Climate Change After the Elections: What We Can Do in America

A Ten-Point Plan

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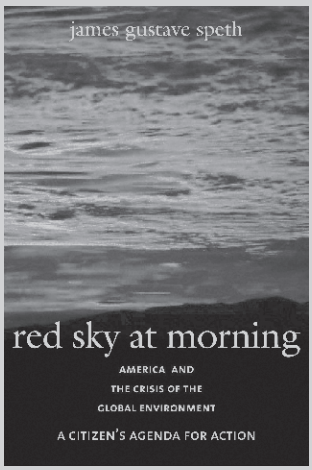

The "Afterword" prepared for the paperback edition of *Red Sky at Morning: America and the Crisis of the Global Environment* to be released by Yale University Press, March 2005

Afterword

Climate change is the most severe problem that we are facing today—
more serious even than the threat of terrorism.

– David A. King,
Chief Scientist, United Kingdom

On the morning of 30 October 2004, three days before the U.S. presidential election, the front page of the *New York Times* greeted us with two news stories of great relevance to the challenges discussed in this book. One reported the now-famous video of Osama bin Laden lecturing us on how to avoid another September 11. The other featured a topic rarely on the front pages of American newspapers—global climate change. The climate story's lead summarized a major report: "A comprehensive four-year study of warming in the Arctic shows that heat-trapping gases from tailpipes and smokestacks around the world are contributing to profound environmental changes, including sharp retreats of glaciers and sea ice, thawing of permafrost and shifts in the weather, the oceans and the atmosphere."[1]

Comparable in importance, the threat of terrorism and the threat of climate disruption have received incomparably different treatment in our national politics and policies. Both President George W. Bush and Senator John Kerry reacted strongly to bin Laden, but there was no reported response by either candidate to the fact that we are melting the Arctic. More important, Washington has erected a huge and very expensive apparatus to combat terrorism but has thus far done next to nothing to slow the buildup of climate-changing gases in the atmosphere.

Perhaps the only surprising thing about the headlines that day was that the climate change story received attention rivaling that given regularly to terrorism and its progeny.

Since September 11, advocates of preventive action on climate change have had to struggle harder than usual to get the attention of the public and our politicians. Not attending to other issues has been part of the collateral damage of the war on terror and the war in Iraq. The good news is that the seriousness of the climate disruption threat is beginning to be appreciated in our country, and the press coverage of the Arctic situation is a sign of that. The bad news is that it is only beginning. Meanwhile, evidence is rapidly mounting of the devastating consequences of the unchecked releases of climate-altering gases. We are in a race against time if we want to stop this terrorism against the planet, but we have now elected national leaders in the presidency and many in the Congress who have shown little evidence that they know there is a threat at all.

This Afterword focuses on the climate change issue. Many of the most significant developments since the cloth edition of this book first went to press have occurred in this arena. More to the point, climate change is both the number one challenge and the number one area where new U.S. attitudes and policies are needed. We Americans have a job to do. We are tragically late in addressing climate change; irreparable damage will unfold in the decades ahead due to our past negligence. With or without the help of the Bush administration, our responsibility now is to prevent the situation from deteriorating further. That, at least, we owe our children and grandchildren.

Before turning to climate change, I should offer a few comments of a more general nature. Recent developments have tended strongly to confirm the main messages in *Red Sky at Morning*. The distressing trends recounted in part 1 continue, with unsettling new data such as the estimates that 90 percent of the ocean's original endowment of large predator fish—swordfish, marlin, and others—are gone.[2] The intergovernmental efforts to frame effective treaties and plans of action discussed in part 2 remain slow at best and flaccid and ineffectual at worst. Here the big news, and it is very good news, is the Russian ratification of the Kyoto Protocol, which brings the protocol into effect throughout the industrial world despite U.S. opposition. But the most encouraging development is the further flowering of the JAZZ world, building on the beginnings reported in part 3. Perhaps most notable here is the gathering strength of the

socially responsible investment community. Also significant is the reemergence in France and elsewhere in Europe of support for some form of world environment organization, presaging, I hope, the metamorphosis of the U.N. Environment Programme out of the cocoon spun for it in 1972.

What Are the Climate Risks?

In 2003, the concentration of carbon dioxide in the atmosphere reached its highest level in 420,000 years—376 parts per million (ppm). Climate scientists are increasingly confident that we are at the planetary controls. "Modern climate change is dominated by human influences," concludes an article published in *Science* in 2004. "We are venturing into the unknown with climate, and its associated impacts could be quite disruptive."[3]

Indeed. The World Health Organization estimates that climate change is already responsible for an estimated 150,000 deaths per year.[4] An analysis of several hundred human diseases has found that their ranges are strongly linked to climate.[5] The European heat wave during the summer of 2003—estimated to have killed more than 19,000 people—was the hottest in more than five hundred years. It is extremely problematic to associate particular events with climate change, but scientists have projected that the type of heat waves that hit Chicago in 1995 and Paris in 2003 will become more likely and more intense as a result of climate change.[6]

Ecosystems, particularly high-mountain systems and those toward the poles, are already being disrupted by changing temperatures and rainfall patterns.[7] One major study indicates that by 2050 climate change could be responsible for committing to extinction perhaps a fourth of all species over large regions of the globe.[8]

As one would expect with temperatures rising, reports of melting ice are pouring in from around the world:

BBC News: "Melting glaciers threaten Peru."[9]

"Patagonian ice in rapid retreat."[10]

"Kazakhstan's glaciers melting fast."[11]

Nature:	"The disruption being seen in the Alps right now could soon be replicated on a larger scale, with global warming eroding a quarter of the earth's land surface that is [now] permanently frozen."[12]
New Scientist:	"Ice melt may dry out U.S. West Coast."[13]
Science:	Antarctic's Larsen ice shelf "must be melting due to warmer ocean waters below."[14]
Washington Post:	"Ice shelf break in Arctic attributed to climate warming."[15]
Science:	"Simulations predict that the Arctic will be almost free of sea ice during the summers toward the end of the century."[16]
Reuters:	"Denmark to claim North Pole, hopes to strike oil."[17]

One of the most comprehensive studies ever of the impact of climate change on a particular region is the Arctic Climate Impact Assessment (ACIA), sponsored by the eight countries bordering the Arctic region and carried out by an international team of three hundred scientists.[18] Released on November 8, 2004, shortly after the U.S. elections (the *New York Times* was leaked a copy before the election), the eighteen-hundred-page report, *Impacts of a Warming Arctic,* makes disturbing reading. Here are some of the findings:

- "The Arctic is warming much more rapidly than previously known, at nearly twice the rate as the rest of the globe, and increasing greenhouse gases from human activities are projected to make it warmer still."
- "In Alaska, Western Canada, and Eastern Russia average winter temperatures have increased as much as 3 to 4°C (4 to 7°F) in the past 50 years, and are projected to rise 4 to 7°C (7 to 13°F) over the next 100 years."
- "Arctic summer sea ice is projected to decline by at least 50 percent by the end of this century with some models showing near-complete disappearance of summer sea ice. This is very likely to have devastating consequences for some arctic animal species such as ice-living seals and for local people for whom these animals are a primary food source. At the same time, reduced sea

ice extent is likely to increase marine access to some of the region's resources."

- "Warming over Greenland is projected to lead to substantial melting of the Greenland Ice Sheet, contributing to global sea-level rise at increasing rates. Over the long term, Greenland contains enough melt water to eventually raise sea level by about 7 meters (about 23 feet)."[19]

The report points out that Arctic developments could affect societies far away from the region. Three mechanisms for these impacts deserve special note.

Sea-level rise. Current estimates suggest sea levels could rise by as much as two to three feet over 1900 levels in the twenty-first century unless major actions are taken to slow the buildup of greenhouse gases (GHGs). But these are the conventional estimates that do not take into account more catastrophic possibilities. An article in *Nature* posed one key question in 2004: "The ice covering Greenland holds enough water to raise the oceans seven meters—and it's starting to melt. How far will it go?" The truth is no one knows for certain, as the article indicates: "A number of factors complicate forecasts about the ice sheet's future. Computer models suggest that if Greenland warms up by 3°C in the next 100 years—which is well within the projections of the IPCC [Intergovernmental Panel on Climate Change]—the ice sheet cannot survive. But these models depend on assumptions about the likely rate of ice retreat that are not guaranteed to be correct, in part because the flow dynamics of glaciers are not yet fully understood."[20] The ACIA report is also disturbing: "Climate models project that local warming in Greenland will exceed 3°C during this century. Ice sheet models project that a warming of that magnitude would initiate the long-term melting of the Greenland Ice Sheet. Even if climatic conditions then stabilized, an increase of this magnitude is projected to lead eventually (over centuries) to a virtually complete melting of the Greenland Ice Sheet, resulting in a global sea level rise of about seven meters."[21]

Life down south in the Antarctic is also uncertain. We know that Antarctic glaciers are thinning and flowing faster to the ocean. The major threat to sea level from the Antarctic seems to be the possible melting and slide into the Amundsen Sea of the

West Antarctic ice sheet, where there is enough water to raise sea levels five meters (sixteen feet) or more.[22]

The ACIA report warns that even predictable amounts of sea-level rise could be extremely serious, undermining coastal ecosystems, communities, and livelihoods. In the United States, Florida and Louisiana are especially vulnerable. In Bangladesh, seventeen million people live fewer than three feet above sea level. Small island nations in the Pacific and Indian Oceans are threatened, as is The Netherlands, where half the population lives below sea level.

Accelerating feedbacks. The ACIA report notes that changes under way in the Arctic could accelerate global climate change: "There are . . . so-called feedbacks, by which Arctic processes can cause additional climate change for the planet. One involves changes in the reflectivity of the surface as snow and ice melt and vegetation cover changes. . . . [Another] involves changes in the amounts of greenhouse gases emitted to the atmosphere from the land as warming progresses."[23]

Many climate disaster scenarios feature a runaway greenhouse effect based on feedbacks such as these. Melting permafrost could release large amounts of carbon dioxide and another, more potent, greenhouse gas, methane.[24] Another potential set of positive feedbacks—where the problem feeds on itself—involves peat bogs, which can release carbon dioxide through decomposition or fires.[25] More generally, rates of carbon decomposition and release from forests are likely to increase as climate change advances, making forests and soils net contributors of carbon dioxide to the atmosphere.

Disrupting ocean currents. In addition to the "freshening" of the North Atlantic discussed in chapter 3, oceanographers believe that they have now also detected some slowing in the forces that drive the Gulf Stream.[26] Scientists are debating whether the change is due to global warming, whether the new trend will continue, and how severe the regional cooling and other impacts will be if it does continue. The ACIA report dryly notes: "The tentative indication from the North Atlantic of an initial slowing of the deep ocean circulation is another example of a possible threshold that might be crossed. If present trends continue, leading to a significant slowdown, the northward oceanic

transport of tropical warmth that now moderates European winters could be significantly diminished."[27]

A report published in the *New York Times* in 2004 summarized the situation nicely: "Although nobody expects shifts as rapid or cataclysmic as portrayed in the new movie 'The Day After Tomorrow,' the cooling could disrupt the relatively stable climatic conditions in which modern human societies have evolved. Some oceanographers say global warming may already be pushing the North Atlantic toward instability. In less than 50 years, waters deep in the North Atlantic and Arctic have become significantly fresher, matched by growing saltiness in the tropical Atlantic. Worldwide, seas have absorbed enormous amounts of heat from the warming atmosphere. A big outflow of water from Greenland could take the system to a tipping point, some say.

"In the past millenniums when such oceanic breakdowns occurred, the climate across much of the Northern Hemisphere jumped to a starkly different state, with deep chills and abrupt shifts in patterns of precipitation and drought from Europe to Venezuela. Some changes persisted for centuries.

"But whether something similar is likely to result from the new melting in Greenland is far from clear. The forces that caused abrupt climate change in the past, like monumental floods released from collapsing ice-age glaciers, are different from the much slower ones being measured today."[28]

Like catastrophic sea-level rise, abrupt climate change—in this case an abrupt cooling associated with a diminution of the Gulf Stream—presents a threat. Climate change could spark enormous transformations of uncertain probability that would be devastating to human societies. We may not get a good scientific resolution before it is too late. So the burning question is: Why are we running these huge risks when we do not have to do so? On this point, we seem to need psychiatrists more than physicists.

How Much Time Do We Have?

The ACIA report correctly observes that although it is too late to prevent a range of unfortunate climate change consequences, it is not too late to head off the worst. The most serious consequences are projected in models that presume business-as-usual; they

assume there are no major societal interventions aimed at halting the buildup of greenhouse gases in the atmosphere. Business-as-usual is precisely what we cannot allow to happen. The consequences are too dire, the risks too great.

The goal of the U.N. Framework Convention on Climate Change is to prevent "dangerous" human-caused climate change. The European Union—which is providing genuine international leadership on this issue—has boldly plunged into the thicket and concluded that it would be "dangerous" to allow global average temperature to increase by more than 2°C over the preindustrial level. (Current temperature is already up by 0.6°C.) The European Union has thus far associated this 2°C rise with allowing carbon dioxide (CO_2) concentrations to rise no higher than 550 ppm—or roughly twice the preindustrial level of 280 ppm. To achieve this goal, the European Union estimates that a global reduction in greenhouse gas emissions of 50 to 60 percent by 2050 will be needed, compared with a business-as-usual scenario. The European Union's own emissions might have to be reduced as much as 70 to 90 percent below business-as-usual by 2050, because steeper-than-average industrial country cuts will be necessary in recognition of developing country growth and energy needs.[29] Taking a slightly different approach, the United Kingdom has committed itself to reducing its CO_2 emissions of 60 percent from today's levels by about 2050.[30]

If one accepts these assumptions, it follows that there is no time to waste at all. To reduce emissions by 2050 to 70 to 90 percent below what they would have been without climate constraints, or to 60 percent below current emission levels as the United Kingdom proposes, requires the adoption of strong policy measures right away. The private and public investments that determine whether one is on a business-as-usual path or a climate-friendly one will last for decades, and many of them are being made today, such as the current plans to construct hundreds of new coal-fired power plants around the world. Truly heroic efforts will be required to realize these European plans, to accomplish such goals in the United States, and to forge a fair (and necessary) regime for developing country participation in climate protection.

It is at this point that I am forced to write what is one of the saddest things I've ever had to pen. I hope that I am wrong. My reading of the IPCC report and more recent studies suggests that the 2°C increase that the European Union has chosen as its ceiling would happen with an atmospheric concentration of 450 ppm or less, not 550 ppm.[31] This means that the climate goals being discussed in Europe, as stringent as they are, may not be stringent enough. Moreover, a global average temperature increase of 2°C could turn out to be quite "dangerous" and not safe at all. Although it would unfold more slowly, with more time to anticipate and adapt, a warming of 2°C globally could translate into twice or more than that at the poles, with serious consequences there and elsewhere. Coral systems would be severely affected; terrestrial and coastal ecosystems would suffer; the ranges of many diseases would change; more extreme weather events would occur; and so on. A world with another 1.4°C global average warming is not a world for which one would wish, and yet right now we are on track to produce a world in far worse shape. And we are moving down that track very rapidly.

An Energy Future for Climate and the Economy?

Today, carbon dioxide from fossil fuel combustion constitutes about half of the greenhouse gases being released into the atmosphere. It follows that a successful climate strategy must involve more than curtailing CO_2 releases from the burning of coal, oil, and natural gas. But it also follows that addressing CO_2 emissions from fossil fuels must be the bedrock of such a strategy.

Among the most widely accepted projections of future fossil fuel use are those provided by the International Energy Agency (IEA). Its report *World Energy Outlook 2004* provides perspective on what will happen in the absence of far-reaching new measures to move to a climate-friendly energy strategy. Its "reference scenario," a business-as-usual projection, has total world energy use climbing by 60 percent between 2002 and 2030. Reliance on coal increases by 51 percent, oil by 57 percent, natural gas by 89 percent. Carbon dioxide emissions thus climb by 62 percent by 2030.[32] In such a business-as-usual future, achieving climate goals is not possible. Globally, CO_2 emissions can climb somewhat for the next two decades and still hold CO_2 concentration below 450

ppm, but the emissions growth forecast in the IEA reference scenario is many times too high.

The U.S. Energy Information Administration has developed a similar business-as-usual scenario for the United States, looking ahead to 2025. It has both coal use and CO_2 emissions increasing in the United States by about 42 percent between 2002 and 2025.[33] Of course, we should be reducing our emissions during this period, not increasing them.

Is the technology available to break sharply with this business-as-usual, carbon-intensive future? Stephen Pacala and Robert Socolow addressed that issue in an important and insightful paper published in August 2004 in *Science.*[34] In their analysis, they note that fossil fuel use can continue at about its current (and already high) level between now and 2050 while still staying below 500 ppm CO_2 in the atmosphere. Assuming such a continuation of fossil fuel use at roughly current levels, they then identify fifteen currently available technologies that, in a variety of combinations, can eliminate the further buildup of atmospheric CO_2 that would occur in the business-as-usual approach. In other words, their answer to the question whether technology is available is an emphatic yes. Technologies are available to prevent increases in fossil fuel use and emissions.

Their fifteen technologies reflect six basic strategies:

- *Energy efficiency and conservation* through doubling the fuel efficiency of vehicles, reduced use of vehicles, high-efficiency building construction, and more efficient coal-fired power plants;
- *Substituting natural gas for coal* through substituting gas power plants for coal ones;
- *Carbon dioxide capture and storage* by capturing CO_2 at power plants, hydrogen plants, and synfuel plants and sequestering the CO_2 in subsurface geologic reservoirs;
- *Nuclear fission* with a new generation of safer nuclear power plants and far-reaching international security arrangements governing uranium enrichment and plutonium recycling;

- *Renewable electricity and fuels* through the substitution of wind power, photovoltaic power, and biomass fuel for fossil energy; and
- *Sequestration of carbon in forests and soils* by reducing deforestation and increasing afforestation and conservation tillage.

Pacala and Socolow urge an intelligent mix of many of these approaches rather than excessive reliance on only a few.

Are measures available to encourage adoption of these approaches and to do so without damaging economic prospects? One place to look for answers to these questions is the remarkable plan developed by the government of Prime Minister Tony Blair in the United Kingdom. As reflected in the government's Energy White Paper, *Our Energy Future—Creating a Low Carbon Economy,* the Blair government is committed to a 60 percent reduction in U.K. carbon dioxide emissions by around 2050, has developed a plan of action to back it up, and estimates that the costs would be "very small—equivalent in 2050 to just a small fraction (0.5 to 2 percent) of the nation's wealth, as measured by GDP, which by then will have tripled as compared to now." The plan avoids setting quantitative targets for various energy sources but stresses renewable energy, natural gas, and energy efficiency gains. As for coal, it "will either play a smaller part than today in the energy mix or be linked to CO_2 capture and storage." The plan defers the question of nuclear power to a later decision "if needed to help meet the UK's carbon aims." Regarding renewables, the Energy White Paper notes that "by 2050, we are likely to need renewables . . . to be contributing at least 30 percent to 40 percent of our electricity generation."[35]

In terms of policy instruments, the Energy White Paper places heavy reliance on the carbon emissions cap-and-trade scheme developed by the European Union; a national carbon tax; efficiency standards for new construction, appliances, and boilers; energy research and development; and various funding and incentive programs.

The British and other Europeans are not foolish. They see the risks of climate disruption and the commercial opportunities in developing viable responses. And they know that the costs involved—perhaps no more than the difference between a 2 percent

increase in GDP in 2050 and a 3 percent increase—are a small price to pay to save the planet. And, of course, there will be large economic costs to pay if we allow climate change to continue. Meanwhile, in America, Washington does not get it—not yet.

What Must We Now Do in America?

So what are we Americans to do? Many of us were taught long ago that the Earth was God's creation, and we had a duty to care for it—to "till and tend the garden." We are not good stewards of the garden if we allow it to be ravaged by the forces of climate change brought by the heedless pursuit of material things. Many of us have worked as conservationists to protect the living landscape of our country—the great American land. If climate change is not addressed with urgency, the consequences will be devastating for America's natural areas. From the vast wilderness areas to the small community land trust lands, from the pathbreaking efforts of Theodore Roosevelt to today's conservation efforts—our protected areas are now at risk. We are on the brink of the greatest tragedy in American conservation history—if we let it happen. We have not created protected areas across our great land for them to become experimental sites for monitoring the effects of climate change.

President George W. Bush and his administration, at this writing, have shown no interest in giving positive leadership on the climate change challenge. They have opposed the Kyoto Protocol and refused to work with the international community within the framework of the U.N. climate treaty. They have opposed the McCain-Lieberman climate bill as well as efforts to treat carbon dioxide as a pollutant under the Clean Air Act and to strengthen vehicle mileage standards, and they have pursued a wrongheaded energy strategy while resisting international efforts to frame renewable energy goals.

We do not know how much the positions of the Bush administration will change for the better or if they will change at all. We must hope for the best but plan for the worst. We therefore need a strategy that does not depend on the Bush administration cooperation and one that makes it increasingly difficult for the administration to persist in its opposition.

Fortunately, the outlines of such a strategy are visible, in part because of the good efforts already being made to move our country in the right directions. What follows is a

ten-point plan of action that builds on the many positive, encouraging initiatives already under way.

1. *State and local action.* With the path forward blocked in Washington, states and localities across the country have moved in a remarkable way to fill the breach. The Pew Center on Global Climate Change reported in 2004 that twenty-eight states have developed or are developing action plans to reduce GHG emissions.[36] Many of these, such as the programs in Massachusetts and Oregon, focus on reducing GHG emissions from power plants. Other states, such as Connecticut and New Jersey, have more ambitious legislation that seeks to reduce overall emissions in the state. For example, the plan in Connecticut aims to reduce GHG emissions to a level 10 percent below that of 1990 by 2020. Connecticut's initiative is linked to a Regional Greenhouse Gas Initiative in the Northeast that will establish a ten-state cap-and-trade program for regulating carbon dioxide emissions from power plants.

Numerous states have regulatory, building code, and financial incentive programs to encourage energy efficiency, but compared with state efforts to promote green energy, efficiency programs are lagging at the state level and need more attention.

The renewable energy efforts at the state level are indeed impressive. Seventeen states have mandated "renewable energy portfolio standards" requiring electric utilities to incorporate renewable energy. New York aims to have 25 percent of its power from renewables by 2013; California is planning on being 20 percent renewable by 2010. In June 2004, thirteen governors of western states agreed to have the equivalent of twenty large power plants (20,000 megawatts) from renewables by 2020.

California has taken the lead in regulating GHGs from vehicles. In September 2004, it announced plans to reduce GHG emissions from cars and light trucks by 34 percent by 2016; the target for large trucks and sport utility vehicles (SUVs) is 25 percent. Since seven states in the East typically follow California on these issues, the California plan could potentially affect about 30 percent of the national market for vehicles.

Although these initiatives create considerable indirect pressure on Washington to act, several states are also pressing for Environmental Protection Agency action directly. In 2004 twelve states filed suit in federal court to force the Bush administration to regulate GHGs as pollutants under the Clean Air Act.

At the local level, the International Council for Local Environmental Initiatives reports that 151 U.S. cities were participating in its Cities for Climate Protection campaign in 2004. Minneapolis is a city leader, having reduced its GHG emissions by 15 percent between 1994 and 2004. And I can report that New Haven is committed to reducing emissions through significant energy efficiency initiatives and a move to 20 percent renewable energy by 2010.

Our goal in the years immediately ahead should be to strengthen and deepen state and local commitments and actions. We should work to get every state to adopt an overall GHG reduction plan, a renewable energy portfolio standard, the California plan for vehicles, and an energy efficiency program that covers everything from much tighter building codes to transportation and land use planning. We should also seek to spread "cap-and-trade" programs, such as that being developed in the Northeast, across the country. Environmental groups and other NGOs have helped pass the pathbreaking actions to date, and they need our vigorous support.

2. *Carrots and sticks with business.* The principal actors on the world stage are business units. More than anyone else, corporations are at the planetary controls. Negatively, corporations are responsible for a huge share of the appalling environmental deterioration now under way. Positively, corporations have the technology, access to capital, and managerial discipline essential to the transition to sustainability. If businesses and governments don't get their act together soon on global warming, the extraordinary economic machine we have created is going to wreak such havoc on the Earth's systems, both natural and social, that today's disruptions by terrorists will look like child's play. The result will not be good for business or for the rest of us. The corporate sector thus has both a profound interest in promoting the transition to sustainability and a responsibility to do so. How then should it respond? The historical transformation now needed is one in which corporations rise to their new responsibility and accept the need for positive

collaboration with government and citizens in adopting far-reaching climate and other measures that are now essential.

The good news here is that many corporations are not waiting on federal action on climate and are taking significant, voluntary initiatives to reduce their GHG emissions. The Pew Center on Global Climate Change describes what is going on: "A growing number of major companies are undertaking significant efforts to address climate change. These efforts include setting GHG reduction targets, improving energy efficiency, investing in the development of clean and renewable energy technologies, increasing the use and production of renewable energy, improving waste management, investing in carbon sequestration, participating in emissions trading, and developing energy-saving products. Some companies also are speaking out about climate change and encouraging stronger government efforts to reduce emissions throughout the economy.

"Companies are acting in the absence of mandatory requirements for a number of reasons. . . . Companies believe that over the long term, the world will have to deal with climate change, and so their climate-friendly investments will pay off. They believe that by taking the initiative, they can help government craft climate change policies that work well for business. They also believe that emissions reduction efforts can drive innovation and improve their bottom line."[37]

Additional background to the encouraging display of corporate initiative was provided in a report of November 2004 by the Sustainable Energy Institute and Numark Associates. After analysis of five U.S. industry sectors, the report concluded that company actions are driven by a combination of:

- "Increased corporate focus on sustainability, deriving from anticipated benefits in both public image and profitability;
- Shareholder pressure on businesses to provide a more aggressive response to climate change and disclose GHG emissions reduction activities, as well as the financial risks they are exposed to from climate change;
- Pressure from insurers to address climate change and disclose GHG emissions reduction activities;

- Recent state-level regulations mandating GHG reductions; and
- State lawsuits against carbon-emitting power companies."[38]

These factors have combined to bring forth some impressive action by leading companies. In this context special recognition awards are due:

- to Lord John Browne, CEO of British Petroleum, who in a major article in *Foreign Affairs* vigorously championed an international goal of stabilizing atmospheric carbon dioxide concentrations at the 500-to-550-ppm level;[39]
- to the Chicago Climate Exchange and the companies, universities, and environmental organizations committed to its GHG reduction program and goals;
- to the Carbon Disclosure Project and its backers—ninety-five institutional investors with assets of ten trillion dollars—for asking tough climate questions of the five hundred largest companies in the world;
- to the Rainforest Action Network and its partners at Bank of America and Citibank for their collaborations on climate and forests;
- to Swiss Re, the world's second largest reinsurer, for tirelessly alerting the world to climate risks (for good business reasons), and to its partners in the Climate Group committed to building a world "coalition of GHG reducers";
- to CERES, a coalition of investor, environmental, labor, and public interest groups representing more than three hundred billion dollars in assets, for its reports finding that climate change poses significant financial risks to a wide range of industry sectors, that failure to address the risks of climate change could represent a breach of fiduciary responsibility, and that companies have neglected to include relevant information in securities filings;
- to the coalition of eight U.S. states that sued the five largest emitters of CO_2 in the United States for creating a public nuisance; and

- to the World Resources Institute, the Pew Center on Global Climate Change, and others for "herding cats" in the business community and being a spark plug for many positive developments.

Our strategy regarding business should be to escalate on all those fronts that recognize and reward positive performance by business as well as those that put serious pressure on business to reduce emissions.

3. *Greening the financial sector*. "Follow the money," Deep Throat told Watergate journalist Bob Woodward. As reflected in the initiatives just mentioned, the financial and insurance sectors are waking up to climate risks. It is estimated that socially responsible investment portfolios in the United States now exceed two trillion dollars. More important in terms of impact on business behavior, large lenders, investors, and insurers are becoming increasingly sensitized to financial risks (and opportunities) presented by climate change. This new interest is being facilitated in part by studies such as those by the World Resources Institute showing that companies in the same industry tend to be situated very differently with regard to the impact of climate on competitiveness and value creation and by the increasing number of company evaluations focusing on climate.

A watershed event in this area occurred in November 2003, when CERES sponsored the Institutional Investor Summit on Climate Risk. In the wake of the summit, CERES established the Investor Network on Climate Risk, a host of state and city treasurers, public and labor pension funds, and religious and socially responsible investment funds representing more than seven hundred billion dollars in assets.

Investors large and small should use shareholder resolutions and negotiations to pressure companies to improve climate-risk disclosure and to take risk-reducing actions. The Securities and Exchange Commission should require companies to disclose fully the financial risks of global warming. Mutual fund managers and other investment managers should be pressed to develop climate-risk competence and to support climate-risk disclosure and action at companies in which they are investing.

4. ***A sensible national energy strategy***. National energy legislation will be on the congressional agenda in the years immediately ahead. It is essential that the results move us strongly into a low-carbon future. Concerns about the links between national security and energy security, volatile foreign sources and international entanglements, and tightening supplies of oil and other considerations will drive the agenda more than will climate and the environment. Still, there is actually very substantial support for a U.S. energy strategy that could help greatly on climate.

It is now customary for pro-business publications like the *Economist* and *Business Week* to urge adoption of sensible energy policies for the United States. In August 2004, they were joined by *Fortune,* which asked, "How much longer do we want to spend our resources simply patching up a system that funnels money to unreliable foreign despots and is based on a commodity we know is sooner or later going to run out?"[40] In answer, *Fortune* suggested four initiatives: (1) improve fuel economy through subsidizing hybrids, cutting oil and gas subsidies, and applying the gas-guzzler tax to SUVs; (2) ramp up spending on alternative fuels, including hydrogen and biofuels; (3) redouble our commitment to energy efficiency, taking advantage of our position as the Saudi Arabia of energy waste to wring more and more production out of each unit of energy; and (4) get serious about solar and wind energy. This is an eminently sensible agenda. We must hope the U.S. business community is listening to its own best thinkers.

Other indications of good sense on the energy front are the several efforts to build coalitions that span the political and economic landscape. The Apollo Alliance, which brings together seventeen U.S. labor unions, environmental groups, and others, has developed an energy strategy aimed at reducing energy dependence, protecting the environment, and generating 3.3 million new jobs. The Energy Future Coalition brought together Republicans, Democrats, environmentalists, business leaders, and others to forge a very attractive energy plan. Also promising is the high-level National Commission on Energy Policy; its report is due in late 2004.

Our goal in this area must be national energy legislation that moves strongly forward along these lines, putting the United States squarely on the road to a low-carbon economy. Despite broad support for such a policy, getting it will not be easy, given the

makeup of Congress, past Bush administration energy proposals, and the power of special interest lobbyists.

5. ***Enact McCain-Lieberman***. On 22 September as Florida prepared for an unprecedented fourth hurricane of the season, Senator John McCain used the occasion of congressional hearings on oceans policy to stress that more frequent hurricanes were a likely consequence of global warming and to excoriate the Bush administration for failing to support the climate change legislation he and Senator Joseph Lieberman had introduced.

The McCain-Lieberman bill is modest by international standards, seeking only to cut U.S. greenhouse gas emissions to 2000 levels by 2010, but it is the best hope of getting the United States on the path to emissions reduction. The bill garnered forty-three votes in the Senate in 2003, and McCain and Lieberman are determined to keep raising the issue.

From where might the needed additional support come? I believe the business leaders who understand the climate stakes should step forward and support McCain-Lieberman. It is pro-business legislation. When Ronald Reagan famously said that "government isn't the solution to our problems; government *is* the problem," many in business cheered. But what if business is shackled by forces far more powerful than government and needs government to free it to do the job it increasingly knows must be done? Business leaders know they are trapped by the imperatives of market competition, consumer preferences, investor behavior, and other factors. They can go only so far without government stepping in to raise the bar for all. The high point of the World Summit on Sustainable Development in Johannesburg in 2002 was a press conference convened by the World Business Council for Sustainable Development and, yes, Greenpeace. They came together to call upon governments to provide the framework within which the creativity and drive of both the corporate and NGO sectors could be unleashed to get the job done on climate protection. The message of that remarkable moment was that government action is needed to transcend the old imperatives that hold companies back. Vigorous business support for the McCain-Lieberman bill would be another step in the right direction.

Our goal here must be to build broader public support—from business, universities, religious organizations, the land trust community, and elsewhere—to get McCain-Lieberman passed into law, and the sooner the better. The Natural Resources Defense Council, Environmental Defense, and others have been vigorously promoting McCain-Lieberman, but they need help.

6. *Hands across the seas.* To get some sense of the intensity of climate concern in Europe, consider that in July 2004, Pascal Lamy, the European Union trade commissioner, had to oppose publicly a proposal that has more than a little support in Europe but may seem wacky to many Americans, namely, that trade sanctions be imposed on countries like the United States that spurn the Kyoto Protocol.[41] Why should European companies, some Europeans argue, be disadvantaged in what is supposed to be an increasingly level playing field for international trade?

Europe is poised to launch the world's first international GHG cap-and-trade scheme, has a plan to reduce GHG emissions from vehicles by 25 percent by 2008, and is leading in renewable energy development, especially wind energy. Meanwhile, Prime Minister Blair is promising not to let his good relationship with President Bush go to waste. On 5 November 2004 Reuters reported: "Britain hopes it can exert influence on reelected President George W. Bush and push the United States to do more to combat climate change, the British government's chief scientist said on Thursday. Prime Minister Tony Blair has made tackling global warming and reducing carbon emissions one of two priorities for Britain's year-long presidency of the Group of Eight (G8) richest nations starting in January. Speaking on the sidelines of a British-German conference on climate change in Berlin, the British government's chief scientific adviser David King said London was looking to take advantage of its close relationship with Washington as the Bush administration prepared for its second four-year term."[42]

The signers of the Kyoto Protocol, now including Russia, represent an international coalition that can press the United States to start a credible program of GHG emissions reduction and also to join the climate treaty process with other nations. European advocates of trade sanctions and other measures aimed at the United States are not going away. The European Union could also invite U.S. states to participate in its

cap-and-trade GHG market. If it is too late for the United States to comply strictly with the Kyoto Protocol, it is certainly not too late to begin rapidly down that path and catch up during the more ambitious post-2010 phase of GHG reductions.

7. *Climate-friendly cooperation with developing countries*. If industrial country GHG emissions fall as they should under the Kyoto Protocol, developing countries—where two billion people lack modern energy services—can see their emissions increase until midcentury while still achieving GHG stabilization at 450 ppm. But with China's emissions now already half of the United States's and Asian emissions almost equal to Americans', future agreements under the climate treaty should provide for developing country commitments on climate and GHGs. Such agreements need not seek (yet) actual reduction in GHG emissions from the developing world as a whole. They should, however, vigorously promote measures to achieve rapid decreases in developing-country GHG releases per unit of GDP or, as it is sometimes put, reductions in the carbon intensity of production.

To support these efforts, the international community, including the World Bank and other development cooperation organizations, will have to launch major new programs far beyond those now available under the Global Environment Facility and elsewhere. Such programs should include large-scale capacity building assistance, urgent transfer of green technology, programs to link access to capital at preferential rates to climate-friendly investments, expanded incentives (like the Clean Development Mechanism under the Kyoto Protocol) to encourage international investment in climate-supporting projects, country-specific North-South compacts to reverse tropical deforestation, and lighter tariffs and improved economic access to countries complying with climate agreements, as the European Union proposed in 2004. A major reorientation of the international lending portfolios of public and private financial institutions is imperative.

8. *Climate-friendly consumers and institutions*. Mahatma Gandhi said, "Be the change you want to see in the world." We can each do our part to reduce our own carbon emissions. Individually, it is satisfying; collectively, if a lot of us get moving, it's significant. As I write this, contractors are here at my home in Guilford tightening up this

leaky 280-year-old house, where we also took advantage of Connecticut's solar electric incentive program to install a photovoltaic power unit. We expect the unit to cut our electricity costs almost in half. My family is trying, but we have a long way still to go. One of my favorite green consumer groups, the Center for a New American Dream, is working to move things along via an e-mail in 2004: "The White House and Congress may refuse to address the growing threats from climate change but consumers are helping reduce carbon emissions right now by replacing gas guzzling vehicles with hybrid electric cars. Please pass this notice on to your networks, websites, list serves and friends. The Center for a New American Dream is generating thousands of letters to auto manufacturers urging them to deliver more hybrid electric vehicles to the U.S. market. Right now, there are waiting lines across the nation and demand exceeds supply" (http://capwiz.com/newdream/mail/oneclick_compose/?alertid=6611876). We need hundreds of initiatives like this.

We can each do our part every day as climate-conscious consumers, and we can urge the adoption of tougher building codes, appliance efficiency standards, and mileage standards; better mass transit; and much else. Also, we need a clear, accurate system of "climate-friendly" labeling. Some have proposed the idea of a certification program for "climate-neutral products."

America has a huge nonprofit sector. The Yale Climate Initiative at the Yale School of Forestry & Environmental Studies took a look at Yale University's greenhouse gas emissions and found that they exceeded those of thirty-two nations—admittedly very small nations, but still a rather startling statistic. This statistic tells us something about the significance to climate of the higher education system in the United States. What if all American colleges and universities joined in a commitment to reduce their GHG emissions impressively below 1990 levels by 2015 or 2020? What if all U.S. religious organizations made a similar commitment? And all fraternal organizations? And all environmental, consumer, civil rights, and other organizations with commitments to the public interest such as private foundations?

We can make a big difference by getting the institutions with which we are associated to take climate action, starting locally, then expanding regionally and nationally.

9. *Limits on coal.* Whatever the long-term supplies of oil and natural gas, coal is abundant and relatively cheap. Today, projections for new coal-fired power plants around the world are staggering. In Asia, utilities are planning about a thousand new coal-using power plants, with a hundred already under construction, mostly in China. The shift to coal is beginning also in the United States, where for years almost all new power plants have been fueled with natural gas, which is cleaner and more climate friendly than coal. No longer. "To the horror of environmentalists, King Coal is back," reported the *Financial Times* in 2004.[43] In November 2004 the *New York Times* reported that plans were being laid to construct 118 coal-fired power plants in thirty-six U.S. states, and American coal use is projected to go up by more than 40 percent over the next twenty years.[44]

A measure of the wastefulness of U.S. electricity consumption is that, while the United States consumes about 45 percent more energy and electricity than the European Union, our GDP is only about 5 percent higher than the European Union's, measured by purchasing power. The capacity for the United States to grow by using existing energy inputs more efficiently is huge. Yet, instead of moving in that direction, plans are being laid to do the worst possible thing we could do climate-wise—launch a new generation of more than a hundred coal-fired power plants without plans for capturing and storing the carbon.

We will need a combination of national, state, and local efforts to ensure that climate and other environmental risks are taken into account in decisions regarding new coal plants. National, state, and local environmental and public health groups can collaborate in such a strategy. The financial and insurance sectors should also be involved. In Congress, the prospect of all these coal plants should spur (with enough local backing) the so-called four-pollutants bill, which would regulate not only sulfur and nitrogen oxides and mercury emissions from power plants but also carbon dioxide.

10. ***Public awareness and a movement of concerned citizens****.* In chapter 10 of this book I discuss the need for a new movement bringing together "a wide array of civic, scientific, environmental, religious, student, and other organizations with enlightened business leaders, concerned families, and engaged communities, networked together, protesting, demanding action and accountability from governments and corporations, and taking steps as consumers and communities to realized sustainability in everyday life." There is much to be done to increase public awareness and build such a movement. I hope some of the grassroots networks that grew in the election campaign of 2004 will turn their attention to building awareness and action on climate. Religious organizations have a big role here, too, as the National Religious Partnership for the Environment is already proving. The entertainment industry and the media need to do far more. Thank you, *National Geographic,* for your excellent cover story on global warming. Thank you, Al Gore, for your inspired presentations on climate, and thank you, Ross Gelbspan, for your excellent book *Boiling Point.* All those who can influence what public service ads make it onto the airwaves can help us reach the public on climate, as has happened with drunk driving, drugs, smoking, and HIV/AIDS. We need a climate awareness campaign modeled on these efforts. Scientists can no longer content themselves with publishing and lecturing. The scientific community has the credibility to take the climate issue to the public and to politicians, but with some notable exceptions, it has not been as outspoken as it should be. That must change. Otherwise, I do not see how we can convince enough people. The various intellectual and policy communities—such as the foreign policy, consumer, and social policy communities—should come out of their silos (we're all in silos) and take up this cause. Climate disruption is too important to be left only to the environmentalists. If they could have won this fight without you, they would have done so already. And someone should build an initiative among those who voted for President Bush to communicate to the president that they did not vote for his energy or climate policies.

In the end, we will need engagements with the climate issue in communities and local areas across the land. The issue must come alive where people live. I was very pleased to receive the following invitation from my hometown: "The Town of Guilford invites you to a workshop on Climate Change—Its Impact on Shoreline Communities, to

be conducted in Guilford on Friday, November 19, 2004. This workshop is intended primarily for municipal and regional officials with responsibilities that might be impacted by climatic issues: boards of selectpersons, economic development, environmental planning and conservation, planning and zoning, infrastructure management, financial management and risk management. Communities from East Haven to Waterford have been invited. The objective of this workshop is to provide municipal officials with authoritative information on the science of climate change as it is expected to impact shoreline communities in the coming decades, and its practical management ramifications for those responsible for environmental, economic and land use policies."[45]

We need to build the movement. If we do, we will not fail. Changing U.S. energy and climate policies has proven extremely difficult in the face of powerful industry opposition. That is why a powerful popular movement for change is so essential. I am reminded in this context of Teddy Roosevelt's words:

"Here is your country—

Do not let anyone take it or its glory away from you

Do not let selfish men or greedy interests skim

Your country of its beauty, its riches or its romance.

The world and the future and your very children shall

Judge you according as you deal with this sacred trust."

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