect a temperature rise of 0.3°C per decade, leading to 2025 temperatures that would be 1°C higher than 1990 temperatures. But satellite data shows that global temperatures have been flat to declining over at least the last ten years. Temperatures remain about 0.2°C above 1990 levels, but the rise has been substantially lower than the IPCC "low estimate" projection.

In a 2005 paper, Dr. James Hansen, head of NASA's Goddard Institute, warned of an "energy imbalance" due to rising atmospheric CO_2 that was causing Earth's oceans to absorb energy. He stated that this was confirmed by "precise measurements over the last 10 years." But measurements of ocean heat content before 2005 were based on sporadic data taken by passing ships, which was anything but precise.

Since 2000, 24 nations and the European Union have cooperated to deploy the Argo network. Argo is a global array of 3,500 buoys that measure temperature and salinity of the upper 2,000 meters of the ocean. With better ocean coverage and consistent measurements, Argo shows a surprising result. For the last eight years, there has been *no change* in ocean heat content, despite climate model predictions of a steady heat content rise. Dr. Kevin Trenberth of the National Center for Atmospheric Research was baffled by the "missing heat," stating in a 2009 paper:



IPCC Projections and Actual Global Temperature. High, best, and low IPCC projections for global temperature from the IPCC First Assessment Report in 1990, compared to actual global temperature from satellite data. (IPCC First Assessment Report, 1990; UAH Satellite Data; Evans, 2012)



Model Projections and Actual Ocean Heat Content. Model projections diverging from Argo buoy measurements. (Hansen, 2005; National Oceanic Data Center; Evans, 2012)

> . . . Was it because a lot of the heat went into melting Arctic sea ice or parts of Greenland and Antarctica, and other glaciers? Was it because the heat was buried in the ocean and sequestered, perhaps well below the surface? . . . Perhaps all of these things are going on?

In addition to the actual measurements of surface temperatures and ocean heat, natural climate cycles appear to be moving against the theory of man-made warming. Within the last ten years, two of the Earth's major climate cycles, the Pacific Decadal Oscillation and the Atlantic Multidecadal Oscillation, appear to have moved into a cool phase. Many solar physicists now predict a period of low solar activity in the current and coming Sunspot Cycles 24 and 25. All of these trends point to a coming period of cooler global temperatures, rather than the feared warming.

Science Does Not Support Climate Alarm

After 20 years, it's clear that climate catastrophe is not occurring. The modest 0.5°C warming from 1975 to 2000 was not abnormal compared to the Medieval Warm Period and other eras, and there has been no global warming for the last ten years. There is no evidence of increasing water vapor in Earth's atmosphere, and the model-predicted hot spot over the tropics has not appeared.

Water vapor is Earth's most abundant greenhouse gas. Contributions of carbon dioxide to Earth's atmosphere are overwhelmingly due to releases from the oceans, biosphere, and volcanoes. Man-made emissions produce only about one percent of Earth's greenhouse effect. Carbon

dioxide is plant food and the best substance humanity could release into the biosphere.

The Antarctic Icecap, which contains 90 percent of Earth's ice, continues to slowly expand. Ocean levels are rising at seven to eight inches per century, not the 20 feet per century predicted by Dr. Hansen and Mr. Gore. Hurricanes and tornados are neither more frequent nor more powerful on a global scale than those of the past. Polar bear populations are at a 50-year high, and stories of the bear's demise are greatly exaggerated. The fear of ocean acidification is based solely on computer model projections, without empirical evidence that changes in ocean pH are historically abnormal.

Climate science jumped to a wrong conclusion more than 20 years ago, and Climatism is now driven by money. The Climategate emails revealed that lead authors of the IPCC reports were strongly biased to develop data to support the false theory of man-made global warming. Despite the mounting evidence, NOAA, NASA, National Academy of Sciences, the Royal Society, and all major scientific organizations of the world continue to support the theory of man-made global warming. Many will be dining on a generous helping of crow when the world returns to climate reality.

The Failure of Global Negotiations

The year 2009 was set to be a year of triumph for Climatism. In 2007, the IPCC's Fourth Assessment Report declared that mankind was very likely the cause of global temperature increase. That same year, Al Gore and the IPCC shared the Nobel Peace Prize. In 2008, Barack Obama was elected President of the United States, heralding a rebirth of a more environmentally conscious nation. After securing the majority of primary delegates in June 2008, candidate Obama declared:

> . . . this was the moment when the rise of the oceans began to slow and our planet began to heal . . .

Following the President's lead, the US House of Representatives passed the Waxman-Markey cap-and-trade bill in June 2009 and sent it to the US Senate.

The Copenhagen Conference in December 2009, part of the United Nations Framework Convention on Climate Change (UNFCCC), was to be the major next step to control global emissions. Climate activists called for a successor treaty to replace and expand the Kyoto Protocol and establish binding emissions limits on all countries. In January 2009, the European Community (EC) proposed a 30-percent emissions cut by year 2020 for developed nations and a 15- to 30-percent reduction in emissions from "business as usual" levels by large developing nations. More than 15,000 conference attendees, including President Obama and more than 100 other heads of state, traveled to Copenhagen. Despite differences between the developed and developing nations, conference delegates were cautiously optimistic.

But then the momentum collapsed. Throughout 2008 and 2009, opposition to the theory of man-made global warming gained headway with world opinion. The Heartland Institute sponsored the first of eight International Conferences on Climate Change in 2008 and 2009, providing skeptical scientists with a forum for realist climate views. In 2009, the Nongovernmental International Panel on Climate Change issued *Climate Change Reconsidered,* an 880-page volume that was the most extensive critique of the IPCC at the time. The report cited thousands of peer-reviewed articles and concluded that "natural causes are very likely to be the dominant cause" of global warming. Citizens began to recognize that man-made warming alarm was a political movement.

Then in late November 2009, just one week prior to the Copenhagen summit, the release of the Climategate emails shook the science of man-made warming. On their home turf of Copenhagen, European delegates had intended to use the conference to lead the world to a more aggressive climate treaty. But they were shocked when their proposals were ignored by developing nations. On the last day, Brazil, China, India, South Africa, and the United States crafted a weak, voluntary agreement named the Copenhagen Accord, which was then adopted. Delegates left the conference without either a binding agreement on emissions limits or a successor treaty to the Kyoto Protocol.

The combination of the failure at Copenhagen and the release of the Climategate emails shook many in the world community. German Chancellor Angela Merkel and other European leaders returned from the conference disillusioned and discouraged about the prospects for a global treaty. Copenhagen shattered the illusion that the world would join a Europe-led climate crusade.

In 2010, more bad news arrived from the United States. First, the Waxman-Markey cap-and-trade bill died in the Senate without even being called to a vote. Then in fall of 2010, mid-term elections saw Republicans capture a majority in the House of Representatives and gain seats in the Senate. Many first-term Republican representatives openly challenged the theory of man-made warming.

The 2010 Cancun and 2011 Durban climate conferences did little to restore the stalled momentum of the

global warming movement. At Cancun, Mexico, representatives reaffirmed their commitment to limit the global temperature rise to 2°C and their pledge to establish a $100-billion climate fund for developing nations. Not that there was any new evidence that mankind could control global temperatures. The Durban, South Africa, conference called on members to negotiate a new agreement on binding emissions that would include all nations, to go into effect by 2020. The conference also proposed an extension of the Kyoto Protocol for another five years.

But key delegates to Durban were not pleased. Representatives from China and India made it clear that they were unhappy with emissions restrictions, stating that the industrial nations were responsible for emissions that caused the global warming problem. Shortly after the end of the Durban conference, Canada announced that it would not participate in an extension of the Kyoto Protocol. Japan and Russia subsequently also declined to participate, and the United States repeated that it would remain outside of the treaty.

After 20 years of climate negotiations and millions of hours of delegate time, the misguided nations of the world have achieved little. The Kyoto treaty ends in 2012, and a wide policy position gap continues to exist between the developed and developing nations. By 2010, global greenhouse gas emissions were *up 45 percent* from 1990 levels. Despite massive efforts to convert to renewables and to enact cap-and-trade and other foolish climate laws, *the growth rate in global emissions from 1990 to 2010 was the same as the growth rate from 1970 to 1990.* It's no wonder most Climatists are in despair.

Renewable Remedies Are Bankrupt

It's increasingly clear that the remedies of Climatism have failed. As we discussed in Chapter 11, wind and solar cannot replace conventional power plants if continuity of electrical supply is to be maintained. As we discussed in Chapter 11, the use of wind turbines forces backup plants to cycle inefficiently, releasing more harmful pollutants and CO_2 emissions than conventional power plants without wind. Similarly, when land usage is taken into account, vehicles using biofuel produce more pollutants and CO_2 emissions than gasoline or diesel-powered vehicles. "Sustainable" renewable sources use dozens of times more land than hydrocarbon or nuclear alternatives, and the production of biofuels requires much more water than gasoline or diesel fuel.

Rather than being at a point of peak oil and gas, we may be at a point of peak renewables, at least as a percentage of global energy usage. The great hope of Climatism was that the cost of hydrocarbons would continue to rise, making renewables competitive. But the hydraulic fracturing revolution has driven the cost of natural gas down 70 percent in the US over the last decade. Electricity from natural gas plants is cheaper, generates lower emissions than combined wind-gas systems, and has a much smaller land footprint than wind systems. It appears that fracking will provide mankind with a supply of low-cost gas for at least 200 years. Why subsidize another wind turbine?

Faced with massive commitments for renewable subsidies, Germany, Greece, the Netherlands, Spain, the United Kingdom, and the United States have all recently cut subsidies for renewables. How many subsidies will remain when people realize that humans are not destroying Earth's climate? When the subsidies disappear, will fields and hills remain scarred by rusting turbines, with wind howling past unturning blades? Who will clean up the acres of solar cell panels, broken and weed-infested?

Europe and Decarbonization Folly

Europe is living in a fantasy world. The EC continues to push for a zero-carbon future, calling for an 80-percent emissions reduction by the year 2050. Although 2010 CO_2 emissions from 27 European nations were down 7 percent since 1990, much of this is due to a shift from production to imports. For example, official UK government numbers showed a 22-percent decline in CO_2 emissions from UK industry from 1990 to 2009. But total CO_2 missions associated with UK consumption *rose* 12 percent over the same period, because more goods were imported from abroad. When imports are considered, European nations aren't cutting anything.

Energy economics will preclude deep emissions cuts short of economic destruction. Solar systems don't deliver enough energy to make a difference. Wind systems, when considered with required hydrocarbon backup, don't reduce emissions. Nuclear, the only viable decarbonization choice, has been rejected by Austria, Belgium, Denmark, Germany, Italy, and Spain.

Transportation poses a special problem for decarbonization. European emissions from the transportation sector increased 36 percent from 1990 to 2007. As we discussed in Chapter 11, studies now show that ethanol and biodiesel fuels *do not* reduce emissions when used in place of gasoline, diesel, and aviation fuels. The EC has no alternative but to stop the use of cars, trucks, and planes, if transportation emissions are to be cut.

Nevertheless, Europe continues to march down the road of climate madness. Even a patio heater ban has been

proposed to halt climate change. When will European citizens wake up to reality?

Sustainability: A House Built on Sand

According to the United Nations, "sustainable development" is development that meets "the needs of the present without compromising the needs of the future." Sustainability is now widely accepted by governments, businesses, universities, and most major organizations.

Economics taught us that resource scarcity was resolved by market pricing through supply and demand and substitution of goods. But sustainability tells us this isn't good enough. Instead, intellectual elites must direct the activities of mankind to preserve the planet for future generations.

At the core of sustainable development is a belief in man-made global warming. The United Nations and other proponents of sustainability call for reduced consumption, reduced production, and reduced energy usage. Wind, solar, and biofuels are defined as "sustainable," despite their ineffectiveness and land-hogging qualities when compared to traditional fuels. But since nature, not man, controls the climate, the philosophy of sustainable development is built on falsehood.

One Trillion Dollars Down a Green Drain

Every day, 25,000 people die from hunger-related issues in developing nations. More than 1 billion people are trying to survive on less than $1.25 per day. Two and one-half billion people do not have adequate sanitation, 1.4 billion do not have electricity, and almost 1 billion do not have access to clean drinking water. Every year, 2 million die from AIDS. Almost 2 million die from tuberculosis. Malaria, pneumonia, and diarrheal diseases kill millions more.

The tragedy of Climatism is a misuse of resources on a vast scale. The world spent $243 billion in 2010 on renewable energy, trying to "decarbonize" energy systems. *More than $1 trillion was spent over the last ten years,* and governments and industries are on pace to waste another $1 trillion in the next four years on foolish climate programs. Each year, twice as much is spent in a futile attempt to stop global warming as is spent for total international aid. Imagine the benefits to the world's poor if decarbonization expenditures could be redirected to solve the problems of hunger, disease, and poverty.

Billions Will Figure It Out

Today, billions of people believe in the theory of man-made global warming. But year after year, temperatures do not follow model predictions, sea levels do not rise abnormally, the polar bears thrive, and predicted disasters do not occur. The world's citizens will figure it out. Changes in public opinion already show that citizens are beginning to learn the real story. The crash of Climatism will be thunderous.

Let's hasten the fall of Climatism and the awakening of mankind to climate reality. Climate change is natural and cars are innocent. Let's reallocate the vast funds spent in foolish efforts to fight global warming, to instead solve the real pressing problems of mankind.

Steve Goreham is a speaker, author, and researcher on environmental issues and the executive director of the Climate Science Coalition of America.