

Some Political Aspects of the Environmental Crisis and Global Warming

Ross McCluney, Ph.D.

22 OCT 2016

Headings List

Principles of Democracy from the Founding Fathers

How the Enterprise of Modern Science Evolved to What it is Today

Environmental Crisis Summary

Historical Trends

Occasional Failures

Two Cultures

More than just science ignorance and denial

Implications for Climate Policy

Principles of Democracy from the Founding Fathers

James Madison attended the Constitutional Convention that hammered out and ratified the original U.S. Constitution. George Washington presided, but other founding fathers were not present. John Adams, Thomas Paine, and Patrick Henry were involved in its writing and passage and James Madison wrote a document that formed the model for the final version of the original.

Thomas Paine wrote: “The mind once enlightened cannot again become dark,” which points to a belief by the framers of the Constitution that democracy can not work if those having all the power, we the people, are insufficiently informed to cast enlightened votes. In his Foreword to Shawn Otto’s book [The War on Science](#), Lawrence M. Krauss writes that Paine’s quote is true of individuals, but not necessarily true for societies. He points out that “the scientific wisdom of the Greeks was largely abandoned in the Middle Ages.”

The point is that the founders of the U.S., people like Thomas Paine, Thomas Jefferson, and Benjamin Franklin, believed that science and (more generally) enlightenment are paramount in guiding the affairs of state. Jefferson and Franklin not only read and believed in the value of science, they devised apparatus and tested design and other ideas with real prototypes, which we might today call experiments.

As a result of this early guidance and a remarkable Constitution, the country ultimately became a place for scientific study, technological innovation, and progress in many fields of endeavor. Central to that history was the proposition “that public policy should be based on rational reflections on sound empirical evidence” in the words of Lawrence Krauss. Holding to this principle led our country to one of its greatest periods, culminating in the unbridled optimism and hope of the 50s and 60s. The country was working, advancing, becoming better, and in charge of itself.

Important components of that success were the advances brought by science and technology, coupled with political systems that largely worked, and with political and media reliance on fact and evidence-based information to guide decision-making and public policy, as envisioned by the founding fathers.

The most important thing I take from this early period in the history of the United States is this: For a very long time, the U.S. political system has followed the principles laid down by the founding fathers, and it mostly still does, by:

Using fact and evidence-based information to guide decision-making and public policy

How the enterprise of modern science evolved to what it is today

It is worth looking at how the science enterprise evolved to its currently successful form. The earliest of what we might today call scientists followed their curiosity, the first step in developing new understandings of the world around us. They explored nature—at least those aspects they found interesting and worthy of exploration. They observed the world and thought about it. Then they wrote down their observations and preliminary interpretations or explanations of what they conjectured might be going on, i.e. the behavior of each piece of nature they were observing and trying to explain. In the early days, the available tools to perform experiments and make tests of their hypotheses were fairly primitive, so resulted in observations or explanations that were only approximately correct.

As mathematical and investigatory tools improved, early scientists proposed theories and did experimental tests of those theories, to see how correct they might be, i.e., how well they predict the correct outcomes of further experiments. Note that the main question is not why things happen but how. Questions of why generally lead us into the realms of philosophy and religion, out of science.

Improved tools, processes, and methods led to greater refinements in the fields of science and other knowledge over time, with the greatest advances seen in the 19th and 20th centuries. During these, individuals, companies, and governments each had important roles in the process. Individuals were great for ideas, early experiments, and early prototypes and products. Business enterprises developed to manufacture and perform further R & D toward improving their products and finding new ones. Government played an increasingly important role because it could pursue more speculative and longer-term research efforts that might not always deliver useful products (or monetary income from their manufacture and sale) for many years.

The result of these combined enterprises was



a flowering of civilization, the advancement of knowledge, technology, science, and understanding. It led to many of the things, some illustrated to the right, we value in modern, industrialized societies.

Environmental Crisis Summary

By the early 70s, significant evidence had been accumulated that there was a down-side to the previous flowering of industrial civilization. It was the discovery of serious adverse side-effects of that grand development. Many of the great manufacturing and product advances were found to produce chemicals and other solid, liquid, and gaseous outputs, waste products, which adversely affected human health, spoiled landscapes, and damaged ecosystems worldwide. These ecosystems are the life-support system for the human inhabitants of planet Earth. Their damage threatens the future health and livelihoods of all people. We also found out how inter-connected all those ecosystems are with the physical systems that make Earth such a dynamic and beautiful place to live:

- Soil for plants, animals, and agriculture
- Pollinators like bees that are essential to agricultural production
- Clean air to breathe
- Fresh water to drink, irrigate crops, power hydroelectric power plants, carry our boats
- Sea water in which many sea creatures live and on which we depend
- Forests and other vegetation on land and in the water, which provide many crops and which help keep the carbon content of our atmosphere at a healthy concentration
- Oil, coal, and natural gas, deposited underground eons ago and withdrawn for the energy used to power much of our industrial civilization, has been discovered to produce, when combusted and leaked into the atmosphere, accelerating climate change and a noticeable global warming. The latter has become the most serious and immediate threat to industrial civilization yet encountered.

These serious threats are growing as industrial technology spreads and as human population grows around the world. Reversing or at least stabilizing these trends at long-term healthy (i.e. sustainable) levels has become one of the most serious difficulties facing us. Overcoming it will require the very best our modern society has to offer. It is therefore important that we consider how well our society is currently equipped to meet the challenge.

Historical Trends

Over the history of civilization many societies developed well by using science, facts, and evidence to guide public policy. Generally, such societies flourished and benefitted from excellent colleges and universities, many with widely available public education, highly developed fields of knowledge, emphasis on the arts, invention, improved building and other design, advanced public infrastructure, and generally open societies.

Occasional Failures

Along the way there have been examples of societies that became gripped by fundamentalism and authoritarianism, pushing out science- and fact-based approaches in favor of narrow ideologies, rigid

dogmatism and/or narrow theocratic ideas—often with severe restrictions on how decisions should be made and how people must live. Examples:

- The advanced society in Greece, by the Middle Ages had largely abandoned scientific wisdom
- Many Arab countries, where early mathematics, geometry, and scholarship were born, abandoned much of these in the tenth and eleventh centuries with the emergence of religious fundamentalism
- Facist Europe of the late 30s and 40s
- Cambodia under ruler Pol Pot in the 70s killed people for being academics or even for wearing eyeglasses (suggesting literacy)
- Turkmenistan’s government today does not act in the public interest; most of its population is impoverished. It is one of the most repressive countries in the world, having no freedom of association, expression, or religion. All print and electronic media are under control of the state.
- Iran, whose people enjoy many of the benefits of civilization’s advance including generally good education and the fruits of modern civilization, became ruled by a narrow, fundamentalist, religious political system suppressing rights, craving power, and using technology for cruel outside terrorist activities.

Many of these cases ended in failed or highly degraded societies, over-populated, poverty-ridden, and without adequate educational, science, and medical systems.

Two Cultures

Over the last few decades, authoritarian, fundamentalist, and anti-intellectual/anti-science ideas have crept into parts of several otherwise well-developed and highly functioning western countries. The consequences have become dangerous for the futures of those countries. In most cases the results are:

- Threats to the economic and environmental stabilities of countries affected by this political and societal shift
- “Brain-drains” of eminently qualified professionals—scientists, engineers, physicians, and teachers—finding the political and social atmosphere surrounding them too hostile to continue working effectively in that country, an early-warning sign that shouldn’t be overlooked
- Inability or unwillingness to deal with
 - the destruction of critical planetary ecosystems—the life-support systems of humanity
 - Accelerated extinction of plant and animal species
 - Depletion of selected nonrenewable minerals and other resources (mostly non-polluting) upon which industrial society has become dependent
 - Inadvertent climate change and its many consequences
 - Ocean acidification , with adverse effects on coral reefs, [shellfisheries](#), and other ecosystems
 - Melting of land ice (glaciers) and the rising of sea level, inundating low-lying areas, including island nations and [some of the world’s largest cities](#).
 - Melting of floating sea ice which exposes dark water to absorb more solar heat, accelerating the warming of ocean water

- Increasing heat and duration of droughts, with adverse effects on wildfires, agriculture production, and the replenishment of valuable fresh water aquifers
 - Stronger and more frequent storms: tornados and hurricanes which do direct damage and flood large areas affected
 - Freshwater shortages
 - Worsening of air pollution by increasing ground level ozone, the main component of smog. This leads to higher hospital admission rates and higher death rates for asthmatics plus worsening the health of people with cardiac or pulmonary disease. The warmer temperature increases airborne pollen, bad news for those allergic to it.
 - Increased wildlife extinction rates for species unable to adapt to the changes produced. [IPCC 2014](#) Vertebrate species are disappearing 114 times faster than they should, according to a [2015 study](#).
- Losses in our abilities to withstand the immense social and economic upheavals the scientific revolution is producing as the rush of new technologies expands and further impacts our lives
 - Difficulties resulting from the rapid commercialization of incomplete scientific knowledge of the past
 - The huge challenge of dealing with a world armed to the teeth with the products of the military-industrial complex, including weapons that could destroy nearly all life on the planet in an instant

In the U.S, this trend has produced its own version of the two different cultures:

- **Those attempting to adhere to the basic principles laid down by our founding fathers:** Using fact and evidence-based information to guide decision-making and public policy. Fortunately, these are still in the majority around the country and especially in our colleges and universities and many of our state and local governments
- **Others selectively abandoning those very principles.** A political culture has arisen, including both aberrant conservative and liberal viewpoints, which follow half-baked beliefs (eventually elevated to ideologies) that what individuals *want* to be true *are* true, regardless of the fact and evidence-based information opposing those ideologies. In the best of cases, this is just intentional ignorance by those who know better (were trained in school to follow facts, rational thinking, and evidence based principles). In other cases, the educational system has failed to instill these qualities in the thinking processes of graduates. In the worst of cases, willful ignorance and firm belief based on inadequate and/or incorrect knowledge are developed and sustained by a aberrant Twitter, Facebook, and talk radio counter-culture.

More than just science ignorance and denial

This relatively new anti-science trend includes a pervasive shift in how our journalists, media reporters, and especially our politicians justify the policies and plans they propose and report on, as well as the conclusions they draw and the plans they propose. Counter to what our founding fathers hoped for, no longer is it necessary to cite legitimate, well-investigated, well-researched evidence and clear facts (scientifically developed or otherwise) about a case or story.

It has too often become simply a matter of stating what you or your ideology or theocracy *want* you to believe. It is increasingly based on emotion and desire rather than fact-based evidence supporting the direction you or the person being reported on concludes is best.

In the U.S., this has resulted in a polarization of the U.S. Congress so severe that it has become nearly unable to act on important bills that could improve the lives of Americans, passing only a few easily justifiable bills that draw little opposition from either of the two warring sides. As Shawn Otto writes in his book, “Democratic governments the world over are increasingly paralyzed, unable to act on many key issues that threaten the economic and environmental stability of their countries and the world. They often enact policies that seem to run against their own interests, quashing or directly contradicting well-known evidence. Ideology and rhetoric guide policy discussions, often with a brazenly willful denial of facts.”

Journalism, of all things, has also fallen victim to this trend in the U.S., with “fair and balanced” replacing “fact and evidence based on sound scientific knowledge” in some news reporting. In the ultimate perversion of what used to be good journalism, many reporters and their editors now feel obligated to accompany good scientific and evidence-based knowledge with “the other side of the issue,” giving equal weight to fallacious statements by those opposing a clear, scientific, fact-based conclusion. This is supposed to be fair and balanced? It is not.

In most of these cases, the erroneous and wildly wrong or inaccurate “side” of the story shouldn’t even be mentioned. The reporter should stick with fact-based, well-researched and peer-reviewed evidence alone. If there are two equally valid but differing scientific fact-based views held by credentialed spokespersons, both can be covered in the story.

Investigative journalism is supposed to be for we the people, examining information that we don’t have the time, expertise, knowledge, or tools to find for ourselves, presenting the evidence truthfully and leaving it to us to make our own conclusions.

Often, and worse, Otto writes, “Budget-strapped and increasingly unable to discern between knowledge and opinion, science-illiterate journalists too often aid the slide into unreason. Many journalists believe there is no such thing as objectivity, rendering otherwise brilliant minds unable to discern between objective knowledge developed from years of scientific investigation, ... and a well-argued opinion made by an impassioned and charismatic advocate on the other.”

Peabody-winning news anchor Don Shelby talks to journalists about this misconceived objectivity: “Some journalists don’t even attempt to establish the reality or truth of a story. Instead, they go out of their way to present ‘both sides,’ as if this were admirable.”

And what I tell them is that “balance” doesn’t mean you present stories evenhandedly. It means you present them like a set of scales, and if the vast weight of the evidence is on one side of the argument, that’s the side that should get the vast weight of your reporting. You don’t push on the other side to falsely balance the scales. You tell the truth. That’s the “balance” we used to talk about in journalism. Today what we too often see is called “false balance,” because it presents both sides as if they have equal weight of the evidence, when that is objectively not true.

It is also important to understand the difficulties faced by the public and even the journalists in this current age of rapid scientific discovery and advancement of knowledge in many fields that is inadequately covered in schools and many colleges and universities.

It can only get worse, as Otto explains, “Over the course of the next forty years, science is poised to create more knowledge than humans have created in all of recorded history, completely redefining our concepts about—and power over—life and the physical and mental worlds as we assume editing control over the genetic code and mastery in our understanding of the brain.”

This rush of new knowledge often ends up in amazing technology that has great impacts on our lives, but is often too complex mathematically and conceptually for the ordinary citizen to understand. Yet the number of well-trained and salaried science and technical journalists in the U.S. is dwindling, making good, well-written stories and well-produced video news reports few and far between.

Otto concludes, “Without a better way of incorporating science into our policymaking, democracy may ultimately fail its promise. We now have a [large] population that we cannot support without destroying our environment—and the developing world is advancing by using the same model of unsustainable development. We are 100 percent dependent on science and technology to find a solution.” In a remarkable section of his book, Otto offers 52 substantive questions greatly affecting our lives and our futures that require fact and knowledge based, well-researched and reported, investigation to answer. The investigations are being or have been done, but are not adequately reported to the populace by the major media. They require a lot of web searching and search-results-sorting efforts to ferret out. That’s what investigative journalists are for.

The problem extends to other areas as well. As Shawn Otto wrote in his 9 October article in *Scientific American*, “Such rejection is essentially an authoritarian argument that says ‘I don’t care about the evidence; what I say/what this book says/what my tribe says/what my wallet says goes.’ [emphasis added]” Otto quotes Francis Bacon (English philosopher, statesman, scientist, and early advocate for the scientific method, d. 1626), who pointed out the problem at the beginning of the scientific revolution, writing: “What a man had rather were true he more readily believes.” This human tendency is carefully guarded against by credentialed scientists. You can read Otto’s article “A Plan To Defend Against the War on Science” at [this link: https://www.scientificamerican.com/article/a-plan-to-defend-against-the-war-on-science/](https://www.scientificamerican.com/article/a-plan-to-defend-against-the-war-on-science/) It is reprinted by permission of the author and of Scientific American, with a few minor, hopefully clarifying edits in [brackets] in the Appendix to this article.

Otto’s book on the subject, *The War on Science: Who’s Waging It, Why It Matters, What We Can Do About It*, details the problem and offers solutions more completely. It can be ordered from Amazon at [this link: https://www.amazon.com/War-Science-Waging-Matters-About/dp/1571313532](https://www.amazon.com/War-Science-Waging-Matters-About/dp/1571313532).

Otto offers in the above two writings examples of the effects of this new dual-culture political environment in our society, especially in our media. Here are some of those examples on both the liberal and conservative ends of the political spectrum.

- “Those on the political left often unwittingly abet the right’s antiscience efforts by arguing that truth is relative, harboring suspicions about hidden dangers to health and the environment that are not supported by evidence, and selectively rejecting science that doesn’t affirm their health-food and back-to-Eden value system.”
- “The leftists are right that there are serious environmental and health threats afoot from poorly regulated industries, but they undermine their credibility when they extend these suspicions to scientifically unsupported ideas like vaccines cause autism, cell phones cause brain cancer, or genetically modified crops are unsafe to eat.”
- “By seeking arguments that support preexisting beliefs (however laudable the concerns that motivate them) instead of looking to scientific evidence, these progressives give up the very critical-thinking and argumentation tools liberals once used to defend modern society against its authoritarian attackers.”
- “Fears that GMO (genetically modified) food is unsafe to eat, equally unsupported, propel a national labeling movement. Fears that cell phones cause brain cancer or wi-fi causes health problems or water fluoridation can lower IQ, none supported by science, also largely originate from the political left.”
- “...the antiscience of those on the right—a coalition of fundamentalist churches and corporations largely in the resource extraction, petrochemical and agrochemical industries— has far more dangerous public-policy implications because it’s about forestalling policy based on evidence to protect destructive business models. As well, the right generally has far more money with which to spread disinformation and attack science on a host of issues.”
- “...the political right has largely organized itself along antiscience lines that have become increasingly stark: fundamentalist evangelicals, who reject what the biological sciences have to say about human origins, sexuality and reproduction, serve as willing foot soldiers for moneyed business interests who reject what the environmental sciences have to say about pollution and resource extraction.”
- “Industry’s war against science isn’t limited to climate change. A host of public relations campaigns over the last five decades have spent billions of dollars with the express purpose of sowing public doubt about science. The techniques are usually the same: highlight cherry-picked facts provided by paid physicians or scientists whose alternative conclusions support your agenda; emphasize the need for healthy debate (when there really is none); attack the integrity of mainstream science and scientists; emphasize the negative consequences of tackling the problem; feed stories to sympathetic journalists (or purchase a news outlet); fund ‘Astroturf’ groups to create the illusion of grassroots support; call for ‘balance’; and give money to lawmakers who will vote your way.”
- “In the 1960s tobacco companies, for example, mounted a campaign to create public uncertainty about the scientific evidence that smoking causes cancer. The sugar industry funded research at Harvard University for decades to create uncertainty about sugar’s role in heart disease while promoting fat as the real culprit. The chemical industry vilified Rachel Carson to create uncertainty about the environmental problems caused by pesticides. Construction and resource extraction industries paid consultants to help them create uncertainty about the health risks of asbestos, silica and lead.”

Implications for Climate Policy

The evidence of climate change has overwhelmingly been studied and concluded to be real and accelerated by certain actions of humanity, after years of measurements, research, and peer-reviewed discussion and evidence-examination. In spite of this, those with monetary or personal political motives are simply claiming it to be false, calling climate change a hoax.

There are two challenges, therefore, facing our country (and indeed, the world) about the serious threats and growing consequences of climate change, especially global warming. First is to overcome its rapid acceleration, resulting in a need to ramp up our efforts to overcome at least the human-induced component.

We already have a great model for doing this. There is a [layer of ozone gas](#) (O₃) high in the atmosphere that is good at absorbing most of the ultraviolet (UV) radiation coming to us in the solar radiation from the sun. Too much UV exposure on the skin of humans leads not only to a suntan but possibly to serious medical maladies such as sunburn and, with excessive exposure, to [genetic mutations](#) that can lead to skin cancer. Diminishment of the ozone layer for a long period of time could have serious adverse consequences to human life.

In 1974, chemists at the University of California at Irvine detailed threats to the ozone layer in our atmosphere from chlorofluorocarbon (CFC) gases, then commonly used in spray bottles and as coolants in many refrigerators. These were rapidly accumulating in the atmosphere, causing the ozone hole which forms every year over Antarctica to grow and spread, reducing the ozone layer's protecting influence.

Eventually, the world recognized the problem, switched from CFCs in refrigerants and spray bottles to an [alternative propellant](#), mainly a variety of hydrofluorcarbons or HFCs. That worked, and resulted in a largely [successful reversal](#) of the damage CFCs were doing to the ozone layer, giving us great hope that global warming can be reversed similarly, by serious worldwide action.

Footnote: It was recently discovered that the HFCs are powerful global warming gases, more so than even CO₂, having as much as thousands of times greater global warming potential than CO₂, molecule-for-molecule, according to a [22 July 2016 speech](#) by Secretary of State John Kerry. Kerry wrote that efforts are underway to fix the problem with an amendment to the UN's Montreal Protocol and he said, "we've already agreed that 2016 is the year to make that happen."

The problem now, is to accelerate the elimination of *all* greenhouse gas emissions going into the global atmosphere, including HRCs, CO₂, CH₄, and several others. In many countries around the world, including the U.S., market forces combined with growing evidence and real consequences of global warming are already driving energy investors away from fossil fuel combustion (which releases global warming gases as combustion products and through leakage from natural gas wells and refineries) to energy conservation and clean renewable energy sources. However, there remains significant resistance to the change-over from the fossil fuel companies and some electric utility companies.

The second challenge is to eliminate the powerful influence of authoritarian, fundamentalist, anti-intellectual and anti-science forces in politics and in the mass media that is greatly inhibiting efforts to stop

the harmful emissions of fossil-fuel based greenhouse gases. This comes at a terrible time, during which substantial public and government support is needed to accelerate the transition away from fossil fuels. Fortunately, several U.S. government agencies have major programs dealing with climate change, which at least can inform, encourage, and offer assistance toward the change-over. They are listed below with web links to their departments working on the technical aspects of the problems and offering substantive information to the public.

U.S. Government: <http://www.globalchange.gov/>, NASA: climate.nasa.gov, NOAA: <https://www.climate.gov/>, DOE: <http://www.energy.gov/science-innovation/climate-change> NREL: <http://www.nrel.gov/analysis/>, LBNL: <http://eesa.lbl.gov/departments/climate-sciences/>, U. S. Dept. of Agriculture: <http://www.globalchange.gov/agency/department-agriculture>, U.S. Dept HHS: <http://www.globalchange.gov/agency/department-health-human-services> U.S., EPA: <https://www.epa.gov/climatechange>, NSF: https://www.nsf.gov/news/special_reports/climate/, Smithsonian Institution: <http://ecosystems.serc.si.edu/climate-change/>

The best of the two cultures mentioned above has spawned non-profit, civil society organizations dedicated to doing what they can to accelerate the transition to a fossil-free future. A selected list is provided below, with descriptions.

I give special mention, at the end, to the Citizens' Climate Lobby, as I believe it to be doing the most, on the ground, in mobilizing citizens for direct political action. I also believe CCL's programmatic approach has the best chance for success, even in the current political climate. Placing a steadily rising fee on carbon entering the economic system will increasingly discourage its extraction and marketing (shifting energy investors to clean renewable energy alternatives). Distribution of the fee proceeds to the citizens of each country enacting such a fee-and-dividend program adds no new government nor spending and will stimulate the country's economy, put money into consumers' pockets, benefit the middle class, stimulate jobs in the renewable energy industries, and avoid serious political controversy.

350.org was founded by environmental journalist Bill McKibben, author of *The End of Nature* in 1989. Started in 2008, by a group of university friends in the U.S. along with McKibben, the organization's name comes from a best estimate by climate scientists of what the carbon dioxide content of the atmosphere must be reduced to, in parts per million (from the greater than 400 ppm current level), in order to restore the climate to what it was around the beginning of the industrial revolution when the global rise in CO₂ emissions from burning carbonaceous fuels began. 350.org is building a global grassroots climate movement to hold world leaders accountable to the realities of science and the principles of justice by creating solutions to ensure a better future for all. The organization carries out online campaigns, grassroots organizing efforts, and mass public actions to create a global network active in over 188 countries.

The [Union of Concerned Scientists](http://www.ucs.org) was founded during the Vietnam war to protest US government militarization of science, mainly nuclear proliferation and energy issues. Over time it shifted its focus to sustainability, but today most of its advocacy focuses on climate change. It is responsible for groundbreaking research on sustainability standards for vehicles and the other disastrous effects of climate change. Its web site says, "Since its beginnings, UCS has followed the example set by scientists: We share

information, seek the truth, and let our findings guide our conclusions.” Joined with other groups such as the [Yale Project on Climate Change Communication](#), UCS has been integral in refuting claims that climate change is a hoax. It also produces reports on how fossil fuel and other [industries profit from inaction](#) on climate change. See “[Blinding Us from Science](#)”, 18 May 2013 by Theresa Riley, an interview on [Moyers & Company](#) with Dr. Andrew Rosenberg, Director of the UCS [Center for Science and Democracy](#).

[The Climate Reality Project](#) was founded in 2006 by Nobel Laureate and former U.S. Vice President Al Gore, who released the Academy Award-winning film *An Inconvenient Truth* earlier that year. It’s purpose was to take the conversation forward and turn awareness into action. The mission is to catalyze a global solution to the climate crisis by making urgent action a necessity across every level of society. Reaching net zero carbon emissions is the key to the collective prosperity and well-being for all – by taking a huge step closer if we all work together. The approach is to unite millions to make our leaders seize this historic moment. Having signed a strong agreement in 2016, those leaders must work to continually reduce emissions and expand renewable energy in the years that follow.

The [Sierra Club](#) was founded in 1892 by John Muir, mostly made up of scientists interested in exploring the Sierra mountains, promoting appreciation and stewardship of the outdoors. Today the club boasts 2.4 million members and supporters. It has prominent programs fighting climate change, including a [variety of programs](#) on fossil fuels regulations and practices, carbon markets, energy economics, renewable energy, and promoting the transition away from fossil fuels to clean, renewable ones, among others.

[Greenpeace](#) was founded in 1971 to oppose nuclear testing. It’s priority has shifted from nuclear proliferation to confronting climate change, mainly focusing on direct action with an international focus. Currently it is addressing Exxon’s climate-denying stance, claiming it uses its profits to block climate action. The organization believes in the public’s right to know what’s happening to the planet, using investigators to expose environmental crimes and the people, companies, and governments that need to be held responsible. It is promoting a renewable energy revolution to win the fight against climate change. It’s motto, “Keep the fossil fuels in the ground!” is placed on a photo of a wind farm.

“Fossil fuels—coal, oil and natural gas—are major contributors to climate change, accounting for the vast majority of greenhouse gas emissions. They’re also one of the main culprits polluting our air, water and soil. Coal-burning power plants, for example, produce millions of tons of toxic sludge every year, and we’re still reeling from the impacts of the 2010 BP Deepwater Horizon spill that rocked the Gulf of Mexico. As global temperatures increase, sea level rise and extreme weather become even bigger threats to communities at home and around the world. Already in the U.S. we’ve seen major hurricanes, floods, drought and wildfires all linked to climate change, and that’s just in the past few years.

“We see a different future—one built on clean, renewable energy. We believe that a 100 percent renewable energy future is not only within reach, it’s our best chance for to preserve the planet.”

[Post Carbon Institute](#) Founded in 2003, Post Carbon Institute’s mission is to lead the transition to a more resilient, equitable, and sustainable world by providing individuals and communities with the resources needed to understand and respond to the interrelated ecological, economic, energy, and equity crises of the 21st century. Bill McKibben has said that PCI is doing the most important work imaginable, and doing it well. Their goals are to

- Grow collective understanding of our energy reality, and the need for both conservation and appropriate, community-centric renewable energy.
- Promote community resilience as the best way to build thriving, relocalized neighborhoods, towns, and cities capable of withstanding coming disruptions.
- Support a growing movement of innovators and early adopters who can develop best practices and provide leadership both now and during future crises.

PCI's Energy Reality Program builds fundamental energy literacy, aiming to shift the public conversation around energy from wanting more to needing less, and valuing what we have.

Citizens' Climate Lobby was founded to take action toward creating the political will for climate solutions by enabling the exercise of political power by individual citizens, using a very compelling strategy. I think this organization's approach has the best chance to work, so joined it in the Spring of 2016, attended its orientation and training sessions and began writing letters to the editor and opinion pieces on the subject. CCL was started in 2007 by Michael Saunders when he became alarmed about the changing climate and incensed when Congress extended a law that gave \$18 billion in subsidies to oil and coal companies. He felt that Congress was doing things exactly backwards, because it is dominated by special interests, including those with deep pockets, especially the fossil fuel industry.

Saunders noticed that ordinary people were not asking their members of Congress for anything about climate change, at least not in an organized, effective way. And they didn't know what to do or how to go about it. Plus many lacked the self-confidence and support from others needed to be successful. CCL's purpose became simply to change all that, with an outrageously simple, but, we hope, successful plan.

This plan is the main thing, as I'll describe shortly, but CCL is putting together a growing cadre of organized and committed individuals and groups around the country to pursue it in an entirely non-partisan, non-political way, by informing and lobbying members of congress and their staffs on behalf of the plan, while also informing the public and enlisting their support in executing it.



Credit: Votesolar.org

The CCL Plan. It's a remarkably straightforward approach that is described in these two simple points.

- Empower thousands to millions of citizens to connect with and influence their members of Congress
- Purpose: Pass appropriate legislation to require and implement a Carbon Fee and Dividend program, designed to bridge any partisan divides

The carbon fee collects a steadily rising tax on fossil fuels as they are brought into the U.S. economy. The fees will be made to increase on a carefully programmed schedule, to enable corporations to plan for fee impacts. One hundred percent of the funds collected from these fees (less modest administrative costs) will be given back to each household monthly, through existing agencies of the government, only a small portion of their operations to be paid for out of fee collections. The increasing fees will shift the economics of continuing to sell fossil fuels for combustion, hopefully driving energy investors to clean, renewable energy sources such as wind, solar, biofuels, and geothermal (where abundant and available).

Firms seeking to escape higher energy costs will be discouraged from relocating to non-compliant nations (“leakage”), as their products will be subject to import fees (which will be removed when those nations create their own equivalent carbon fee program).

CCL is mobilizing citizen chapters in House political districts around the country and hopes to have legislation enabling this “carbon fee and dividend” program to be passed by Congress in 2017.

Making it Happen. The United States has overcome difficult challenges before. Remember that we are the country that won World War II over two oceans and put men on the moon.

The current challenge, however, has its difficulties, mostly motivational. Although we have the technology, tools, and skills to prevail—it remains to be seen whether we have the collective will. Can we overcome the war on science, the narrow and closed-minded factions at both ends of the liberal-conservative spectrum, sufficiently to implement a positive carbon fee and dividend program in the U.S. quickly? To stop runaway climate change, we need to focus on one goal—replacing fossil fuels with renewables *now*.¹ There are no technological or economic barriers to reaching this goal, but it will require an extraordinary level of participation, commitment, and cooperation amongst all sectors of U.S. society. If the U.S. will lead, other countries will quickly follow.

Indeed, the boomer warrior [web site reports](#) that “Canada Might Provide the Spark for a Carbon Fee and Dividend.” It writes that climate scientist James Hansen “believes that Canada is well poised to become a world carbon pricing leader and that Canada might provide the spark for Carbon Fee and Dividend on a global level” which could thereafter spread around the world fairly quickly.

The Carbon Tax Center, www.carbontax.org is keeping track of countries and provinces as they enact carbon fees or taxes. It notes that “Canada now has its [own page](#), in recognition of its several actual and proposed provincial carbon taxes. Discussed at length is the British Columbia carbon tax, befitting its status as the most comprehensive and transparent carbon tax in the Western Hemisphere, if not the world.” As of this writing, that site indicates carbon taxes have been enacted or proposed in Ireland, Australia, Chile, Sweden, and several other nations including Finland, Great Britain, and New Zealand. The [CCL approach](#) is a stunningly straightforward way to do the important political part of it.

¹ If you are concerned that we will be unable to switch completely, 100%, away from fossil fuels to energy conservation and renewable energy, I have attempted to dispel that concern in these two articles: “[Yes, We Can! A Path to 100% Renewables](#)” and “[The Cost of a 100% Conversion from Fossil Fuels to Renewable Energy](#).”

APPENDIX

Appended to “Political Aspects of the Environmental Crisis” by Ross McCluney, 22 October 2016

A Plan To Defend Against the War on Science

The challenge of creating a public able to parse evidence-free “facts” rests with the press, educators and other thought leaders

By [Shawn Otto](#) 9 October 2016 *Scientific American* [LINK](#)

Reprinted by permission of Shawn Otto, ShawnOtto.com, and ScientificAmerican.com.

Four years ago in *Scientific American*, I warned readers of a growing problem in American democracy. The article, entitled “Antiscience Beliefs Jeopardize U.S. Democracy,” charted how it had not only become acceptable, but often required, for politicians to embrace antiscience positions, and how those positions flew in the face of the core principles that the U.S. was founded on: That if anyone could discover the truth of something for him or herself using the tools of science, then no king, no pope and no wealthy lord was more entitled to govern the people than they were themselves. It was self-evident.

In the years since, the situation has gotten worse. We’ve seen the emergence of a “post-fact” politics, which has normalized the denial of scientific evidence that conflicts with the political, religious or economic agendas of authority. Much of this denial centers, now somewhat predictably, around climate change—but not all. If there is a single factor to consider as a barometer that evokes all others in this election, it is the candidates’ attitudes toward science.

Consider, for example, what has been occurring in Congress. Rep. Lamar Smith, the Texas Republican who chairs the House Committee on Science, Space and Technology, is a climate change denier. Smith has used his post to initiate a series of McCarthy-style witch-hunts, issuing subpoenas and demanding private correspondence and testimony from scientists, civil servants, government science agencies, attorneys general and nonprofit organizations whose work shows that global warming is happening, humans are causing it and that—surprise—energy companies sought to sow doubt about this fact.

Smith, who is a Christian Scientist and seems to revel in his role as the science community’s *bête noire*, is by no means alone. Climate denial has become a virtual Republican Party plank (and rejecting the Paris climate accord a literal one) with a wide majority of Congressional Republicans espousing it. Sen. Ted Cruz (R–Texas), chairman of the Senate’s Subcommittee on Space, Science and Competitiveness, took time off from his presidential campaign last December to hold hearings during the Paris climate summit showcasing well-known climate deniers repeating scientifically discredited talking points.

The situation around science has grown so partisan that Hillary Clinton turned the phrase “I believe in science” into the largest applause line of her convention speech accepting the Democratic Party nomination. Donald Trump, by contrast, is the first major party presidential nominee who is an outright climate denier, having called climate science a “hoax” numerous times. In his responses to the organization I helped found, ScienceDebate.org, which gets presidential candidates on the record on science, he told us that “there is still much that needs to be investigated in the field of ‘climate change,’” putting the term in scare quotes to cast

doubt on its reality. When challenged on his hoax comments, campaign manager Kellyanne Conway affirmed that Trump doesn't believe climate change is man-made.

Over the last 25 years the political right has largely organized itself along antiscience lines that have become increasingly stark: fundamentalist evangelicals, who reject what the biological sciences have to say about human origins, sexuality and reproduction, serve as willing foot soldiers for moneyed business interests who reject what the environmental sciences have to say about pollution and resource extraction. In 1990, for example, House Democrats scored an average of 68 percent on the League of Conservation Voters National Environmental Scorecard and Republicans scored a respectable 40 percent. But by 2014 Democrats scored 87 percent whereas Republican scores fell to just over 4 percent.

Such rejection is essentially an authoritarian argument that says "I don't care about the evidence; what I say/what this book says/what my tribe says/what my wallet says goes." This approach is all too human, and is not necessarily conscious. It is, rather, reflective of the sort of confirmation bias scientists themselves continually guard against. Conservatives notice that many scientists are, in fact, left-leaning. If one is not a scientist, and is conservative, a shorthand is brought to bear, with suspicion of the science as—rather than an objective statement—being a politically motivated argument from the left.

Those on the left are more inclined to accept the evidentiary conclusions from biological and environmental science but they are not immune to antiscience attitudes themselves. There, scientifically discredited fears that vaccines cause autism have led to a liberal anti-vaccination movement, endangering public health. Fears that GMO (genetically modified) food is unsafe to eat, equally unsupported, propel a national labeling movement. Fears that cell phones cause brain cancer or wi-fi causes health problems or water fluoridation can lower IQ, none supported by science, also largely originate from the political left.

Much of this comes from suspicions of so-called regulatory capture, in which government agencies align themselves with corporate interests, a danger the Green Party candidate, Jill Stein, raised in her answer to ScienceDebate.org about vaccination. These suspicions are not always unfounded, and if one can't trust the impartiality of government safety regulations, the avoidance principle becomes the default position and science is denied on the basis that it's corporate PR. This was well illustrated by a 2011 battle in San Francisco, where the board of supervisors, all of them Democrats, voted 10–1 to require cell phone shops to warn customers that they may cause brain cancer (an ordinance that was widely criticized and later repealed). The difference is that although those on the left seek to extend regulations based on fears that are not always supported by science, those on the right oppose regulations that are.

Such confirmation bias has been enabled by a generation of university academics who have taught a corrosive brand of postmodernist identity politics that argues truth is relative, and that science is a "meta-narrative"—a story concocted by the ruling white male elite in order to retain power—and therefore suspect. The claims of science, these academics argue, are no more privileged than any other "way of knowing," such as black truth, female truth or indigenous truth. We can't know, a Minneapolis professor recently argued, that Earth goes around the sun, for example, because these sorts of worldviews have been dislodged by paradigm shifts throughout history. Thus, each of us constructs our own truth, and the job of an educator or a journalist is to facilitate that process of discovery.

The ideas of postmodernism align well with the identity politics of the left, and they have helped to empower disadvantaged voices, which always adds to the conversation. But what works in this case for political discourse is demonstrably false when applied to science. A scientific statement stands independent of the gender, sexual orientation, ethnic background, religion or political identity of the person taking the measurement. That's the whole point. It's tied to the object being measured, not the subject doing the measuring.

By undermining science's claim of objectivity, these postmodernists have unwittingly laid the philosophical foundation for the new rise of authoritarianism. Because if there is no objective evidence that has ultimate credibility, how is one to settle competing claims of truth, such as those made by Trump? Without objective truth, the nattering of warring pundits can go on forever, and can only be settled by those with the biggest stick or the loudest megaphone—in short, by authoritarian assertion, a situation not of postmodernism but of premodernism. Which is exactly what's happening. And which runs completely counter to the enlightenment ideas of American democracy and the journalism that is supposed to inform it.

The problem is that the dangers science is revealing are real, and the failure to regulate, promoted in the name of free market economics, is itself scientifically unsupported. The exploding human population coupled with expanding technological power is having a profound collective impact on a nonexpanding planet. When Adam Smith first offered the libertarian idea of the self-regulating market's "invisible hand," the world was effectively unlimited and relying only on market forces to produce the highest good seemed reasonable because one was never concerned with waste that wouldn't flow away or resources that wouldn't replenish.

But the model becomes a problem when the world is limited, population has grown exponentially, we are swimming in waste and facing dwindling resources, and our cumulative exhaust is warming the planet. These are scientific facts, and facing them implies regulation of the free market. It's no surprise, then, that the science has divided along political lines between those on the left, who favor personal morality and collective responsibility via regulation and those on the right who favor collective morality and personal responsibility through regulation's removal.

Industry's war against science isn't limited to climate change. A host of public relations campaigns over the last five decades have spent billions of dollars with the express purpose of sowing public doubt about science. The techniques are usually the same: highlight cherry-picked facts provided by paid physicians or scientists whose alternative conclusions support your agenda; emphasize the need for healthy debate (when there really is none); attack the integrity of mainstream science and scientists; emphasize the negative consequences of tackling the problem; feed stories to sympathetic journalists (or purchase a news outlet); fund "Astroturf" groups to create the illusion of grassroots support; call for "balance"; and give money to lawmakers who will vote your way.

In the 1960s tobacco, for example, companies mounted a campaign to create public uncertainty about the scientific evidence that smoking causes cancer. The sugar industry funded research at Harvard University for decades to create uncertainty about sugar's role in heart disease while promoting fat as the real culprit. The chemical industry vilified Rachel Carson to create uncertainty about the environmental problems caused by pesticides. The construction and resource extraction industries paid consultants to help them create uncertainty about the health risks of asbestos, silica and lead. More recently the National Football League used incomplete data and league-affiliated doctors to create uncertainty about the relationship between head trauma and chronic traumatic encephalopathy. The central message is always: because we can't be 100 percent certain, we should do nothing.

The partisan split has been exacerbated by these campaigns, and by a news media that has been trained for two generations in the false postmodernist view that there is no such thing as objectivity. Journalism schools teach it; it's contained in reporter guidelines and repeated by leading journalists. Intended as an admonishment against assuming one's own reporting is unbiased, the mantra has become so ingrained that reporters rarely challenge those in power on evidentiary grounds, which is one of the main purposes of the fourth estate. David Gregory, NBC News's chief White House correspondent during the George W. Bush administration, put it quite clearly in his defense of the White House press corps for not pushing Pres. Bush on the lack of credible evidence of Saddam Hussein's "weapons of mass destruction" before the U.S. invaded Iraq. "I think there are a lot of critics who think that...if we did not stand up and say this is bogus,

and you're a liar, and why are you doing this, that we didn't do our job," Gregory said. "I respectfully disagree. It's not our role."

But if it is not the press's role, whose is it? Is it partisan to challenge Trump on his false assertions about global warming? How are people to make well-informed decisions about momentous policies or important elections without accurate, reasonably objective information and questioning of the powerful? Instead, journalists often seek to find stand-ins who will provide opposing arguments and create "balance," so they can appear as neutral arbiters in a playground spat. But the journalistic principle of balance gets into trouble when there is a matter in which significant evidence from science can be brought to bear.

Public relations firms know this and take advantage of it to manipulate journalists. A journalist who dedicates half the story to a scientist who is representing all the knowledge created from tens of thousand of experiments carried out by thousands of scientists (many of whom have risked their careers and sometimes their lives) using billions of data points, on the one hand; and the other half to a passionate advocate with an opposing opinion representing a minority view or from outside of science altogether, is engaging in false balance. Such representations portray the outlier views as if they have the same weight as those of the mainstream science, and thus elevate extreme views (and extreme partisanship) in the national dialogue.

The authoritarian nature of science denial is part and parcel of the rise of a new authoritarian nationalism that is in reaction to the globalization brought about by our postwar scientific success, and is antithetical to science and the scientific process of investigation. Such authoritarians put science in their crosshairs and claim it is a partisan tool, just as they have argued against the "liberal media" to cow journalists from testing claims against evidence. But science is never partisan. To be effective, scientists must be both conservative and progressive: They must survey all the known science on a given topic and at least acknowledge and account for those traditional values if they publish something new on the topic or they risk career suicide. But they must also be open to new insights and new ways of thinking, because that's where the frontier is, and to do less is to risk career stagnation, another form of suicide. Science is never partisan but it is inherently political, because its antiauthoritarian, evidence-based conclusions either confirm or challenge somebody's cherished ideological or economic interests—and that is always political. Considered this way, politics is not a simple left-right continuum; it also has a vertical component between authoritarianism and antiauthoritarianism. Thus there are authoritarians like Mao and Stalin on the left; Hitler and Mussolini on the right, but what they have in common is intolerance to the sort of open exchange that is central to art, science, and human progress.

This vertical tension between experts and authoritarians helps explain what is going on in both the Republican Party and in the European Union with the Brexit vote and the rise of a new authoritarianism, and why it is so corrosive to science. The argument is between antiauthoritarians who support science and evidence, and authoritarians who have had enough of experts.

This problem can be expected to worsen in the coming years, particularly if authoritarian candidates continue to be elected with the aid of a news media that treats any view, no matter how unsupported, as legitimate. We are creating knowledge at 10 times the rate we have in the recent past. All of that new information must be parsed and its implications worked through our moral and ethical discussion, then codified in our legal and regulatory systems, and that is inevitably a fraught and political process. Advances in gene editing are providing increasing control over the process of life design and creation, raising complex ethical and political issues. Advances in neuroscience are increasingly showing the mind to be a construction of the brain. These insights, combined with advances in pharmaceuticals and computer-brain interface technology, will challenge our ideas about psychology, spirituality and personal responsibility as well as upend our ideas about criminal justice. And yet we are still stuck in a 40-year debate over the evidence that humans are causing global warming.

There are solutions, however. Sciencedebate.org is certainly a start. Evidence shows the public is hungry for such discussion of science-driven issues—which affect voters at least as much as the economics, foreign policy, and faith and values issues candidates traditionally discuss—that afford an opportunity to hold candidates to account on the evidence. Individuals can join and support organizations like ScienceDebate.org or the Union of Concerned Scientists that fight for scientific integrity. Pastors and preachers can certainly do more by staying informed of cutting-edge science and helping their parishioners parse the complex moral and ethical implications of new knowledge instead of rehashing old political divides. Educators can develop model curricula and provide training for science-civics classes at the secondary and postsecondary level so that nonscience students develop an understanding of how science works in public policy as well as how it relates to their daily lives. There are dozens of others. I discuss many of these solutions in my new book, *The War on Science*.

“Wherever the people are well informed,” Thomas Jefferson wrote, “they can be trusted with their own government.” We have to develop more robust ways of incorporating rapidly advancing scientific knowledge into our political dialogue, so that voters can continue to guide the democratic process and battle back authoritarianism as we did at our foundation and have done throughout our history. That will require the media to rethink their role in reporting on issues in which scientific knowledge is crucial. Is that idealistic? Yes. But so were America’s founders.

Shawn Otto

Shawn Otto (<http://shawnotto.com>) is the award-winning author of "The War on Science: Who's Waging It, Why It Matters, What We Can Do About It" (<https://www.amazon.com/War-Science-Waging-Matters-About/dp/1571313532>). He is cofounder and chair of ScienceDebate.org. Scientific American is media partner to the ScienceDebate project.