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THE ENVIRONMENT

While Washington Slept

The Queen of England is afraid. International C.E.O.'s are nervous. And the scientific establishment is loud and clear. If global warming isn't halted, devastating sea-level rises will be inevitable by 2100. So how did this virtual certainty get labeled a "liberal hoax" in the U.S.? Try the same tactics Big Tobacco used to deny the dangers of smoking.

BY MARK HERTSGAARD

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The Greenland ice sheet shrank by 50 cubic miles last year. Were it to melt completely, sea levels would rise 20 feet—which would leave large areas of Washington, D.C., including the Mall, between the Lincoln Memorial and the Washington Monument, underwater.

Ten months before Hurricane Katrina left much of New Orleans underwater, Queen Elizabeth II had a private conversation with Prime Minister Tony Blair about George W. Bush. The Queen's tradition of meeting once a week with Britain's elected head of government to discuss matters of state—usually on Tuesday evenings in Buckingham Palace and always alone, to ensure maximum confidentiality—goes back to 1952, the

year she ascended the throne. In all that time, the contents of those chats rarely if ever leaked.

So it was extraordinary when London's *Observer* reported, on October 31, 2004, that the Queen had "made a rare intervention in world politics" by telling Blair of "her grave concerns over the White House's stance on global warming." *The Observer* did not name its sources, but one of them subsequently spoke to *Vanity Fair*.

"The Queen first of all made it clear that Buckingham Palace would be happy to help raise awareness about the climate problem," says the source, a high-level environmental expert who was briefed about the conversation. "[She was] definitely concerned about the American position and hoped the prime minister could help change [it]."

Press aides for both the Queen and the prime minister declined to comment on the meeting, as is their habit. But days after the *Observer* story appeared, the Queen indeed raised awareness by presiding over the opening of a British-German conference on climate change, in Berlin. "I might just point out, that's a pretty unusual thing for her to do," says Sir David King, Britain's chief scientific adviser. "She doesn't take part in anything that would be overtly political." King, who has briefed the Queen on climate change, would not comment on the *Observer* report except to say, "If it were true, it wouldn't surprise me."

With spring arriving in England three weeks earlier than it did 50 years ago, the Queen could now see signs of climate change with her own eyes. Sandringham, her country estate north of London, overlooks Britain's premier bird-watching spot: the vast North Sea wetlands known as the Wash. A lifelong outdoorswoman, the Queen had doubtless observed the V-shaped flocks of pink-footed geese that descend on the Wash every winter. But in recent years, says Mark Avery, conservation director of the Royal Society for the Protection of Birds, she also would have seen a species new to the area: little egrets. These shiny white birds are native to Southern Europe, Avery says, "but in the last 5 to 10 years they have spread very rapidly to Northern Europe. We can't prove this

is because of rising temperatures, but it sure looks like it."

Temperatures are rising, the Queen learned from King and other scientists, because greenhouse gases are trapping heat in the atmosphere. Carbon dioxide, the most prevalent of such gases, is released whenever fossil fuels are burned or forests catch fire. Global warming, the scientists explained, threatens to raise sea levels as much as three feet by the end of the 21st century, thanks to melting glaciers and swollen oceans. (Water expands when heated.)

Unless greenhouse-gas emissions are curbed, warns James Hansen of NASA, global temperatures could climb 2 to 3 degrees Celsius by 2100. Such a rise would leave little of Manhattan but the skyscrapers.

This would leave much of eastern England, including areas near Sandringham, underwater. Global warming would also bring more heat waves like the one in the summer of 2003 that killed 31,000 people across Europe. It might even shut down the Gulf Stream, the flow of warm water from the Gulf of Mexico that gives Europe its mild climate. If the Gulf Stream were to halt—and it has already slowed 30 percent since 1992—Europe's temperatures would plunge, agriculture would collapse, London would no longer feel like New York but like Anchorage.

The Queen, says King, "got it" on climate change, and she wasn't alone. "Everyone in this country, from the political parties to the scientific establishment, to the Archbishop of Canterbury, to our oil companies and the larger business community, has come to a popular consensus about climate change—a sense of alarm and a conviction that action is needed now, not in the future," says Tony Juniper, executive director of the British

arm of the environmental group Friends of the Earth.

At the time of his meeting with the Queen, Blair was being attacked on climate change from all ideological sides, with even the Conservatives charging that he was not doing enough. Yet Blair's statements on the issue went far beyond those of most world leaders. He had called the Kyoto Protocol, which has been ratified by 162 countries and requires industrial nations to reduce greenhouse-gas emissions 5 percent below 1990 levels, "not radical enough." The world's climate scientists, Blair pointed out, had estimated that 60 percent cuts in emissions were needed, and he committed Britain to reaching that goal by 2050.

But it wouldn't matter how much Britain cut its greenhouse-gas emissions if other nations didn't do the same. The U.S. was key, not only because it was the world's largest emitter but because its refusal to reduce emissions led China, India, Brazil, and other large developing countries to ask why they should do so. All this Blair had also said publicly. In 2001 he criticized the Bush administration for withdrawing from the Kyoto Protocol. In 2004 he said it was essential to bring the U.S. into the global effort against climate change, despite its opposition to Kyoto.

It was no secret that Bush opposed mandatory emissions limits, but Blair, who had risked his political future to back the deeply unpopular war in Iraq, was uniquely positioned to lobby the president. Bush owed him one. At the same time, Blair needed to show his domestic audience that he could stand up to Bush, that he wasn't the presidential "poodle" his critics claimed.

To compel Bush to engage the issue, Blair made climate change a lead agenda item at the July 2005 meeting of the Group of 8, the alliance of the world's eight richest nations. A month before the meeting, which was held at Gleneagles, in Scotland, Blair flew to Washington to see Bush face-to-face. That same day, the national academies of science of all the G-8 nations, as well as those of China, India, and Brazil, released a joint statement declaring that climate change was a grave problem that required immediate action.

On the morning of July 7, the summit was interrupted by the shocking news that four suicide bombers had set off explosions in London, killing 56 people. Blair rushed to the scene, but he returned that night, still determined to secure an agreement.

In the end, however, Bush held firm. Washington vetoed all references to mandatory emissions cuts or timelines, and the climate-change issue was overshadowed by African debt relief, which had been publicized by Bob Geldof's Live 8 concerts.

"There were no tough targets at Gleneagles because we would not have got all signatures on the document," says King, who adds, "We might well have" gotten seven—that is, every nation but the U.S. The farthest the G-8 leaders went—and even this required a battle, says King—was to include a sentence that read, in part, "While uncertainties remain in our understanding of climate science, we know enough to act now."

But seven weeks later, nature acted first, and it was the United States she hit.

No one can say for sure whether global warming caused Hurricane Katrina, which slammed into the Gulf Coast on August 29, 2005. But it certainly fit the pattern. The scientific rule of thumb is that one can never blame any one weather event on any single cause. The earth's weather system is too complex for that. Most scientists agree, however, that global warming makes extra-strong hurricanes such as Katrina more likely because it encourages hot oceans, a precondition of hurricane formation.

"It's a bit like saying, 'My grandmother died of lung cancer, and she smoked for the last 20 years of her life—smoking killed her,'" explains Kerry Emanuel, a professor at the Massachusetts Institute of Technology who has studied hurricanes for 20 years. "Well, the problem is, there are an awful lot of people who die of lung cancer who never smoked. There are a lot of people who smoked all their lives and die of something else. So all you can say, even [though] the evidence statistically is clear connecting lung cancer to smoking, is that [the grandmother] upped her probability."

Just weeks before Katrina struck, Emanuel published a paper in the scientific journal *Nature* demonstrating that hurricanes had grown more powerful as global temperatures rose in the 20th century. Now, he says, by adding more greenhouse gases to the earth's atmosphere, humans are "loading the climatic dice in favor of more powerful hurricanes in the future."

But most Americans heard nothing about Hurricane Katrina's association with global warming. Media coverage instead reflected the views of the Bush administration—specifically, the National Oceanic and Atmospheric Administration, which declared that the hurricane was the result of natural factors. An outcry from N.O.A.A.'s scientists led the agency to backtrack from that statement in February 2006, but by then conventional wisdom was set in place. Post-Katrina New Orleans may eventually be remembered as the first major U.S. casualty of global warming, yet most Americans still don't know what hit us.

Sad to say, Katrina was the perfect preview of what global warming might look like in the 21st century. First, Katrina struck a city that was already below sea level—which is where rising waters could put many coastal dwellers in the years ahead. In 2001, the U.N.-sponsored Intergovernmental Panel on Climate Change (I.P.C.C.), a peer-reviewed, international collaboration among thousands of scientists that is the world's leading authority on climate change, predicted that sea levels could rise as much as three feet by 2100. By coincidence, three feet is about how much New Orleans sank during the 20th century. That was because levees built to keep the Mississippi River from flooding also kept the river from depositing silt that would have replenished the underlying land mass, explains Mike Tidwell, the author of *Bayou Farewell: The Rich Life and Tragic Death of Louisiana's Cajun Coast*. "You could say that in New Orleans we brought the ocean to the people," Tidwell adds, "which is pretty much what global warming will do to other cities in the future."

What's more, Katrina was a Category 5 hurricane, the strongest there is. Such extreme weather events will likely become more frequent as global warming intensifies, says the

I.P.C.C. Yes, Katrina's winds had slowed to high–Category 3 levels by the time it made landfall, but it was the hurricane's storm surge that killed people—a surge that formed in the Gulf of Mexico when the storm was still Category 5. Thus, Katrina unleashed 10 to 15 feet of water on a city that was already significantly below sea level.

To envision global warming's future impacts, the illustrations accompanying this article reflect this and other scenarios. [For illustrations, see the May 2006 issue of *Vanity Fair*.] The three large-scale illustrations are an artist's interpretations of projections generated for *Vanity Fair* by Applied Science Associates Inc. (appsci.com), a marine-science consulting firm based in Rhode Island. The projections do not account for small-scale features such as coastal-protection structures.

The effects of a three-foot sea-level rise compounded by a storm surge from a Category 3 hurricane are shown in the image of the Hamptons, which would suffer severe flooding. The image of Washington, D.C., shows the effects of a 20-foot sea-level rise, which is what scientists expect if the entire Greenland ice sheet melts. The ice sheet has shrunk 50 cubic miles in the past year alone, and is now melting twice as fast as previously believed.

Finally, the image of New York City shows the effects of an 80-foot rise in sea levels. That's what would happen if not only the Greenland ice sheet but its counterpart in the Antarctic were to melt, says James Hansen, the director of NASA's Goddard Institute for Space Studies. Hansen, who put climate change on the media map in 1988 by saying that man-made global warming had already begun, made headlines again earlier this year when he complained that White House political appointees were trying to block him from speaking freely about the need for rapid reductions in greenhouse-gas emissions. Hansen warns that, if global emissions continue on their current trajectory, the ice sheets will not survive, because global temperatures will increase by 2 to 3 degrees Celsius by the end of this century. "The last time the earth was that warm, sea levels were 80 feet higher than today," he says. It will likely take hundreds of years for sea levels to rise the full 80 feet, but the process would be irreversible, and the rises

would not be gradual. "You're going to be continually faced with a changing coastline, which will force coastal dwellers to constantly relocate," he says.

This article's smaller, aerial-view illustrations are based on simulations by the National Environmental Trust, a nonprofit group in Washington, D.C. N.E.T. relied on data from the I.P.C.C., the U.S. Geological Survey, and the N.O.A.A. Additional N.E.T. simulations are available at net.org. Philip Clapp, N.E.T.'s president, says, "The U.S. government has never released its own simulations. The Bush administration doesn't want these pictures in front of the American people because they show that a three-foot sea-level rise plus storm flooding would have catastrophic consequences."

In New York, it would leave much of Lower Manhattan, including the Ground Zero memorial and the entire financial district, underwater. La Guardia and John F. Kennedy airports would meet the same fate. In Washington, D.C., the Potomac River would swell dramatically, stretching all the way to the Capitol lawn and to within two blocks of the White House.

Since roughly half the world's 6.5 billion people live near coastlines, a three-foot sea-level rise would be even more punishing overseas. Amsterdam, Venice, Cairo, Shanghai, Manila, and Calcutta are some of the cities most threatened. In many places the people and governments are too poor to erect adequate barriers—think of low-lying Bangladesh, where an estimated 18 million people are at risk—so experts fear that they will migrate to neighboring lands, raising the prospect of armed conflict. A Pentagon-commissioned study warned in 2003 that climate change could bring mega-droughts, mass starvation, and even nuclear war as countries such as China, India, and Pakistan battle over scarce food and water.

These are just some of the reasons why David King wrote in *Science* in 2004, "Climate change is the most severe problem that we are facing today—more serious even than the threat of terrorism." King's comment raised hackles in Washington and led a top press aide to Tony Blair to try to muzzle him. But the science adviser tells me he "absolutely" stands by his statement. By no means does King underestimate terrorism;

advising the British government on that threat, he says, "is a very important part of my job." But the hazards presented by climate change are so severe and far-reaching that, in his view, they overshadow not only every other environmental threat but every other threat, period.

"Take India," King says. "Their monsoon is a fact of life that they have developed their agricultural economy around. If the monsoon is down by 10 percent one year, they have massive losses of crops. If it's 10 percent over, they have massive flood problems. [If climate change ends up] switching off the monsoon in India, or even changing it outside those limits, it would lead to massive global economic de-stabilization. The kind of situation we need to avoid creating is one where populations are so de-stabilized—Bangladesh being flooded, India no food—that they're all seeking alternative habitats. These, in our globalized economy, would be very difficult for all of us to manage."

The worst scenarios of global warming might still be avoided, scientists say, if humanity reduces its greenhouse-gas emissions dramatically, and very soon. The I.P.C.C. has estimated that emissions must fall to 60 percent below 1990 levels before 2050, over a period when global population is expected to increase by 37 percent and per-capita energy consumption will surely rise as billions of people in Asia, Africa, and South America strive to ascend from poverty.

Yet even if such a reduction were achieved, a significant rise in sea levels may be unavoidable. "It's getting harder and harder to say we'll avoid a three-foot sea-level rise, though it won't necessarily happen in this century," says Michael Oppenheimer, a professor of geosciences and international affairs at Princeton. Oppenheimer's pessimism is rooted in the lag effects of the climate system: oceans store heat for a century or longer before releasing it; carbon dioxide remains in the atmosphere for decades or longer before dissipating.

According to King, even if humanity were to stop emitting carbon dioxide today, "temperatures will keep rising and all the impacts will keep changing for about 25 years."

The upshot is that it has become too late to prevent climate change; we can only adapt to it. This unhappy fact is not well understood by the general public; advocates downplay it, perhaps for fear of fostering a paralyzing despair. But there is no getting around it: because humanity waited so long to take decisive action, we are now stuck with a certain amount of global warming and the climate changes it will bring—rising seas, fiercer heat, deeper droughts, stronger storms. The World Health Organization estimates that climate change is already helping to kill 150,000 people a year, mainly in Africa and Asia. That number is bound to rise as global warming intensifies in the years ahead.

The inevitability of global warming does not mean we should not act, King emphasizes: "The first message to our political leaders is, action is required. Whether or not we get global agreement to reduce emissions, we all need to adapt to the impacts that are in the pipeline." That means doing all the things that were not done in New Orleans: building sound levees and seawalls, restoring coastal wetlands (which act like speed bumps to weaken hurricanes' storm surges), strengthening emergency-preparedness networks and health-care systems, and much more.

Beyond this crucial first step—which most governments worldwide have yet to consider—humanity can cushion the severity of future global warming by limiting greenhouse-gas emissions. Hansen says we must stabilize emissions—which currently are rising 2 percent a year—by 2015, and then reduce them. *Avoiding Dangerous Climate Change,* a book based on a scientific conference convened by Tony Blair before the G-8 summit, estimates that we may have until 2025 to peak and reduce.

The goal is to stop global warming before it crosses tipping points and attains unstoppable momentum from "positive feedbacks." For example, should the Greenland ice sheet melt, white ice—which reflects sunlight back into space—would be replaced by dark water, which absorbs sunlight and drives further warming.

Positive feedbacks can trigger the kind of abrupt, irreversible climate changes that

scientists call "nonlinear." Once again, Hurricane Katrina provides a sobering preview of what that means. "Hurricanes are the mother of all nonlinear events, because small changes in initial conditions can lead to enormous changes in outcomes," says Hans Joachim Schellnhuber, the director of the Potsdam Institute for Climate Impact Research and the former chief environmental adviser to the German government. "A few percent increase in a hurricane's wind speed can double its destructiveness under certain circumstances."

Although scientists apply the neutral term "climate change" to all of these phenomena, "climate chaos" better conveys the abrupt, interconnected, wide-ranging consequences that lie in store. "It's a very appropriate term for the layperson," says Schellnhuber, a physicist who specializes in chaos theory. "I keep telling politicians that I'm not so concerned about a gradual climate change that may force farmers in Great Britain to plant different crops. I'm worried about triggering positive feedbacks that, in the worst case, could kick off some type of runaway greenhouse dynamics."

Among the reasons climate change is a bigger problem than terrorism, David King tells me, is that the problem is rooted in humanity's burning of oil, coal, and natural gas, "and people don't want to let that go." Which is understandable. These carbon-based fuels have powered civilization since the dawn of the industrial era, delivering enormous wealth, convenience, and well-being even as they overheated the atmosphere. Luckily, the idea that reducing greenhouse-gas emissions will wreck our economy, as President Bush said in 2005 when defending his opposition to the Kyoto Protocol, is disproved by experience. "In Britain," King told the environmental Web site Grist, "our economy since 1990 has grown by about 40 percent, and our emissions have decreased by 14 percent."

Ultimately, society must shift onto a new energy foundation based on alternative fuels, not only because of global warming but also because oil "will get harder and costlier to find" in the years ahead, says Ronald Oxburgh, the former chairman of the British arm of Royal Dutch Shell oil. "The group around President Bush have been saying that, even

if climate change is real, it would be terribly costly to shift away from carbon-based fuels," Oxburgh continues. "Of course it would, if you try to make the change overnight. But that's not how you do it. If governments make the decision to shift our society to a new energy foundation, and they make it clear to everyone this is what we're doing by laying out clear requirements and incentives, corporations will respond and get the job done."

The opening move in this transition is to invest massively in energy efficiency. Amory Lovins, co-founder of the Rocky Mountain Institute, a think tank that consults for corporations and governments around the world, has demonstrated that measures such as insulating buildings and driving more fuel-efficient vehicles could reduce humanity's consumption of energy and natural resources by a factor of four. And efficiency investments have a demonstrated record of creating jobs and boosting profits, suggesting that emissions can be reduced without crippling economies.

One of the first moves Angela Merkel announced as the new chancellor of Germany last fall was the extension of a Green Party initiative to upgrade energy efficiency in the nation's pre-1978 housing stock. Most of that housing is in the former East Germany, where unemployment approaches 20 percent. Replacing old furnaces and installing efficient windows and lights will produce thousands of well-paying laborers' jobs that by their nature cannot be outsourced.

Corporations, too, have discovered that energy efficiency can be profitable. Over a three-year period beginning in 1999, BP invested $20 million to reduce the emissions from its internal operations and saved $650 million—32 times the original investment.

Individuals can cash in as well. Although buying a super-efficient car or refrigerator may cost more up front, over time it saves the consumer money through lower energy bills.

Efficiency is no silver bullet, nor can it forever neutralize the effects of billions of people consuming more and more all the time. It can, however, buy humanity time to further

develop and deploy alternative-energy technologies. Solar and wind power have made enormous strides in recent years, but the technology to watch is carbon sequestration, a method of capturing and then safely storing the carbon dioxide produced by the combustion of fossil fuels. In theory, sequestration would allow nations to continue burning coal—the most abundant fuel in the world, and the foundation of the Chinese and Indian economies—without worsening the climate problem. "If carbon capture is not feasible, our choices are much less good, and the cost of climate change is going to be much higher," says Jeffrey D. Sachs, the director of the Earth Institute at Columbia University and a special adviser to the United Nations.

No one pretends that phasing out carbon-based fuels will be easy. The momentum of the climate system means that "a certain amount of pain is inevitable," says Michael Oppenheimer. "But we still have a choice between pain and disaster."

Unfortunately, we are getting a late start, which is something of a puzzle. The threat of global warming has been recognized at the highest levels of government for more than 25 years. Former president Jimmy Carter highlighted it in 1980, and Al Gore championed it in Congress throughout the 1980s. Margaret Thatcher, the arch-conservative prime minister of Britain from 1979 to 1990, delivered some of the hardest-hitting speeches ever given on climate change. But progress stalled in the 1990s, even as Gore was elected vice president and the scientific case grew definitive. It turned out there were powerful pockets of resistance to tackling this problem, and they put up a hell of a fight.

Call him the $45 million man. That's how much money Dr. Frederick Seitz, a former president of the National Academy of Sciences, helped R. J. Reynolds Industries, Inc., give away to fund medical research in the 1970s and 1980s. The research avoided the central health issue facing Reynolds—"They didn't want us looking at the health effects of cigarette smoking," says Seitz, who is now 94—but it nevertheless served the tobacco industry's purposes. Throughout those years, the industry frequently ran ads in newspapers and magazines citing its multi-million-dollar research program as proof of

its commitment to science—and arguing that the evidence on the health effects of smoking was mixed.

In the 1990s, Seitz began arguing that the science behind global warming was likewise inconclusive and certainly didn't warrant imposing mandatory limits on greenhouse-gas emissions. He made his case vocally, trashing the integrity of a 1995 I.P.C.C. report on the op-ed page of *The Wall Street Journal,* signing a letter to the Clinton administration accusing it of misrepresenting the science, and authoring a paper which said that global warming and ozone depletion were exaggerated threats devised by environmentalists and unscrupulous scientists pushing a political agenda. In that same paper, Seitz asserted that secondhand smoke posed no real health risks, an opinion he repeats in our interview. "I just can't believe it's that bad," he says.

Al Gore and others have said, but generally without offering evidence, that the people who deny the dangers of climate change are like the tobacco executives who denied the dangers of smoking. The example of Frederick Seitz, described here in full for the first time, shows that the two camps overlap in ways that are quite literal—and lucrative. Seitz earned approximately $585,000 for his consulting work for R. J. Reynolds, according to company documents unearthed by researchers for the Greenpeace Web site ExxonSecrets.org and confirmed by Seitz. Meanwhile, during the years he consulted for Reynolds, Seitz continued to draw a salary as president emeritus at Rockefeller University, an institution founded in 1901 and subsidized with profits from Standard Oil, the predecessor corporation of ExxonMobil.

Seitz was the highest-ranking scientist among a band of doubters who, beginning in the early 1990s, resolutely disputed suggestions that climate change was a real and present danger. As a former president of the National Academy of Sciences (from 1962 to 1969) and a winner of the National Medal of Science, Seitz gave such objections instant credibility. Richard Lindzen, a professor of meteorology at M.I.T., was another high-profile scientist who consistently denigrated the case for global warming. But most of the public argument was carried by lesser scientists and, above all, by lobbyists and paid

spokesmen for the Global Climate Coalition. Created and funded by the energy and auto industries, the Coalition spent millions of dollars spreading the message that global warming was an uncertain threat. Journalist Ross Gelbspan exposed the corporate campaign in his 1997 book, *The Heat Is On,* which quoted a 1991 strategy memo: the goal was to "reposition global warming as theory rather than fact."

"Not trivial" is how Seitz reckons the influence he and fellow skeptics have had, and their critics agree. The effect on media coverage was striking, according to Bill McKibben, who in 1989 published the first major popular book on global warming, *The End of Nature*. Introducing the 10th-anniversary edition, in 1999, McKibben noted that virtually every week over the past decade studies had appeared in scientific publications painting an ever more alarming picture of the global-warming threat. Most news reports, on the other hand, "seem to be coming from some other planet."

The deniers' arguments were frequently cited in Washington policy debates. Their most important legislative victory was the Senate's 95-to-0 vote in 1997 to oppose U.S. participation in any international agreement—i.e., the Kyoto Protocol—that imposed mandatory greenhouse-gas reductions on the U.S.

The ferocity of this resistance helps explain why the Clinton administration achieved so little on climate change, says Tim Wirth, the first under-secretary of state for global affairs, who served as President Clinton's chief climate negotiator. "The opponents were so strongly organized that the administration got spooked and backed off of things it should have done," says Wirth. "The Kyoto negotiations got watered down and watered down, and after we signed it the administration didn't try to get it ratified. They didn't even send people up to the Hill to talk to senators about ratifying it."

"I wanted to push for ratification," responds Gore. "A decision was made not to. If our congressional people had said there was even a remote chance of ratifying, I could have convinced Clinton to do it—his heart was in the right place.... But I remember a meeting in the White House with some environmental groups where I asked them for the names of 10 senators who would vote to ratify. They came up with one, Paul

Wellstone. If your most optimistic supporters can't identify 10 likely gettables, then people in the administration start to ask, 'Are you a fanatic, Al? Is this a suicide mission?'" (Clinton did not respond to e-mailed questions.)

James Hansen, without singling out any individual, accuses global-warming deniers of "acting like lawyers, not scientists, because no matter what new evidence comes in, their conclusion is already decided." Richard Lindzen responds that Hansen has been wrong time and time again and operates "one of the worst climate models around." Lindzen agrees that both global temperature and atmospheric concentration of carbon dioxide have increased over the last century. But temperatures won't rise much further, he says, because humans aren't the main driving force in the climate system. The reason most scientists disagree with him, Lindzen explains, is simple careerism. "Once President Bush the elder began spending $2 billion a year on climate science, scientists developed a self-interest in maintaining this is an urgent problem," he says, adding that the scientific community's fixation on climate change will be remembered as an episode of "mass insanity."

Among many rebuttals to the deniers' arguments, perhaps the most authoritative collection is found on the Web site of Britain's national academy of science, the Royal Society. But such rebuttals have little impact on true believers, says Robert May, the Society's former president. "[Nobel Prize–winning physicist] Max Planck used to say that people don't change their minds [because of evidence]," he adds. "The science simply moves on and those people eventually die off."

But if the deniers appear to have lost the scientific argument, they prolonged the policy battle, delaying actions to reduce emissions when such cuts mattered most. "For 25 years, people have been warning that we had a window of opportunity to take action, and if we waited until the effects were obvious it would be too late to avoid major consequences," says Oppenheimer. "Had some individual countries, especially the United States, begun to act in the early to mid-1990s, we might have made it. But we didn't, and now the impacts are here."

"The goal of the disinformation campaign wasn't to win the debate," says Gelbspan. "The goal was simply to keep the debate going. When the public hears the media report that some scientists believe warming is real but others don't, its reaction is 'Come back and tell us when you're really sure.' So no political action is taken."

Representative Henry Waxman, the California Democrat who chaired the 1994 hearings where tobacco executives unanimously declared under oath that cigarettes were not addictive, watches today's global-warming deniers with a sense of déjà vu. It all reminds him of the confidential slogan a top tobacco flack coined when arguing that the science on smoking remained unsettled: "Doubt is our product." Now, Waxman says, "not only are we seeing the same tactics the tobacco industry used, we're seeing some of the same groups. For example, the Advancement of Sound Science Coalition was created [in 1993] to debunk the dangers of secondhand smoking before it moved on to global warming."

The scientific work Frederick Seitz oversaw for R. J. Reynolds from 1978 to 1987 was "perfectly fine research, but off the point," says Stanton A. Glantz, a professor of medicine at the University of California, San Francisco, and a lead author of *The Cigarette Papers* (1996), which exposed the inner workings of the Brown & Williamson Tobacco Corporation. "Looking at stress, at genetics, at lifestyle issues let Reynolds claim it was funding real research. But then it could cloud the issue by saying, 'Well, what about this other possible causal factor?' It's like coming up with 57 other reasons for Hurricane Katrina rather than global warming."

For his part, Seitz says he was comfortable taking tobacco money, "as long as it was green. I'm not quite clear about this moralistic issue. We had absolutely free rein to decide how the money was spent." Did the research give the tobacco industry political cover? "I'll leave that to the philosophers and priests," he replies.

Seitz is equally nonplussed by the extraordinary disavowal the National Academy of Sciences issued following his most visible intervention in the global-warming debate. In 1998 he urged fellow scientists to sign an Oregon group's petition saying that global

warming was much ado about little. The petition attracted more than 17,000 signatories and received widespread media attention. But posted along with the petition was a paper by four global-warming deniers that was presented in virtually the same layout and typeface used by the National Academy of Sciences in its scholarly journal. The formatting, combined with Seitz's signature, gave the clear impression that the academy endorsed the petition. The academy quickly released a statement disclaiming any connection with the petition or its suggestion that global warming was not real. *Scientific American* later determined that only 1,400 of the petition's signatories claimed to hold a Ph.D. in a climate-related science, and of these, some either were not even aware of the petition or later changed their minds.

Today, Seitz admits that "it was stupid" for the Oregon activists to copy the academy's format. Still, he doesn't understand why the academy felt compelled to disavow the petition, which he continues to cite as proof that it is "not true" there is a scientific consensus on global warming.

The accumulation of scientific evidence eventually led British Petroleum to resign from the Global Climate Coalition in 1996. Shell, Ford, and other corporations soon left as well, and in 2002 the coalition closed down. But Gelbspan, whose Web site tracks the deniers' activities, notes that key coalition personnel have since taken up positions in the Bush administration, including Harlan Watson, the State Department's chief climate negotiator. (Watson declined to be interviewed.)

ExxonMobil—long the most recalcitrant corporation on global warming—is still spending millions of dollars a year funding an array of organizations that downplay the problem, including the George C. Marshall Institute, where Seitz is chairman emeritus. John Passacantando, executive director of Greenpeace USA, calls the denial campaign "one of the great crimes of our era." Passacantando is "quite confident" that class-action lawsuits will eventually be filed against corporations who denied global warming's dangers. Five years ago, he told executives from one company, "You're going to wish you were the tobacco companies once this stuff hits and people realize you were the ones

who blocked [action]."

The public discussion about climate change in the U.S. is years behind that in Britain and the rest of Europe, and the deniers are a big reason why. "In the United States, the Chamber of Commerce and National Association of Manufacturers are deeply skeptical of climate-change science and the need to reduce greenhouse-gas emissions," says Fiona Harvey, the environment correspondent for the *Financial Times*. "In Britain, the equivalent body, the Confederation of British Industry, is absolutely behind the science and agrees on the need to cut emissions. The only differences are over how to do that."

America's media coverage is also well behind the curve, says Harvey. "In the United States you have lots of news stories that, in the name of balance, give equal credence to the skeptics. We don't do that here—not because we're not balanced but because we think it's unbalanced to give equal validity to a fringe few with no science behind them."

Prominent right-wing media outlets in the U.S., especially the editorial page of *The Wall Street Journal,* continue to parrot the claims of climate-change deniers. (Paul A. Gigot, the page's editor, declined to be interviewed.) Few beat reporters are still taken in, but their bosses—the editors and producers who decide which stories run, and how prominently—are another matter. Charles Alexander, the former environmental editor at *Time,* complains that, while coverage has improved recently, media executives continue to regard climate change as just another environmental issue, rather than as the overriding challenge of the 21st century.

"Americans are hearing more about reducing greenhouse emissions from BP ads than from news stories in *Time, The New York Times,* or any other U.S. media outlet," Alexander says. "This will go down as the greatest act of mass denial in history."

In 2002, Alexander went to see Andrew Heyward, then the president of CBS News, after running into him at a Harvard reunion. "I talked to him about climate change and other global environmental threats, and made the case that they were more dangerous than terrorism and CBS should be doing much more coverage of them," Alexander

recalls. "He didn't dispute any of my factual points, but he did say the reason CBS didn't do more of that coverage was that 'people don't want to hear all that gloom and doom'—in other words, the environment wasn't a ratings winner. He seemed to think CBS News's job was to tell people what they wanted to hear, not what they need to know, and I think that attitude is increasingly true for the news business in general."

"That's bullshit," responds Heyward, who left CBS in 2005. "I've never been one of those guys who thinks news has to be light and bright. And in talking to Charles, I wasn't stating the policy of CBS News. I was just trying to explain to an old college classmate why there isn't more coverage of the environment on TV. Charles is an advocate, and advocates are never happy with the amount of coverage their cause gets."

American television did, however, give prime-time coverage to the latest, and most famous, global-warming denier: novelist Michael Crichton. ABC's *20/20* broadcast a very friendly interview with Crichton when he published *State of Fear,* a novel arguing that anyone who bought into the phony scientific consensus on global warming was a modern equivalent of the early-20th-century eugenicists who cited scientific "proof" for the superiority of the white race.

When Crichton was invited to testify before the Environment and Public Works Committee, observers in Britain were floored. "This is fairyland," exclaims Michael Meacher, the member of Parliament who served as Tony Blair's environment minister from 1997 to 2003. "You have a science-fiction writer testifying before the United States Senate on global-warming policy? I mean, you can almost see the little boy off to the side, like in the story of the emperor's clothes, saying, 'But he's a science-*fiction* writer, isn't he?' It's just ludicrous."

The man who invited Crichton, committee chairman James M. Inhofe, a Republican from oil-rich Oklahoma, had already said on the floor of the Senate that global warming was "the greatest hoax ever perpetrated on the American people." In an e-mail interview, Inhofe defended Crichton's appearance, noting that the writer holds a medical degree from Harvard. (Crichton is also a post-doctoral fellow at the Salk

Institute for Biological Studies.) The senator added that he stood by his hoax statement as well.

David King responded that Britain's climate-science research is headquartered within the Ministry of Defense, "and you wouldn't find a group of people less likely to perpetrate a hoax than the people in the Ministry of Defense."

King has "extremist views," Inhofe replied. If the I.P.C.C. and the world's leading academies of science echo King's views, he argued, it is because they actively silence dissidents: "Scientists who believe warming trends are naturally occurring, or benign, are almost always excluded from climate-change conferences and meetings because their conclusions do not support the political agendas of the others who host the conferences." (The I.P.C.C. denies this accusation.) The truth, Inhofe continued, is that "there is no consensus on the science of global warming." As proof, he cited—what else?—Frederick Seitz's Oregon petition.

Paul H. O'Neill, who served nearly two years as George W. Bush's secretary of the Treasury, does not buy the common notion that Bush and Vice President Dick Cheney resist taking action on global warming because they are oilmen. "I don't think either one of them is an oilman," insists O'Neill. "You have to have success to be an oilman. It's like saying you're a ballplayer, but you never got on the field."

In 1998, while running the aluminum giant Alcoa, O'Neill was among the first U.S. business leaders to recognize the enormity of climate change. He says Bush asked him, early in the first term, to put together a plan of action, but it was ignored. Like Bush, O'Neill opposed Kyoto, so he proposed other ways to move forward. But instead, he says, the administration "cherry-picked" the science on climate change to justify taking no action, "just like it cherry-picked the intelligence on weapons of mass destruction" to justify the invasion of Iraq.

"The United States is the only entity on this planet turning its back on this problem," says Massachusetts senator John Kerry. "Even as he talks about protecting the security

of the nation, the president is willfully choosing not to tackle this problem. History will record it as one of the greatest derelictions of duty ever."

Bush-administration officials counter that they are doing more to fight global warming than anyone else—just with different tools than those favored by supporters of the Kyoto Protocol. James L. Connaughton, the head of the White House Council on Environmental Quality, starts by pointing out that Bush has raised federal mileage standards for S.U.V.'s and light trucks. When I point out that the increase is tiny (a mere 0.3 miles per gallon, says Dan Becker of the Sierra Club), Connaughton maintains that over time further increases will result in substantial energy savings, especially when paired with the administration's new tax credits for efficient vehicles. It's also important, he says, to "keep personal income taxes in check" to encourage people to buy these new cars. What's more, the administration recently provided $10 billion in incentives for alternative-energy development and $40 billion over 10 years to encourage farmers to plant trees and preserve grassland that can soak up carbon dioxide.

The administration opposes the Kyoto Protocol, Connaughton claims, because its mandatory emissions cuts would punish the American economy, costing as many as five million jobs. It would also dry up the capital needed to fund the technological research that will ultimately solve global warming.

"It's important not to get distracted by chasing short-term reductions in greenhouse emissions. The real payoff is in long-term technological breakthroughs," says John H. Marburger III, the president's science adviser. Besides, "there is no question that mitigating the impact of climate change as it takes place will be much less [expensive] than the costs of reducing oil and coal use in the short term."

"The world is now on a trajectory to slow the growth in greenhouse-gas emissions," concludes Connaughton, who as a lawyer represented mining and chemical interests before joining the administration. "I'm highly confident we will stabilize [those emissions]." He says that's exactly what happened over the last 80 years with air

pollution. He seems to take pleasure in observing that, under Bush, the U.S. has actually reduced its annual emissions, which, he says, is more than some of its harshest critics overseas have done.

It's a cheerful story, but virtually no one else believes it. Waiting 80 years to eliminate greenhouse-gas emissions would guarantee runaway global warming, says James Hansen. In January, six former chiefs of the Environmental Protection Agency, including five who served Republican presidents, said Bush needed to do much more to fight climate change. In Britain, Peter Ainsworth, the Conservative Party's shadow secretary of state for the environment, says his party is "saddened" by the Bush administration's approach. "We would have preferred the Bush administration to take a leadership position on this problem ... instead of allowing itself to be seen as foot-dragging."

Outsiders doubt President Bush's desire to confront the issue, pointing out that his right-wing political base agrees with Inhofe that global warming is a liberal hoax. Critics also question the administration's faith in volunteerism. They argue that imposing mandatory timelines and emissions limits would put a price tag on carbon and push corporations and individuals to use less of it. "Long-term research is fine, but to offer that as a substitute for the stark necessity of near-term cuts in emissions is a kind of magical thinking—trusting that something will happen to make everything all right," says Donald Kennedy, the editor in chief of *Science*. In fact, despite Bush's call to end our "addiction" to oil, his 2007 budget actually reduced funding for alternative energy and efficiency.

Nor has the Bush administration cut short-term emissions, says a European diplomat who requested anonymity because he has to work with Bush officials. Citing data from the Energy Information Administration, the diplomat says Connaughton is correct to say that U.S. greenhouse-gas emissions declined, but only in the single year following the 2001 terrorist attacks, owing to the ensuing economic recession. U.S. emissions increased in every other year of Bush's presidency, making it "complete hokum" to

claim that Bush's policies are cutting emissions, the diplomat says, adding of Connaughton, "I'm afraid Jim has drunk the Kool-Aid."

As for John Marburger's assertion that it will be cheaper to adapt to climate change than to try to head it off, Michael Oppenheimer says, "It's a sad day when the president is being told by his science adviser that climate change isn't worth avoiding. It may be possible for rich nations and people to adapt, but 90 percent of humanity doesn't have the resources to deal with climate change. It's unethical to condemn them just because the people in power don't want to act."

"I think it is a slam dunk that we are on a path of dangerous anthropogenic interference with the climate, and it is also absolutely clear that what this administration has proposed so far will not get us off that path," says Jeffrey Sachs. "The administration says several things I agree with: technology is extremely important, global warming is a long-term issue, and we can't do it without China and India [because their greenhouse-gas emissions will soon outstrip our own]. But none of this adds up to taking no action. The fact that China and other developing economies have to be involved doesn't mean the United States refuses to commit to specific actions; it means the U.S. should commit itself, in part to help bring the others in.

"I've had discussions with leaders in China and India," adds Sachs. "They are very concerned about climate change because they see the effects it could have on them. We should help to set up prototype carbon-capture-and-sequestration power plants in China and India, and the rich countries should help to finance them. It's hard to ask poor countries to bear the full financial burden of these technologies, especially when it is the rich countries' past burning of carbon fuels that has created most of the problem. But the U.S. takes every opportunity to do virtually nothing to engage in practical steps with the developing countries."

Ask Al Gore how to avoid dangerous climate change and, despite his wonkish reputation, he doesn't begin by talking about hybrid cars or carbon sequestration. No, says Gore, the first imperative is to "punch through the massive denial and resistance"

that still exist in the United States.

But the rest of the world is no longer waiting for the Bush administration. At the international climate conference held in Montreal last year, European nations called the administration's bluff when it refused to commit even to the breathtakingly modest step of someday discussing what framework might follow the Kyoto Protocol, which expires in 2012. At past summits, the administration's stubbornness led other nations to back down in hopes of keeping America involved in the process. At Montreal, the world quit waiting for Godot and recognized, as Elliot Morley, Tony Blair's minister of the environment, says, "there are a lot of voices in the United States in addition to the Bush administration, and we will work with all of them to address this problem."

The same thing is happening inside the U.S. "It is very clear that Congress will put mandatory greenhouse-gas-emission reductions in place, immediately after George W. Bush leaves office," says Philip Clapp of N.E.T. "Even the Fortune 500 is positioning itself for the inevitable. There isn't one credible 2008 Republican presidential candidate who hasn't abandoned the president's do-nothing approach. They have all adopted the approach the rest of the world took at the Montreal talks—we're moving forward, you're a lame duck, and we have to deal with it."

Regardless of what happens in Washington, D.C., state and local governments across America are aggressively confronting the problem. Two hundred and eight mayors have committed their cities to meet or exceed the emissions reductions mandated by the Kyoto Protocol, and some have gone further. Governor Arnold Schwarzenegger has committed California to 30 percent cuts by 2020.

California officials have also held talks with their counterparts in Oregon and Washington about launching a so-called carbon-trading system like the one currently in force in Europe. Such a system allows efficient users to profit while wasteful users must pay for burning more fuel. A similar mechanism worked in the 1990s to dramatically reduce emissions of sulfur dioxide—the cause of acid rain—at far less cost than industrialists or environmentalists anticipated.

New York and seven other northeastern states, which together with California amount to the third-biggest economy in the world, are also considering a carbon-trading system. Their collective actions—investing in energy efficiency, installing wind turbines, sequestering carbon—could boost production runs and lower costs to the point where the green technologies needed to fight global warming become affordable for everyone.

At the same time, investors and others worried about global warming are pressuring corporations and Wall Street to take the problem seriously. The Investor Network on Climate Risk, a coalition of pension-fund managers and institutional investors representing $3 trillion in assets, has put corporations on notice that its members will reconsider investing in companies that don't pay enough attention to climate change. In 2005, investment-banking giant Goldman Sachs pledged to embrace carbon trading and invest $1 billion in renewable energy.

"To use a term coined by George W. Bush in the context of the Iraq war, I think this coalition of the willing might be much more successful than the Kyoto process," says Hans Schellnhuber. "I've been to a lot of these international conferences, and it's a pretty frustrating experience that usually produces little more than cheap talk. Whereas a true coalition of the willing can bring together regional governments, enterprises, and individuals and show that it is technologically and economically possible to take meaningful action."

No matter what happens, the global warming that past human activity has already unleashed will make this a different planet in the years ahead. But it could still be a livable, even hospitable, planet, if enough of us get smart in time. If we don't, three feet of water could be just the beginning.

Mark Hertsgaard is the environmental correspondent for *The Nation*.

Washington, D.C.: *Original photograph from Corbis; photo illustration by John Blackford*. New York City: *Original photograph by Cameron Davidson; photo illustration by John Blackford*.

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