

Conclusions

*There is still time to avoid the worst impacts of climate change,
if we take strong action now.*

—SIR NICHOLAS STERN¹

*The issue of climate change is one that we ignore at our own
peril. . . . Unless we free ourselves from a dependence on these
fossil fuels and chart a new course on energy in this country,
we are condemning future generations to global catastrophe.*

—PRESIDENT BARACK OBAMA²

I WILL NOW BRIEFLY RECAP the basic facts about the climate crisis that show why action is urgently needed, what the general nature of that action ought to be, and what obstacles stand in the way.

The Indisputable Facts

Since the start of the Industrial Revolution, humans have released 545 metric tons of carbon to the atmosphere.^a It now contains the highest levels of heat-trapping gases—carbon dioxide, methane, and nitrous oxide—of any time in the past 800,000 years. Annual emissions of carbon dioxide—from fossil fuel burning and cement production plus land-use changes^b—have surged 54 percent just from 1990 to 2011 to 10.5 billion metric tons of carbon a year.³ The Earth has responded to all these heat-trapping gases by getting warmer: its average land and sea temperature has thus risen by about one and a half degrees F since the mid-nineteenth century. The Greenland and the Antarctic Ice Sheets are melting at increasing rates, as are the world's

^a That is equivalent to two trillion metric tons of carbon dioxide.

^b The land-use changes include deforestation and emissions from agricultural activities, such as animal husbandry, rice cultivation, and fertilizer application.

glaciers. Positive climate system feedbacks, such as the warming, melting, and thinning of Arctic permafrost, are appearing. Arctic sea ice is also melting very fast, adding more positive feedback. Meanwhile, sea level is rising at an accelerating rate; ocean temperature, currents, and salinity are changing; and the oceans are growing dangerously more acidic. Because global temperature has risen, heat waves and other weather extremes have become more common, the onset of seasons has altered, and the global water cycle and atmospheric circulation have been affected.

These trends are likely to continue and accelerate for the foreseeable future. But even after emissions stop, adverse climate effects will continue for millennia. Eventually, society will have to cease its discharge of heat-trapping gases. Delay only allows the atmospheric burden of heat-trapping gases to swell. The greater these cumulative emissions, the higher the Earth's final temperature, and the more severe the consequences—longer-lasting droughts, more insufferable heat, larger deserts, scarcer food and water, higher oceans, more corrosive seawater, more fetid ocean bottoms, and a dreadful paroxysm of species extinctions.

The Earth cannot indefinitely withstand the ravages of habitat destruction, the strain of an exploding human population, *and* abrupt climate change. The outcome is predictable.

Healthy natural ecosystems will lose their diversity or collapse outright. As their productivity declines, so will the Earth's life-support capacity. People will suffer and populations will contract. These impacts are now so imminent and devastating that it is time to declare that the planet is in a climate emergency.

Every emergency has two basic aspects: (1) a grave threat to life, liberty, property, or the environment, and (2) a need for immediate action. Millions of people have already died from disease and malnutrition brought on by climate change. Even more harm is likely, according to hundreds of authoritative scientific studies. So climate change presents a grave threat to life, liberty, and property as well as to the environment. And it is irreversible for the foreseeable future, so immediate action is necessary before further avoidable harm is done. Even if heat-trapping gas emissions miraculously fell to zero tomorrow, the atmosphere would get another 1 to 2°F degrees hotter, just from excess heat already absorbed by the oceans.

In a matter of decades, billions of people will lack adequate food and water if society continues on its current emissions trajectory. Governments and relief organizations today are already struggling to care for millions of

refugees. In an overheated world, tens of millions *more* environmental refugees will be on the move—hungry, sick, and desperate. This is a recipe for conflict and chaos. This problem and that of climate change in general are greatly compounded by rapid global population growth, most of it in developing countries, exacerbated by child marriage and inadequate access to family planning resources.^c

Time Is Running Out

Because of the cumulative nature of carbon emissions and the decades required to convert global economies from fossil fuels to clean energy, the chance to protect the Earth from horrific consequences is slipping away. Merely to have a two-thirds chance of avoiding a global temperature increase of more than 3.6°F means we cannot add more than another 270 billion metric tons of carbon to the atmosphere, according to the *Fourth Assessment Report* of the Intergovernmental Panel on Climate Change (IPCC). Thus, even if the world held its current emissions constant at 10.5 billion metric tons of carbon a year, instead of increasing them rapidly, the world would have only 26 years to avoid crossing the 270 billion metric ton carbon threshold. Future emissions would then need miraculously to fall to zero in 2039 to avoid overshooting 3.6°F, the nominal boundary between safe and unsafe climate change.

We are therefore now clearly on the precipice of extremely dangerous changes: by between 2080 and 2100 we are on track to increase global average temperatures by 6 to 10°F, as compared with preindustrial times, according to the scientifically conservative IPCC. Some experts are projecting that 7°F could be reached by 2060. Such temperatures haven't been seen on this planet in five million years. Moreover, those average temperatures would be roughly doubled in continental interiors.

In the overheated world of a few decades from now, up to 30 percent of the world would be in drought at any time, up from 1 percent today. Fifty percent of land where crops now grow would become unsuitable for farming. A 7°F temperature increase could cause most of the world's old trees to die from a combination of drier conditions, heat, and climate-related diseases.⁴ Even a temperature increase of 3.6°F could eventually drive the Earth's climate past

^c One in three girls in developing countries (excluding China) is married before age 18 and one in nine is married before age 15. This not only raises birth rates but violates girls' human rights and jeopardizes their health, often curtailing their education and vocational choices. (See United Nations Population Fund, *Marrying Too Young: End Child Marriage* (New York, UNFPA, 2012).

various “tipping points” at which the climate system itself begins to multiply the effects of human greenhouse gas releases. Such feedbacks could defy all conceivable human control.

Making Remedial Action a Top Priority

If our current emissions trajectory continues, a quarter of all land plant and animal species will likely be gone within just 50 years—far less than a human life span. Then by 2100, half of all the species on Earth would likely disappear—a catastrophe unprecedented in human history.^d For all these reasons, the climate emergency, too long neglected, must become a top financial as well as political priority. It is even more threatening to our long-term security than terrorism and conventional military threats—on which the United States spends hundreds of billions a year—and the financial crisis of 2008 and beyond, when the Federal government committed trillions to bail out troubled banks and insurers. Economies have recovered from financial crises. But once a critical climate tipping point is passed, no financial manipulation will un-tip it. Whereas a healthy climate is essential for economic prosperity, a runaway global climate catastrophe would devastate rich financiers along with poor subsistence farmers, dwarfing the 2008 financial crisis.

Fortunately, many global studies confirm that we have the technology, financial capability, and renewable energy resources to successfully transition to an energy economy largely free of fossil fuels. But this will require some hard technological and political choices. Very large global programmatic investments in energy efficiency, renewable energy technology, agriculture, forestry, as well as carbon capture and storage will be needed to protect the climate. Yet affordability is not the main impediment.⁵ The United States currently has a gross domestic product of about \$16 trillion, but like most other nations, it prioritizes military and other spending over climate protection. The United States thus spends \$1.0 to \$1.4 trillion a year of its \$3.45 trillion federal budget on defense⁶—which amounts to about 40 percent of the entire world’s military spending.⁷ All the nations of the world together, however, spent only \$145 billion for all renewable energy technologies and systems in 2009.^{8,9,10}

^d That trajectory has been designated as A1B by the IPCC in its *Special Report on Emissions Scenarios* and is roughly equivalent to a scenario known as Representative Concentration Pathways 8.5—a path of increasing emissions sufficient to add 8.5 watts/square meter of Earth’s surface to the planet. Pursuing RCP 8.5 for the twenty-first century would bring atmospheric carbon dioxide levels to more than 925 parts per million by 2100, well over the level seen on Earth for millions of years.

Redirecting Energy Investments

The International Energy Agency estimates that the world needs \$38 trillion in energy infrastructure investment between 2010 and 2035—an average of over \$1.5 trillion a year.¹¹ If past is prologue, most would be spent on gas, oil, and coal energy infrastructure. Yet if those dollars were redirected from fossil fuel infrastructure into efficient and renewable energy systems, they would make more energy available more cleanly and with vastly more new employment than business-as-usual fossil fuel investments. It is therefore hard to escape the conclusion that socially irrational energy decisions are being made due to the political and economic influence of fossil fuel producers. A relatively small number are responsible for a disproportionate share of the world's carbon emissions. From 1854 to 2010, nearly two-thirds of all human-induced carbon dioxide and methane were attributable to just 90 major commercial and state entities, according to Richard Heede of the Climate Accountability Institute.¹²

A redirection of capital would partially de-fund these entities. The new funding for renewables and efficiency could come from many sources. Using federal, state, and local financial incentives, governments could leverage public money to encourage private investment. Loan guarantees, revolving credit, public-private cost-sharing, accelerated depreciation, tax exemptions, tax credits, and “feed-in tariffs,”^e can all tilt markets in favor of climate-safe energy sources. Funds could also be made available by ending direct fossil fuel subsidies that totaled \$500 billion worldwide in 2010. As resource policy expert Lester R. Brown wrote, “All together, governments are shelling out nearly \$1.4 billion per day to further destabilize the earth's climate.”¹³ Additional funds to supercharge a global transition to climate-safe energy sources can also come from fees on carbon-based fuels. In short, if intelligent clean energy and transportation programs are interwoven with enlightened agricultural and forestry policies, humanity can avoid aggravating the climate crisis. “Our progress here will be measured . . .,” said President Obama in his 2013 Georgetown University climate speech, “in crises averted, in a planet preserved.”

Sensible Steps Toward Climate Protection

A comprehensive national energy plan for each nation on Earth is needed—aimed at nothing less than a total transformation of its national energy system. The plan needs to provide for a steadily increasing national

^e A “feed-in tariff” is a guaranteed price for renewable power set by a regulatory body, such as a public utility commission or a legislature.

renewable energy requirement, the electrification of the transportation system, energy storage technologies, and modernization of the electric transmission grid. Such plans could also aim at achieving full employment and economic revitalization, so ordinary people would both benefit from, and support, the plan. Jobs would be created in energy efficiency services as well as in manufacturing, installing, transporting, financing, and maintaining new renewable energy equipment. Millions of people could be put to work restoring and enhancing damaged natural resources that naturally remove carbon from the atmosphere, including forests, agricultural lands, grasslands, and wetlands. My forthcoming book, *Climate Solutions: Turning Climate Crisis Into Jobs, Prosperity, and a Sustainable Future*, provides an in-depth look at exciting opportunities to simultaneously reduce emissions while creating enormous economic opportunities and environmental benefits that would accompany a massive clean-energy infrastructure program. Nonetheless, momentous political and logistical challenges currently stand in the way of implementing such a solution.

Barriers to Climate Protection

Efforts to pass sweeping climate protection legislation in the US Congress have been stymied over the past two decades by the alliance of powerful fossil fuel interests and wealthy corporations described in my earlier book, *Climate Myths: The Campaign Against Climate Science* (2013). America's Climate Security Act of 2007, introduced by Democratic Senator Joseph Lieberman and Republican Senator John Warner, would have capped US carbon dioxide emissions at 2005 levels and reduced them 63 percent by 2050. The fossil fuel industry and the US Chamber of Commerce opposed the bill, however, claiming it would damage the economy. Senators seeking to delay or derail the bill insisted on having all 491 pages read aloud in the Senate, and two Republican senators offered over 150 amendments. Although supported by a majority of senators, the bill then fell short of the 60 votes to override a filibuster and so was killed by Senate Republicans before a final vote could be taken.

Another major cap-and-trade climate bill, the American Clean Energy and Security Act of 2009, introduced by Representative Edward Markey (D-MA) and Representative Henry Waxman (D-CA), would have cut carbon dioxide emissions by 83 percent by 2050. It also would have required US electric utilities to get 20 percent of their power from renewable energy or energy efficiency by 2020. After more than 400 amendments were introduced by House Republicans hoping to delay the bill, and after provisions generous

to industry were included—85 percent of the emissions allowances were to be given away free—the weakened and more industry-friendly bill passed the House, only to be defeated in the Senate. The bill's opponents included the US Chamber of Commerce, the National Association of Manufacturers, the American Petroleum Institute, the Heritage Foundation, and the Competitive Enterprise Institute. Although the Congressional Budget Office had found the bill to be deficit-neutral for its first decade, these groups claimed the bill would cause egregious harm to the economy.

Congress's failure to assertively respond to the climate emergency reflects a deeper crisis in American democracy, which is under assault from powerful interests that have consolidated their political power, thanks to a growing concentration of wealth and income since the 1980s.¹⁴ Former US Secretary of Labor Robert Reich and others have documented how Wall Street financiers, wealthy corporations, and superwealthy individuals have garnered virtually all the income gains since the financial crisis of 2008 while ordinary Americans have been left behind. Forty-seven million of those ordinary Americans now depend on food stamps. Others have been left with stagnant wages, high unemployment, and decreased social mobility. They are discontented, and many have grown disillusioned and cynical about government. They are therefore more likely to be receptive to demagogic, antigovernment rhetoric than to government climate protection programs.

The experience with climate legislation in Congress has needlessly delayed measures to protect the climate. The executive branch has tried to take action through “jaw boning” and executive orders but has been largely unable to compensate for Congress's inaction.^f The climate in fact cannot be effectively protected until the excessive political influence of fossil fuel interests and other large corporations is reduced. The conventional energy industry—oil, coal, natural gas, and electric utility companies—vastly outspends and out-lobbies environmental advocates. In the 2008 elections, it spent about 20 times what environmental advocates spent to influence elections, according to Common Cause. By funneling millions of dollars of campaign contributions to tractable legislators and their Political Action Committees (PACs), the industry gains access to these lawmakers and on occasion even helps draft legislation. All this not only stalls progress on climate protection but also undermines American democracy. PACs offer wealthy individuals

^f Its own energy policies have sent mixed messages. The administration embraced a fossil fuel-friendly “all of the above” energy policy that included an expansion of domestic oil and gas production while it also advocated climate protection and modestly increased support for both renewable energy and energy efficiency.

and corporations convenient conduits for channeling large amounts of cash to parties, candidates, and their media campaigns, often while keeping donors' identities secret. Later, prominent lawmakers who "voted correctly" or others in government who did the lobbyists' bidding are rewarded with plush jobs or consulting contracts.

Removing Obstacles to Climate Protection

Far-reaching campaign finance reform is needed in the United States. Campaigns for public office should be publicly funded to fend off the corrupting influence of large donations. A government untainted by de facto institutionalized bribery would in time induce more people of merit, distinction, and knowledge back into Congress and political life. Were the inordinate influence of wealth reduced, a nascent climate-protection movement could wield more influence in electoral politics, not only supporting candidates for office but fielding its own. More than 40 Green Parties worldwide do so.

A major step toward fairer elections in the United States would be passage of a constitutional amendment to overturn the Supreme Court's 2010 *Citizens United v. Federal Election Commission* decision in which corporations, associations, and unions were accorded the same rights as individuals to spend as much money as they want on TV commercials and other ads to frame political issues and elections. The court concluded that the contributions were an exercise of free speech.

To quickly build a broad and knowledgeable constituency for climate protection, the public needs to hear the truth about climate change, and climate science denial needs to be vigorously rebutted. Restoring the Federal Communications Commission's Fairness Doctrine (abolished in 1987) would be a step in this direction.[§] The doctrine requires broadcasters to provide contrasting views on political issues and also requires that people subject to on-air political attack be given advance notice, when possible, and an opportunity to respond.

What Is to Be Done—Taking Action

What can concerned individuals do now to improve the quality of government and bring climate protection to center stage? "Those with the privilege to know, have the duty to act," Albert Einstein declared. Studying the

[§] The doctrine was abolished by the FCC in 1987 on the executive order of President Ronald Reagan. Its abolition was followed in the late 1980s and 1990s by an explosion of strident right-wing talk shows that often mock environmental concerns and deride environmental advocates.

issues and talking about them with family and friends as well as with the media and government officials is a good first step. A few people of high moral purpose, however, will not be sufficient to defeat entrenched conventional energy interests. In the twenty-first century, an unaided voice crying in the wilderness—however passionate—is not as powerful as a voice raised on CNN, Fox News, or the BBC.

Unfortunately, the movement for climate protection and clean energy does not have 50 years to put clean energy proponents in high offices and end business-as-usual energy policies. Fortunately, grassroots political activism plus new technology sometimes produces faster results. President Obama himself used grassroots organizing and social media to gain the White House in 2008. Social media was also indispensable to the Arab Spring revolutions that began in Tunisia in 2010. But whereas many climate organizations are already active on the web, their initiatives are often lost in internet cacophony, much of it created by powerful commercial interests.

The mass marketing of forceful climate protection messages to hundreds of millions of people ultimately requires a powerful mass-media network devoted to the planetary environmental emergency. Thought leaders, articulate scientists, plus entertainment and sports celebrities with large followings need to speak out for climate protection. Large radio and TV networks need to provide daily, in-depth coverage of climate and energy news and analysis, along with relevant scientific, political, and economic developments. More of this programming could be available if organized groups demanded it and helped broadcasters recruit audiences for it. Advertisers follow audiences and pay for programming. What if the climate-protection and safe-energy movement had the same radio and TV clout as Rush Limbaugh, Sean Hannity, Bill O'Reilly, or others who cast doubt on climate science, muses environmental broadcaster Betsy Rosenberg. So long as the movement lacks an effective mass-media platform, is it any surprise that the masses are not mobilizing around climate issues, she wonders.¹⁵

Powerful Reasons for Hope

Even though governments tend to be captured by special interests and resist needed change that challenges the global fossil fuel industry, it is possible to overcome even very powerful minority interest groups and to force bad governments from power. Through years of struggle, Nelson Mandela and the global campaign to end apartheid demonstrated the power of a well-organized and coordinated international boycott to bring down the racist government of South Africa.

Protecting the climate is still possible, but it is something, like apartheid, that needs to be fought for with steadfast determination and implacable will. Wendell Berry said, you can't ask if you're going to win, but if it is right. While it is not a lost cause, there is no magic bullet, no formula for protecting the climate—just long, hard work and a great deal of political organizing by many committed people to generate the pressure that will create change. Thankfully, the 7.2 billion people on Earth do not all need to be convinced of the policies needed to protect the climate. Only a small fraction need to be mobilized to create intense pressure on the people at the apex of power resisting climate protection. Life must become less comfortable and less profitable for them. People can vote against fossil fuels by supporting the right candidates for office and with their dollars, by curtailing reliance on fossil fuel products, and by urging others not to invest in fossil fuel companies.

The argument that climate catastrophe can't be prevented or that creating a clean-energy economy is too expensive or will take forever is a disempowering myth fostered by fossil fuel interests. When the world's power brokers, heads of states, and oligarchs feel enough pressure and therefore finally decide the climate should be protected, things can start to happen very quickly.



FIGURE C-1. During a major flood in Mexico in 2009, members of Greenpeace protest the failure of politicians to act to reduce the magnitude and risks of climate change. The yellow sign reads, “Politicians: You Failed. Solve Your Climate Disaster!” Photo courtesy of Marco Ugarte, Associated Press.



FIGURE C-2. Fifty years after 200,000 people turned out for the historic August 28, 1963, March on Washington for Jobs and Freedom at which Martin Luther King Jr. delivered his inspiring “I Have a Dream” speech, crowds once again gathered in 2013 (above) at the Lincoln Memorial to commemorate the 1963 event. They were addressed by President Barack Obama, America’s first black president.

Radical change comes from the bottom up. Millions of people do care about the Earth, their children, the future, and the climate. Ordinary people are powerful when deeply committed to a cause. They defeated slavery, guaranteed women the right to vote, fought for civil rights in the United States and South Africa, ended colonialism in India and Africa, and brought down governments in the Middle East and elsewhere.

There is no time to lament the climate predicament or make excuses for inaction. The movement for climate protection needs active, wholehearted support. Millions of people believe we are in a climate crisis. They will stand up if inspired or asked to do so. So take action. Inspire them. And ask their help. Chances are you have more power and influence than you think!