A sustained, critical look at climate change economics and science is long overdue.

A Looming Policy Disaster

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After decades of activism by environmentalists, American policymakers are embracing the notion that climate change is a serious problem and that the United States must take action to lower greenhouse gas emissions. In 2006, California governor Arnold Schwarzenegger signed a vague but ostensibly comprehensive bill that caps his state's greenhouse gas emissions. By last June, 17 states had adopted California's vehicle emission standards for greenhouse gases, which require automobile manufacturers to reduce car and truck emissions by 30 percent by 2016. That same month, the U.S. Senate came close to voting on the Lieberman-Warner Climate Security Act, which would have established an enormously complicated cap-and-trade system for greenhouse gases and instituted a number of subsidies and special interest carve-outs for various carbon-emitting interest groups.

The federal courts have also decided that something must be done about greenhouse gas emissions. In the spring of 2007, the U.S. Supreme Court ruled in *Massachusetts v. EPA* that the U.S. Environmental Protection Agency must promulgate automobile tailpipe carbon dioxide emission standards under Section 202 of the Clean Air Act (CAA). In the lower federal courts, states and environmental groups have attempted to use the old common law doctrine of public nuisance to create a new, judge-made common law regulation of climate change. While the federal courts have rejected the most obvious attempts to substitute judicial remedies for democratic legislation (see, e.g., *Connecticut v. AEP* and *California v. General Motors Corp.*), imaginative plaintiffs' attorneys have now shifted ground by arguing that the public nuisance consisted not in the greenhouse gas emissions of defendants such as ExxonMobil, but rather in those firms' funding of scientific research that created doubt about the effects of global warming (*Kivalina v. ExxonMobil*).

The recent wave of global warming legislation and litigation represents a triumph for climate change activists. But it is in no way a rational, economically sound response to the problems potentially raised by global warming. Instead, the legislation and litigation seem to be products of an adversarial campaign that has presented a very one-sided and hence misleading story about global warming science, about the likely costs and benefits of global warming on Americans' health and welfare, and about the ability of the United States to act alone to alter possible future paths of global warming. The far-distant future may indeed bring a climate catastrophe, but if we do not now take a sustained and critical look at climate change economics and science, an imminent policy catastrophe is a sure thing.

COSTS AND BENEFITS

As with all policy decisions, the choice between combating climate change or continuing the current greenhouse gas emissions trend is a choice between different sets of risks, costs, and benefits. The costs of a warming climate are commonly discussed, but the debate offers little discussion of the benefits of a warming climate or the costs of trying to slow climate change. Those issues need to be part of the public discussion of greenhouse gas policy, as they will affect efforts to reach a political consensus.

BENEFITS There is abundant empirical economic evidence that an increase in climatic temperature of 2–3° C may well benefit many regions of the United States in the form of enhanced amenity value, increased agricultural productivity, reduced deaths and disease resulting from cold weather, and increased value from warm weather recreational pursuits.

A warmer climate with milder winters will confer a very large amenity benefit in areas of the United States that now have cold winters. According to the Coupled Ocean Atmosphere Gener-

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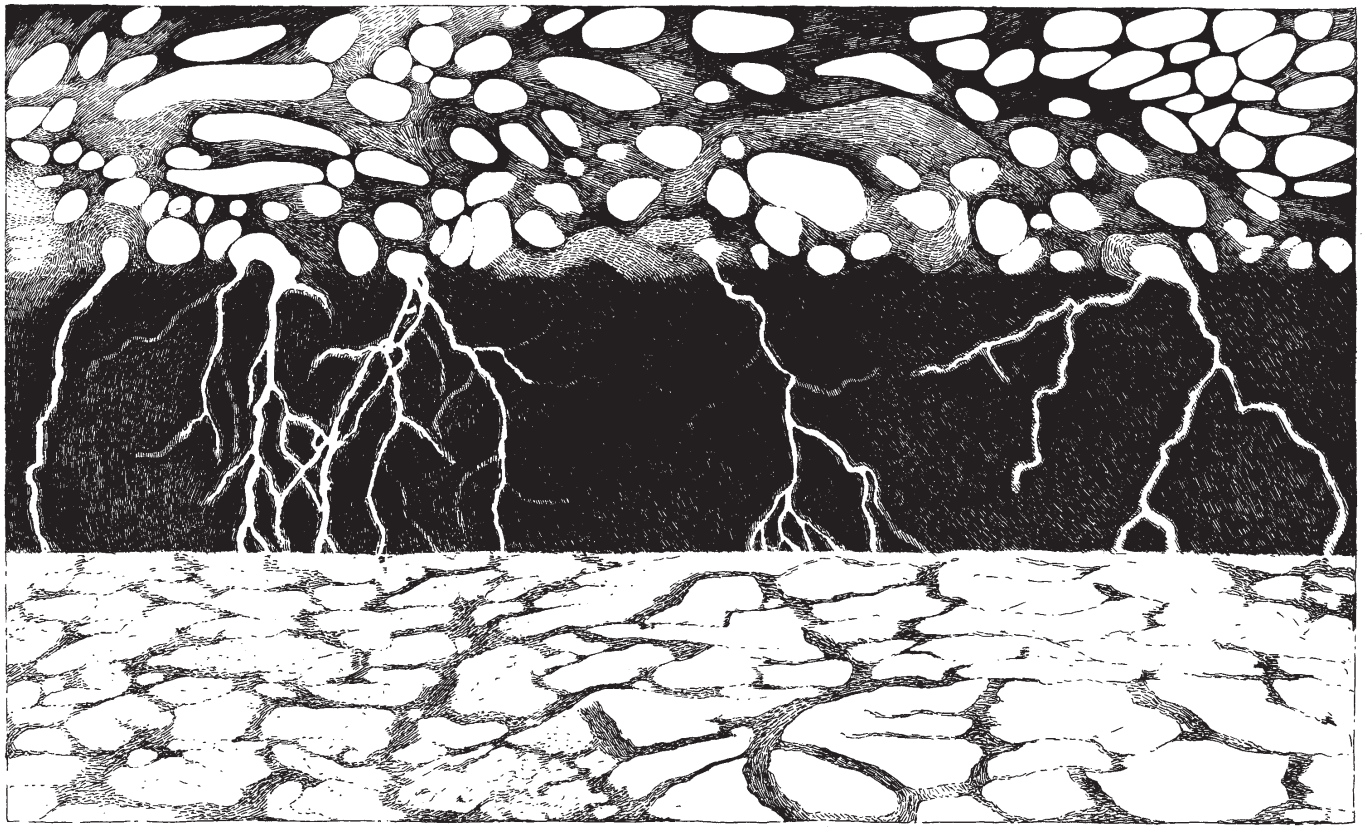

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al Circulation computer models that constitute the current state of the art in climate change prediction, global warming will not give lots of places California's mild, Mediterranean climate, but it will moderate wintertime cold temperatures. Econometric studies of the amenity value of climate show that the moderating effect of global warming on wintertime temperatures in the cold northern, interior, and northeastern regions of the United States will be a decided benefit to people living in such places, worth billions of dollars a year.

The models also indicate a warming climate will likely make for warmer summers with extreme heat waves. However, developed nations like the United States are more capable of withstanding extreme hot weather than extreme cold weather; heat-related mortality in the United States has declined steadily since the 1960s. A number of factors seem to account for this trend, including the broad use of air conditioning and improved weather forecasting that enables more advance notice of coming heat waves. A recent study of climate scenarios using two prominent global climate models that predict huge temperature increases in the 2070–2099 period predict that there will be no statistically significant increase in U.S. mortality from such temperature increases. The study finds that if warming turns out to be concentrated most in the coldest months, as climate science suggests would happen, then it would lead to a "substantial" reduction in U.S. mortality.

In the United States, a warmer climate would likely not only bring health benefits, but also quite sizeable recreational benefits. Early studies of the impact of moderate climate warming on recreational benefits focused on skiing and, unsurprisingly, found that a warmer climate would mean a decline in both ski industry profits and skier welfare. But however much skiers may love their sport, the reality is that skiing in the United States is not very economically important when compared to summertime recreational activities such as boating, camping, fishing, golfing, hunting, and wildlife viewing. Global warming has the potential of greatly lengthening the outdoor season for those sports and recent work estimates that global warming will generate an increase in profits and consumer welfare from such warm weather sports, offsetting the negative impact on skiing.

A final and relatively well known benefit to the United States from global warming is a likely increase in agricultural productivity and (depending upon what happens to world output and prices) on agricultural profits. Even the most recent Assessment Report from the International Panel on Climate Change (IPCC), which is not particularly interested in economic analysis and not at all keen on identifying benefits from global warming — notes that during the warming that occurred over the period 1970–2000, corn yields in the U.S. Midwest increased 20 percent. Econometric studies that correctly and carefully attempt to control for the ability of U.S. farmers to adapt rapidly to climate change generally find a relatively complex relationship between climate and agricultural value (as measured by land prices). On balance, however, moderate climate change is predicted to have clearly beneficial effects on agriculture. Interestingly, this work also suggests that there may be very large interstate differences in the effect of climate change on agricultural profits. According to one widely used climate change scenario, California is expected to suffer a significant annual decline in agricultural profits, while other states, together, are expected to see an increase in agricultural profits.

COSTS Economists can estimate the value of a warmer climate by looking at how current-day climate variation affects market behavior and market values. Established alternative energy sources and proposed methods of reducing greenhouse gas emissions allow economists to derive similar estimates of the cost of slightly altering emissions trends. However, really large reductions in greenhouse gas emissions depend upon the widespread adoption of new technologies that are either not yet technologically and economically feasible — most prominently, carbon capture and sequestration — or whose large-scale implementation possibilities are seemingly inherently limited and are at best unclear (e.g., solar). For those reasons, the aggregate costs of decarbonizing the American economy are enormously uncertain.

What is certain and relevant to policy is that the cost of decarbonizing the American economy will be radically unequal across both regions and income groups. For instance, increasing automobile efficiency will entail higher prices for cars. In America, unlike densely populated Europe, lots of lower income people depend upon their cars to drive to work. Unless large subsidies are provided to the poor, expensive and dramatic cuts in automobile greenhouse gas emissions could have severely regressive distributional consequences, effectively decreasing the availability of employment opportunities to people of low to moderate income.

The unfair distributional consequences of costly reductions in greenhouse gas emissions from power plants are likely to be just as bad as are the distributional consequences of reducing auto and truck greenhouse gas emissions. By one estimate, the only current method of carbon capture for coal-burning power plants increases a typical customer's utility bills by 44 percent. Because the poor spend a larger part of their income on energy than do wealthier people, such cost (and price) increases will disproportionately hurt poorer people.

There will also be large regional and interstate variations in the cost of reducing greenhouse gas emissions. Figure 1 depicts state per-capita carbon dioxide emissions as of 2003. As can be seen from the figure, there are enormous variations across states: some states, such as Vermont, California, and Massachusetts, have per-capita emissions in the range of 10–11 metric tons (roughly the same as hyper–energy efficient countries such as Germany), while other states have very high emission rates — 125 tons per person in Wyoming, 63 tons per person in West Virginia, and 80 tons per person in North Dakota. Several factors contribute to that variation. One major determinant is fuel source: states such as Indiana and West Virginia rely on coal for their electric power, and those states tend to have higher emissions vis-à-vis states in New England and the Pacific Northwest that rely more on nuclear and hydroelectric generation. Large, sparsely populated states with extremes of winter cold and summer heat tend to have high per-capita emissions. Insofar as the per-person cost of reducing such emissions tracks status quo levels, certain states would almost surely have much higher than average costs of meeting a national greenhouse gas emission reduction mandate — states in the northern Mountain and Plains regions as well as the upper Midwest and south-central regions.

THE DIFFICULTY OF AGREEMENT

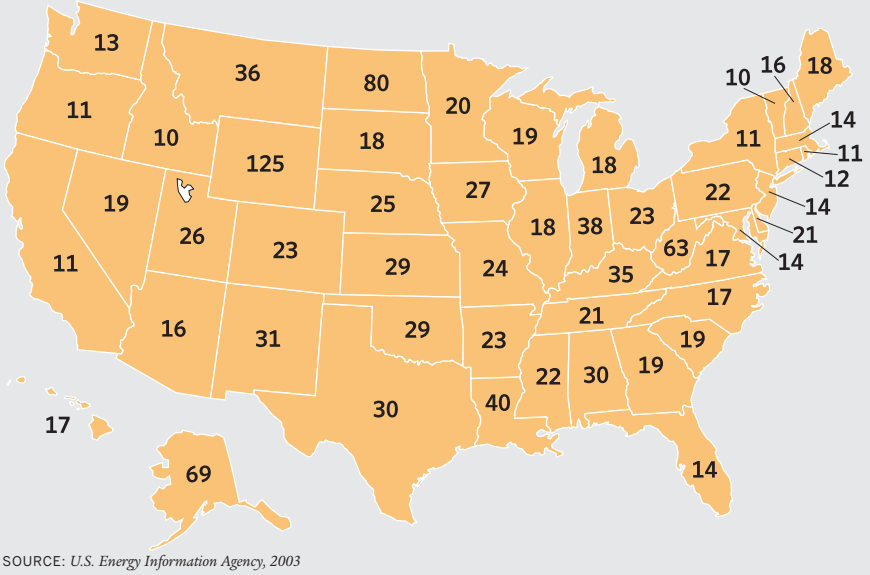
A commonly voiced criticism of the recently tabled Lieberman-Warner bill is that it was so complex and attempted to accomplish so many different goals that the only thing it would certainly have done would have been to create a vast and expensive new multi-agency climate change regulatory bureaucracy. It is true that Lieberman-Warner would have been a boon to environmental regulatory bureaucracy; however, the economic evidence also predicts that without such complexity, mandatory greenhouse gas emission reduction legislation would have had no chance of passing.

For the residents of a large number of American states, it would be very costly to reduce greenhouse gas emissions, and yet such reductions would generate for them few benefits and may even entail losses. To have any chance of passage, emission reduction legislation would have to offer potentially very large carrots for lawmakers from the not-insubstantial number of states that would be almost certain losers from the legislation. The Lieberman-Warner bill included everything from wide-ranging agricultural offsets (allowing certain agricultural practices to be sold as net greenhouse gas reducers) to subsidies for low income energy consumers. Yet it is far from clear that such side payments would be adequate to fully compensate the residents of Wyoming, Nebraska,

Figure 1

Uneven Distribution

Per-capita carbon dioxide emissions by state (metric tons)



SOURCE: *U.S. Energy Information Agency, 2003*

West Virginia, and many other states for the large net costs that Lieberman-Warner would have imposed upon them.

LITIGATION This same basic consideration of economic costs and benefits reveals the fundamental weakness of the Supreme Court's decision in *Massachusetts v. EPA* that greenhouse gases are pollutants under the Clean Air Act. The Court's decision has support in the broad literal language of the CAA's statutory definition of "air pollutant" as "any air pollution agent or combination of such agents, including any physical, chemical...substance or matter which is emitted into or otherwise enters the ambient air." But interpreting that language to include greenhouse gases makes no sense in light of the overall purpose and structure of the CAA.

In the act, Congress sought to regulate emissions that cause direct harm to the environment and health of Americans. Greenhouse gas emissions would be sensibly regulated under the act if they poisoned the environment or human health directly. But greenhouse gas emissions cause harm indirectly, by effecting climate change. Hence, greenhouse gases are very different from the "criteria" air pollutants envisioned by the lawmakers who passed the CAA.

Thus, federal greenhouse gas regulation would seem to require congressional passage of new regulation. However, given the uneven distribution across the United States of the costs of mandated reductions in greenhouse gas emissions, it is unclear whether such legislation could be passed today, even with the growing consensus in Congress that such legislation is necessary.

In its regulation of criteria air pollutants and auto emissions, the CAA imposed a pattern of costs and benefits that varied greatly across states and regions. However, the act anticipated (and subsequent research has confirmed) that states and legislative districts with the dirtiest air would incur the biggest costs but also receive the biggest health benefits from reducing air pollution. The CAA was filled with legislative deals: for the auto industry (whose employment at that time was enormously concentrated in Michigan, Indiana, and Ohio), national auto emissions standards set a stringency ceiling that only California could exceed; for legislators from the oldest, most polluted states and districts, a program (Prevention of Significant Deterioration) required even the then-pristine southern and mountain regions to require industrial emissions controls. An equally — if not more — complicated set of legislative bargains would be necessary to secure the passage of greenhouse gas reduction legislation.

But as Lieberman-Warner shows, the kinds of bargains necessary to pass decarbonization legislation are completely different than the set of bargains that secured the passage of the CAA. This should not be surprising: the air pollution problem dealt with by the CAA and the climate change/decarbonization problem are completely different. On this analysis, it is impossible to reasonably construe a federal legislator's vote in favor of regulating traditional air pollutants under the CAA as a vote in favor of regulating greenhouse gas emissions under the statute.

This makes the Supreme Court decision in *Massachusetts v. EPA* problematic. The Court's decision — that because Congress used a broad definition of "air pollutant" in seeking to cut American air pollution, it also intended to save the world from global warming — ignores the vast web of compromises that were necessary to secure the CAA. The implicit interpretive principle adopted by the Court — that broad statutory definitions should be interpreted blindly — is absurd and essentially rewrites and expands the CAA into a judge-made climate change law.

CONSEQUENCES Many states may suffer harm, not benefit, from global warming. Some of those states would directly benefit from costly mandatory greenhouse gas emissions regulation. States that already have low per-capita carbon dioxide emissions — because of a combination of favorable (that is, mild) climate and/or relatively greater reliance on nuclear, hydropower, or even natural gas versus coal — are likely to have relatively low costs of decarbonizing their economies. Such states stand to gain in relative competitiveness from mandatory decarbonization. Of the 12 state plaintiffs in *Massachusetts v. EPA* (California, Connecticut, Illinois, Maine, Massachusetts, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, and Washington), all except New Mexico already have relatively low per-capita carbon dioxide emissions and therefore stand to gain an economic comparative advantage relative to other, higher-emitting states.

Many of those states may be able to argue that they will be net losers from global warming. Indeed, to satisfy standing requirements, Massachusetts alleged that it would benefit from federal regulation of greenhouse gases today because it would suffer harm from possible 21st century sea level rise from global warming. The other plaintiff states could have also pointed to evidence of similar potential harms to them and/or their citizens from global warming. For example, some climate models predict that New Mexico (and other southwestern states) will become more drought-prone from global warming; as already discussed, the ski industry in states such as Vermont is generally projected to lose from global warming.

It is precisely because the different states can expect such different consequences from global warming versus mandatory emission reduction that the lower federal courts in California and Connecticut were correct to dismiss lawsuits alleging that greenhouse gas emissions constitute a public nuisance. The injunctive remedies sought by the plaintiffs would constitute what is essentially a form of judicially imposed common law greenhouse gas emissions regulation. The logical consequence of such regulation is that federal global warming policy would be whatever remedy emerged from bargaining between certain plaintiff states who are in favor of mandatory reduction and the group of private greenhouse gas emitters that such states chose to sue. Unsurprisingly, the plaintiff states have sued out-of-state greenhouse gas emitters.

But in Congress all the states have a voice and a vote. Legislators who perceive that their states or districts stand to benefit from mandatory greenhouse gas emissions reduction cannot simply externalize the cost of such reduction to out-of-state emitters located in states that would be net losers from

reduction. In Congress (especially the Senate), legislators from states that will probably lose from mandatory reduction would bargain to force beneficiary states to both bear some of the costs of such a program and/or to compensate high-emissions states for the costs that their constituents would bear. The public nuisance suits are an attempt by states that want mandatory greenhouse gas reduction to get what they want for free, without bargaining with the elected federal representatives of states where the defendant emitters are located. Relative both to a legislative solution and to the economically optimal regulatory approach, such common law "regulation" would be much too stringent — because only the interests of the most-harmed state or states are represented — and would also be fundamentally undemocratic.

QUESTIONS AND UNCERTAINTIES

If the economic impact on the United States of moderate climate change is indeed as I have portrayed it, then how, one might ask, could the Supreme Court have decided that the Clean Air Act encompasses greenhouse gas emissions and how could Congress (or at least the Senate) have gotten so close to passing climate change legislation that would have created a vast new regulatory bureaucracy and possibly imposed catastrophic costs on the American economy? The answer is that the economic analysis of climate change impacts on the United States has been ignored by the proponents of greenhouse gas reduction legislation. The IPCC Assessment Reports ignore the vast majority of economic work on climate change impacts: indeed, only a small fraction of the leading empirical economic work that I summarized above is even mentioned in the IPCC reports. And "mention" is indeed the correct term for the IPCC's attitude toward economic evidence: even when discussing the likely impact of climate change on developed economies such as the United States, the IPCC relies not on rigorous economic evidence but on a variety of studies that are not based clearly on any particular established social science methodology but on a variety of ad hoc methodologies that seem most closely akin to the informal "futurism" one finds occasionally on the paperback bestseller list.

With the economics pushed aside, climate change activists have been free to argue that *physical science alone* dictates the need for greenhouse gas emission reduction policies. Rhetorically, this strategy takes advantage of one of the most regrettable and perhaps ultimately tragic features of the secular societies of modern developed countries: the coupling of profound popular ignorance about the methodology of physical science with profound popular faith in scientific prognostications. As so often happens, ignorance drives faith — in this case, ignorance of scientific methodology means that the vast majority of people simply cannot read scientific journals with any degree of understanding. As people cannot themselves evaluate anything that scientists say, they trust that somehow the "scientific process" has weeded out true from false assertions. Climate change activists have seized upon this popular faith in science by continuously using the popular media to attribute various adverse contemporaneous climate events to human-induced warming and to predict that more dire consequences await us in the future unless something radical is done now to reduce greenhouse gas emissions.

Opinion polls show that this rhetorical strategy has succeeded quite brilliantly in shifting popular opinion about climate change and the need for greenhouse gas emissions reduction policies. But this rhetorical strategy is deeply cynical and highly misleading. Behind the popular media claims of climate change activists are rich bodies of research published in peer-reviewed scientific journals. More often than not, the academic research reveals a more nuanced and uncertain world than what is portrayed in the popular media. There are rigorous and empirically supported competing explanations for the climate phenomena that have been or are being observed. Models upon which climate change predictions are based rely upon assumptions about particular climate mechanisms (e.g., the impact of a warming atmosphere on cloud formation) that are not strongly supported. Climate change activists are well aware of the fact that neither journalists nor the public have the time or the training to even briefly review the scientific literature lying behind their popular media claims, and they have cynically exploited this fact to present a very one-sided and hence misleading picture of climate science.

A climate change activist might respond that only a scientist could comprehend the climate science literature at a level sufficient to ask questions about it. Behind this response lies the implicit assumption that science is, or should be, beyond critical analysis except by other scientists in the same field. But just as the peer review system is used in the scientific realm to test the merits of research, so the American legal and legislative system uses the adversarial process. In American legal proceedings, there is a long tradition of admitting expert testimony if relevant and potentially informative. But expert testimony is not treated as somehow sacrosanct and immune from criticism. Instead, aided by their own experts, attorneys typically subject expert witnesses to thorough and oftentimes exhaustive cross-examination. As any attorney or expert witness who has been part of this process will immediately attest, in the hands of skilled attorneys, assisted by top experts, this process constitutes an extremely rigorous investigation into the scientific basis for expert opinion and its ultimate policy relevance.

Elsewhere (see Readings, below) I have attempted to set out a series of questions that my own review of the climate science literature suggests would be asked of climate change activists in such an adversary proceeding. Admittedly, my questions reflect the limits of my own layperson economist's training and ability, so they may well be flawed and incomplete. But I am especially curious about the following:

- There is substantial evidence that high levels of atmospheric carbon dioxide did not cause previous warm global climate periods in the near to far-distant climate past, but were instead a consequence of such warming.
- There are highly plausible competing hypotheses to atmospheric carbon dioxide increase that would explain all or most of the observed 20th century global surface warming.

- Many climate models' precise recent period predictions have been disconfirmed, such as the prediction that increases in global precipitation will be small relative to the warming-induced increase in atmospheric water vapor.
- The bulk of global warming predicted by the various models is not the product of carbon dioxide itself, but rather positive feedback effects from a given carbon dioxide–induced increase in average temperature. However, the most important positive feedbacks underlying the models — in particular, cloud response — are not well understood and there is evidence that they may be negative rather than positive. Yet it has been shown that the predominance of the models' positive feedbacks is so great that regardless of what we actually learn about the various climate feedbacks, the models will always say that there is some positive change of extremely high temperature increases.

Perhaps these are non-issues, suggested by my own failure to understand subtleties in the climate science literature. If so, that could be quickly clarified by climate science experts, who could explain precisely where the mistaken understanding lies. Far from encouraging and responding to such examination by scientists and policymakers, climate change activists have taken great pains to squelch any cross-examination of the scientific basis of their opinions. Media superstar James Hansen, for example, urged this past summer that the chief executive officers of ExxonMobil and other oil and resource firms be criminally prosecuted for funding think tanks and researchers who spread disinformation and create a sense of doubt about climate change. Hansen's abhorrence of dissent does not increase one's confidence that his view is correct.

WHAT SHOULD WE DO?

At the very least, climate change science suggests that continuing, uncontrolled increases in carbon dioxide and other greenhouse gas emissions and in the atmospheric concentration of such gases would constitute a global-level experiment with unknown but potentially very serious and harmful long-term consequences. Together with the existing economic evidence, climate science suggests that moderate global warming will not be especially costly and may even be beneficial to the United States over the next several decades. In the long run (post-2100) however, the United States may be at risk of harm from bigger temperature increases. And in the short to medium run, even moderate global warming could cause significant harm to the developing world. If by reducing its greenhouse gas emissions, the United States could slow or even reduce the buildup of those gases in the atmosphere, then the nation may well help reduce short- to medium-term suffering in the developing world and also generate a long-term benefit for future Americans.

But it is far from clear that by reducing its own greenhouse gas emissions, the United States could do much to alter the time path of change in atmospheric greenhouse gas concentration. China's carbon emissions have been significantly higher than those of the United States since 2006, and probably for much longer and by much more than have been estimated. If Brazil, India, and Russia continue on their fossil fuel–intensive growth paths, they may eventually surpass the United States as well. Hence it is very unlikely that even by drastically cutting its greenhouse gas emissions, the United States can significantly alter the rate of change in the atmospheric concentration of greenhouse gases. If U.S. emission reductions are to be effective in lessening the probability or magnitude of harmful global warming, then it must be because somehow action by the United States now will increase the probability that China, India, and similar industrializing countries will in the future find it in their interest to take costly action to reduce their own greenhouse gas emissions.

It is unclear how early action by the United States would have that impact. Some environmentalists seem to assume that international cooperation in taking costly action to reduce greenhouse gas emissions is like a social conformity game played in schoolyards and country clubs: if "leader" countries spend money to reduce their own greenhouse gas emissions, then later-developing countries will feel intense pressure to join the club and spend lots of money to reduce their emissions. Politely put, this seems naive. Even if someone in the United States discovers a now-unforeseen, cheap, and wonderfully effective way to burn coal for power while capturing and storing the carbon combustion byproduct, it is far from clear that China and other late-industrial powers would find it worthwhile to spend the extra money to build "clean" coal plants. Even if China could someday prevent harmful global warming by acting alone to reduce its emissions (something that is perhaps not so fanciful), whether the Chinese government would take costly action to reduce its emissions would depend upon how quickly its economy was then growing, how much its per-capita income had grown, and in general upon how the Chinese government perceived the political benefits of costly emission reduction versus a continuation of more rapid growth.

Present greenhouse gas emission reductions by the United States do have some potential to influence future Chinese incentives for greenhouse gas emission reduction. U.S. advances in emission reduction technologies could lead to lower costs and greater effectiveness for later-adopters. However, China has largely eschewed currently available emission reduction technologies for conventional pollutants, so why should we expect China to adopt some future greenhouse gas reduction technologies?

Indeed, it seems quite possible that unilateral U.S. emission reduction would leave unchanged or actually weaken future Chinese incentives for greenhouse gas emission reduction. If the atmospheric stock of carbon continues to increase despite U.S. reductions, but global average temperature and harms from such temperature changes begin to stabilize or even decline, then pressure for Chinese reductions would seem surely to diminish. Alternatively, if the atmospheric stock of carbon begins to fall, the Chinese might well argue that the scientific justification for action has weakened.

U.S. action need not, of course, be strictly unilateral. Lieberman-Warner anticipated an international effort, under-

taken by treaty. A multinational agreement would increase the probability that treaty signatories will live up to their promises (and somehow punish defectors), so U.S. action may make an international treaty relatively more attractive and hence broader in membership.

Global warming treaties are not, however, like other environmental treaties. It is hard to see how there is anything that any subgroup of treaty signatories can do to effectively sanction a defecting, non-compliant signatory. Compliant signatories are unlikely to suspend the treaty temporarily in order to "punish" the defector. Perhaps the compliant signatories could use trade sanctions to rein in the defector, but China's current trade stature likely protects it from such discipline.

BLAME GAME The recent spate of global warming public nuisance litigation attempts to find defendants who are to blame for U.S. greenhouse gas emissions. But there is no one to blame. Those emissions are a consequence of the tremendous economic engine that is the American carbon-based economy, an engine that has, since World War II, enormously improved the lives and well being of literally billions of people around the world. On any reasonable reading, climate science and economics have generated evidence that present-day U.S. emissions do not pose a risk of an imminent climate catastrophe. Rather, continuation of rapid increases in global greenhouse gas emissions constitutes an experiment in atmospheric chemistry with potentially harmful long-term consequences to many regions of the earth, and with potentially harmful near-term consequences for lesser-developed regions of the earth — places where people's daily lives and well being are still enormously dependent upon weather and climate.

Lots of experiments run risks, and like any risky experiment, the question about the global experiment in increasing greenhouse gas emissions is whether the benefits are worth the risks. On this view, a sensible U.S. policy would be one with the goal of discovering a less risky alternative to our greenhouse gas experiment — in the form of readily available non-greenhouse gas emitting energy sources — and creating incentives for this alternative to be sufficiently widely adopted so that the global increase in greenhouse gas emissions is slowed or reversed. The first task — of discovering and lowering the cost of adoption of alternative energy sources — would seem best accomplished directly, through a much increased program of government-funded research into clean coal (carbon capture and sequestration) and other non-carbon-based energy sources. If and when such technologies are developed, their adoption can also be subsidized. Such a pattern of expenditure would acknowledge an obligation of the present generation to do something now — the U.S. government of today should spend far, far more than it has thus far in directly funding and indirectly rewarding research and development into technologies that generate no or low carbon emissions — while also shifting to future generations (who will reap the supposed benefit of a cooler climate) a good share of the cost of widespread adoption of whatever technologies are developed.

Directed as it is toward generating options to avert potential long-term harm, such a policy would admittedly do nothing to help lesser-developed countries deal with potential near-term harms from climate change. Yet it is far from clear what the best policy would be with respect to climate change and developing countries. Because carbon emissions persist in the atmosphere for many decades (and even longer at low levels), if global warming activists are correct in thinking that even current levels are causing contemporaneous climate change, then people in the developing world might well suffer near-term harm from climate warming even if the United States and other developed countries immediately reduced their greenhouse gas emissions to zero. The abysmal record of post-colonial western development aid, especially in Africa, does not suggest that a massive new program of western financial assistance for developing world climate change adaptation infrastructure would have much effect (other than enriching new generations of corrupt developing world politicians). The most effective way to help people in developing countries at particular risk from global warming would probably be to provide such people with the education and resources to improve governance in such places, and alternatively to help them immigrate to the safer and more prosperous developed world. This option — immigration as climate change adaptation — is hardly ever discussed. That is in large part because many people in the developed world — in Europe in particular — currently view with horror any increase in immigration for any reason. But it is hard to see how the poor people of the developing world would be better off living as they do now, with their current climate, than they would be with a different climate but with the education, resources, and world immigration policies that enable them to live where they wish. R

Readings

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