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Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future

Richard J. Lazarus
Georgetown University Law Center, lazarusr@law.georgetown.edu

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SUPER WICKED PROBLEMS AND CLIMATE CHANGE: RESTRAINING THE PRESENT TO LIBERATE THE FUTURE

Richard J. Lazarus†

Climate change may soon have its "lawmaking moment" in the United States. The inherent problem with such lawmaking moments, however, is just that: they are moments. What Congress and the President do with much fanfare can quickly and quietly slip away in the ensuing years. This is famously so for environmental law. Subsequent legislative amendments, limited budgets, appropriations riders, interpretive agency rulings, massive delays in rulemaking, and simple nonenforcement are more than capable of converting a seemingly uncompromising legal mandate into nothing more than a symbolic aspirational statement. Climate change legislation is especially vulnerable to being unraveled over time for a variety of reasons, but especially because of the extent to which it imposes costs on the short term for the realization of benefits many decades and sometimes centuries later. To be successful over the long term, climate change legislation will need to include institutional design features that insulate programmatic implementation to a

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significant extent from powerful political and economic interests propelled by short-term concerns. Such design features should include a variety of asymmetric precommitment strategies, which deliberately make it hard (never impossible) to change the law in response to some kinds of concerns while simultaneously providing avenues for change in response to other longer term concerns that are in harmony with the law's central purpose—to achieve and maintain greenhouse gas emissions reductions over time. The traditional objection to lawmaking precommitment strategies—that the present should not be allowed to bind future lawmakers—also has little force in the climate-change context, where the purpose of such strategies is not to protect the present at the expense of the future, but the precise opposite: to protect the future at the expense of the present.

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INTRODUCTION

During the next four years, the new President, Barack Obama, and the new Congress are expected to join together in the first serious effort in the United States to enact sweeping national legislation to address global climate change. If they are successful, federal climate legislation will be the first major environmental protection law in almost two decades, dating back to the Clean Air Act Amendments of 1990.[1] Indeed, given the enormity of the undertaking necessary to address climate change, the passage of federal climate change legislation will rival in historic significance one of the nation's greatest lawmaking moments—the passage in the 1970s of a series of extraordinarily demanding and sweeping pollution control and natural resource conservation laws.[2] To reduce the nation's greenhouse gas emissions from 1990 levels by as much as 60 percent to 80 percent

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1 Pub. L. No. 101-549, 104 Stat. 2399 (codified in scattered sections of 42 U.S.C.).

2 Congress passed the following laws during the 1970s: Clean Air Act (1970), Federal Water Pollution Control Act (1972), Federal Insecticide Fungicide and Rodenticide Act (1972), Noise Control Act (1972), Coastal Zone Management Act (1972), Marine Mammal Protection Act (1972), Endangered Species Act (1973), Safe Drinking Water Act (1974), Forest and Rangeland Renewable Resources Planning Act (1974), Magnuson Fishery Conservation and Management Act (1976), Federal Coal Leasing Act Amendments (1976), Toxic Substances Control Act (1976), Resource Conservation and Recovery Act (1976), National Forest Management Act (1976), Federal Land Policy and Management Act (1976), Clean Air Act Amendments (1977), Clean Water Act (1977), Surface Mining Control and Reclamation Act (1977), and Outer Continental Shelf Lands Act (1978). *See* RICHARD J. LAZARUS, THE MAKING OF ENVIRONMENTAL LAW 67–75 (2004) (highlighting "the most significant environmental events of the [1970s], including an overview of the related statutory and institutional changes that occurred"); *see also* Daniel A. Farber, *Politics and Procedure in Environmental Law*, 8 J.L. ECON. & ORG. 59, 66–67 (1992) (describing original 1970 Earth Day as a "republican moment" for lawmaking); Christopher H. Schroeder, *Rational Choice Versus Republican Moment—Explanations for Environmental Laws, 1969–73*, 9 DUKE ENVTL. L. & POL'Y F. 29, 29 (1998) ("The years between 1969 and 1973 constitute a watershed in the evolution of federal environmental policy and legislation.").

by 2050 and then maintain that emissions level throughout the twenty-first century will require Congress to craft an ambitious mix of regulatory programs and economic incentives. Those programs must fundamentally change business operations in virtually every economic sector as well as individual behavior in many aspects of daily life. To be effective, the new federal law will also need to include programs that allow for the adaptation necessary to lessen the serious adverse public health and welfare effects of climate change that, based on past emissions levels, will unavoidably occur in the next few decades even if significant reductions are achieved in the future. Finally, the federal legislation will have to strike a proper balance between the federal government's need to maintain a country-wide legal regime sufficiently stable to achieve these essential national objectives and the states' sovereign authority over activities within their own borders.[3]

The inherent problem with such lawmaking moments, however, is just that: they are moments. What Congress and the President do with much fanfare can quickly and quietly slip away in the ensuing years. This is famously so in environmental law.[4] Subsequent legislative amendments, limited budgets, appropriations riders, interpretive agency rulings, massive delays in rulemaking, and simple nonenforcement are more than capable of converting a seemingly uncompromising legal mandate into nothing more than a symbolic aspirational statement. In short, what Congress and the President give, they can just as easily take away.[5]

This Article's central thesis is that making it easy for subsequent lawmakers to unravel, undermine, or even formally change existing law is not always desirable, and it is certainly not an essential feature of our democratic lawmaking system. Lawmakers should instead be understood as possessing the authority to anticipate and respond in the first instance to the dynamic nature of lawmaking and its related chal-

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[3] The exclusive focus of this Article is federal rather than state legislation, with the exception of some related discussion of potential federal preemption of state law. This focus is not intended to intimate that states do not have (as they already have had) a major role to play in climate change law in the future. Clearly, they do. Many of the lawmaking design features that I describe in this Article may lend themselves to use by the states. And the states no doubt already use some techniques of which I am unaware.

[4] *See* Daniel A. Farber, *Taking Slippage Seriously: Noncompliance and Creative Compliance in Environmental Law*, 23 HARV. ENVTL. L. REV. 297, 298–99 (1999) ("It could almost be said . . . [that] slippage is actually the primary feature of the system: the so-called standards are important only because they help channel the informal interactions between agencies and regulated parties."); *see also* Richard J. Lazarus, *Congressional Descent: The Demise of Deliberative Democracy in Environmental Law*, 94 GEO. L.J. 619, 638–52 (2006) (describing the rise of environmental appropriations legislation).

[5] ERIC M. PATASHNIK, REFORMS AT RISK: WHAT HAPPENS AFTER MAJOR POLICY CHANGES ARE ENACTED 3 (2008) ("Rather than a one-shot static affair, policy reform must be seen as a *dynamic process*, in which political forces seeking to protect a general-interest reform may be opposed by forces seeking to undermine it.").

lenges, which do not end with the formal enactment of much-needed legislation. The same powerful short-term impulses that seek to prevent a law's enactment do not disappear upon the law's passage. They instead typically remain to seek the law's ultimate undoing. Lawmakers should not ignore but legitimately account for that possibility in the first instance, especially for climate change legislation, because failure to do so could significantly limit rather than promote the ability of future generations to govern themselves. To be sure, current lawmakers may well be making it more difficult for future legislators and agency officials to substitute their views of sound policy for the judgment of past lawmakers. Current lawmakers would be doing so, however, not to enrich themselves at the expense of future generations. Instead, given the potentially catastrophic consequences of failing to reduce greenhouse gas emissions over the longer term, they would be acting for the very different purpose of safeguarding the ability of future generations, including their elected representatives, to have far greater control over their own lives. This is an especially legitimate basis for imposing lawmaking restraints notwithstanding their undemocratic effects.

The critical lesson for climate change legislation, accordingly, is that the pending lawmaking moment must include the enactment of provisions specifically designed to maintain the legislation's ability to achieve its long-term objectives over the longer term. Climate change legislation is peculiarly vulnerable to being unraveled over time for a variety of reasons, but especially because of the extent to which it imposes costs on the short term for the realization of benefits many decades and sometimes centuries later. Because of its fundamentally redistributive character, there will invariably be politically and economically powerful interests, unhappy with the short-term costs of climate change legislation, seeking to relax the law's requirements either formally or informally. It is therefore not enough for Congress to enact a law that mandates tough, immediate controls on greenhouse gas emissions. Nor is it enough for Congress to build into the new law strong economic incentives that render more palatable the changes in business and individual behavior necessary for those mandates to be accomplished and promote overall economic efficiency.

Much more is needed. Like much legislation, for climate change legislation to be successful, the new legal framework must simultaneously be flexible in certain respects and steadfast in others. Flexibility is necessary to allow for the modification of legal requirements over time in light of new information. Steadfastness or "stickiness" is important to maintain the stability of a law's requirements over time. The need for both is particularly great for climate change legislation. Flexibility is absolutely essential for climate change legislation in light

of the enormity of the undertaking, both in its temporal and spatial reach, and the surrounding uncertainty concerning the wisdom of specific regulatory approaches. Yet the basic legal framework and legal mandate must also be steadfast enough to be maintained over the long term notwithstanding what will be an unrelenting barrage of extremely powerful short-term economic interests that will inevitably seek the mandate's relaxation.

To that end, the law will need to include institutional design features that allow for such flexibility but insulate programmatic implementation to a significant extent from powerful political and economic interests propelled by short-term concerns. Such design features will include "precommitment strategies"[6] that deliberately make it hard (but never impossible) to change the law in response to some kinds of concerns. At the same time, the legislation should also include contrasting precommitment strategies that deliberately make it easier to change the law in response to other longer-term concerns that are in harmony with the law's central purpose, which is to achieve and maintain greenhouse gas emissions reductions over time. Such concerns are otherwise less likely to have powerful voices in lawmaking fora.

Directed to all three branches of government, such institutional design features should therefore be deliberately asymmetric, making it easier to change the law in one substantive direction rather than another. Like the classic children's board game Chutes and Ladders, the design of climate change law should include *chutes* that make it harder for certain kinds of changes to be made and *ladders* that make it easier for other kinds of changes to be accomplished and for the overall statutory purpose to be achieved over time. Climate change law should further include a series of other structural features deliberately designed to keep the statute on track over time within the executive branch in particular. These features include a series of *requirements for consultation* with other agencies, scientific advisory committees, and stakeholders more insulated from short-term political pressures; *statutory and regulatory hammers* and *judicial review provisions* that ensure timely implementation; and *preemption triggers* that accommodate the prerogatives of competing sovereigns while also exploiting the resulting tension as leverage to further climate change policy.

The purpose of this Article is to explain why such asymmetric institutional design features are a critical, legitimate aspect of global climate change legislation here in the United States and how such features might operate. The Article is divided into three parts. The first part highlights the distinct features of the lawmaking challenges

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6 *See infra* note 138 and accompanying text.

presented by global climate change that render it a "super wicked problem" for public policy resolution and therefore legal redress. These challenges include both those that derive exclusively from the underlying science of climate and those that derive more immediately from human nature and the nature of U.S. lawmaking institutions. The second part explains the central role that institutional design features can play in responding to these kinds of lawmaking challenges. This explanation is both historical and theoretical. It describes why such design features are necessary and legitimate, notwithstanding the constraints that they place on future lawmaking, and how such features have historically been used in various settings to overcome certain kinds of lawmaking challenges. Finally, the third part of the Article offers a menu of possible institutional design features that might be appropriate in global climate change legislation.

I
THE CHALLENGES OF CLIMATE CHANGE LEGISLATION: A "SUPER WICKED PROBLEM"

Even once one accepts the current scientific consensus that significant global climate change is happening, human activities are a significant contributing cause of that change, and the associated public health and welfare impacts are sufficiently serious to warrant climate change legislation,[7] crafting that legislation is extraordinarily difficult. Scholars long ago characterized a public-policy problem with the kinds of features presented by climate change as a "wicked problem" that defies resolution because of the enormous interdependencies, uncertainties, circularities, and conflicting stakeholders implicated by any effort to develop a solution.[8] Sometimes described as

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[7] The purpose of this Article is not to rehash the threshold question of whether human activities causing global climate change are sufficiently serious to warrant climate change legislation that seeks a major reduction of greenhouse gas emissions. In light of recent scientific studies, this Article assumes the propriety of such legislation and considers the next step of how best to draft that legislation to accomplish its goals. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Summary for Policymakers*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 7, 8–22 (Martin Parry et al. eds., 2007) [hereinafter IPCC *Summary for Policymakers*, IMPACTS], *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf (summarizing "the impacts of climate change on natural, managed and human systems" and the adaptability and vulnerability of those systems); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Summary for Policymakers*, *in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 1–18 (Susan Solomon et al. eds., 2007) [hereinafter IPCC *Summary for Policymakers*, PHYSICAL SCIENCE], *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf (summarizing findings on global climate change and presenting options and long-term perspective to policymakers).

[8] *See generally* Horst W. J. Rittel & Melvin M. Webber, *Dilemmas in a General Theory of Planning*, 4 POL'Y SCI. 155, 160–69 (1973) (introducing the term "wicked problems" to describe nature of social policy problems); *see also* JEFF CONKLIN, DIALOGUE MAPPING: BUILDING SHARED UNDERSTANDING OF WICKED PROBLEMS 3–40 (2006).

"social messes," classic wicked problems include AIDS, healthcare, and terrorism.[9]

Climate change, however, has been fairly described as a "super wicked problem" because of its even further exacerbating features.[10] These features include the fact that time is not costless, so the longer it takes to address the problem, the harder it will be to do so.[11] As greenhouse gas emissions continue to increase, exponentially larger, and potentially more economically disruptive, emissions reductions will be necessary in the future to bring atmospheric concentrations down to desired levels.[12] Future technological advances, therefore, would likewise have to be able to achieve those exponentially greater reductions to make up for lost time. The climate change that happens in the interim may itself cause sufficient economic disruption, for instance, by slowing growth rates, so as to make it much harder to accomplish the necessary technological innovation.

Another problematic characteristic of climate change is that those who are in the best position to address the problem are not only those who caused it, but also those with the least immediate incentive to act within that necessary shorter timeframe.[13] The major sources of greenhouse gas emissions include many of the world's most powerful nations, such as the United States, which are not only reluctant to embrace restrictions on their own economies but are least susceptible to demands by other nations that they do so. In addition, by a perverse irony, they are also the nations least likely to suffer the most from climate change that will unavoidably happen in the nearer term.[14]

A third feature is the absence of an existing institutional framework of government with the ability to develop, implement, and maintain the laws necessary to address a problem of climate change's tremendous spatial and temporal scope.[15] Climate change is ulti-

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9 Robert E. Horn & Robert P. Weber, New Tools for Resolving Wicked Problems: Mess Mapping and Resolution Mapping Processes 3 (MacroVU(r), Inc. & Strategy Kinetics LLC, 2007), *available at* http://www.strategykinetics.com//New_Tools_For_Resolving_Wicked_Problems.pdf. I owe special thanks to Professor Douglas Kysar for notifying me about "wicked" analysis in his comments on an early draft of this article.

10 *See* Kelly Levin et al., Playing It Forward: Path Dependency, Progressive Incrementalism, and the "Super Wicked" Problem of Global Climate Change 8–10 (July 7, 2007) (unpublished manuscript, on file with author), *available at* http://environment.yale.edu/uploads/publications/2007levinbernsteincashoreauldWicked-Problems.pdf ("Although the challenges of climate change and many other complex environmental and social problems are captured by the above characteristics, climate poses three additional features that render it a 'super wicked problem.'").

11 *See id.* at 8–9.

12 *See infra* notes 39–42 and accompanying text.

13 *See* Levin et al., *supra* note 10, at 9.

14 *See infra* text accompanying notes 59–66.

15 *See* Levin et al., *supra* note 10, at 9; *infra* text accompanying note 42.

mately a global problem. But there is an absence of any global lawmaking institution with a jurisdictional reach and legal authority that match the scope of the problem.[16]

Each of these features, which I discuss in more detail below, relates to the science of climate change, human nature, and the nature of U.S. lawmaking institutions. They present significant obstacles both to the enactment of climate change legislation in the first instance and to its successful implementation over time.

A. The Science of Climate Change

The science of climate change has several distinct features that render lawmaking especially difficult. As I describe below, these include the physics and chemistry underlying climate change as well as the resulting impacts of such change on humankind and the global ecosystem.

1. *The Greenhouse Effect*

Although ultimately riddled with complexities, the basic science of climate change is fairly straightforward. As the concentration of certain chemicals in the atmosphere increases, the amount of heat from sunlight in the form of infrared radiation that would otherwise simply reflect off the earth's surface and radiate back into space is instead captured within our atmosphere. This process works like a "greenhouse," which is why it is popularly referred to as a "greenhouse effect" and also why those chemicals that capture higher concentrations of heat are known as "greenhouse gases."[17]

Carbon dioxide (CO_2) is one of several significant greenhouse gases, and a CO_2 molecule's potential to capture heat is actually far less than others', such as methane, by several orders of magnitude.[18]

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16 *See* William W. Buzbee, *Recognizing the Regulatory Commons: A Theory of Regulatory Gaps*, 89 IOWA L. REV. 1, 13 (2003) ("Global warming also confronts no matching or commensurate political or legal regime that . . . is logically situated to take the lead and address global warming's causes and anticipated harms.").

17 *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Historical Overview of Climate Change Science*, *in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 93, 103, 105–06, 115 (Susan Solomon et al. eds., 2007) [hereinafter IPCC *Historical Overview*], *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter1.pdf (providing a historical overview of scientists' understanding of the greenhouse effect); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Technical Summary*, *in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 19, 23–28 (Susan Solomon et al. eds., 2007) [hereinafter IPCC *Technical Summary*], *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-ts.pdf (providing a technical summary of greenhouse gases); *see also* R.T. Pierrehumbert, *Climate Change: A Catastrophe in Slow Motion*, 6 CHI. J. INT'L L. 573, 573–74 (2006) (discussing human-induced emissions).

18 *See* Jennifer Woodward, *Turning Down the Heat: What United States Laws Can Do to Help Ease Global Warming*, 39 AM. U. L. REV. 203, 210 (1989) ("In amounts comparable to carbon dioxide, other gases are also currently adding to the greenhouse effect. Although

The reason CO_2 is nonetheless the subject of so much attention is because the natural concentrations in the atmosphere are relatively small compared to the volume of CO_2 emissions now being added by human activities.[19] Although the largest source of CO_2 emissions historically was volcanic activity, fossil-fuel burning alone adds fifteen times that supplied by volcanoes each year, and that ratio is rapidly increasing.[20] The now-famous "hockey-stick" graphs depicting the dramatic and accelerating rise in CO_2 atmospheric concentrations during the last one hundred years and the corresponding rise in global temperatures illustrate the essential relationship between CO_2 and global warming as a matter of scientific cause and effect.[21]

Exacerbating the additions of CO_2 to the atmosphere from classic sources of pollution, especially power plants and motor vehicles, are other human activities that dramatically eliminate nature's ability to take CO_2 out of the atmosphere. There are several natural "sinks" that can decrease greenhouse gas concentrations by taking those gases out of the atmosphere.[22] If those sinks were increasing in capacity while the sources were increasing their emissions, there would be no net greenhouse effect. But just the opposite is happening: the number and capacity of those natural sinks are decreasing.[23]

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scientists have identified at least a dozen trace greenhouse gases in the atmosphere, the most significant gases are chlorofluorocarbons, methane, nitrous oxide, and tropospheric ozone.") (citations omitted).

19 *See* Pierrehumbert, *supra* note 17, at 574–75 ("It is because there is relatively little carbon dioxide in the atmosphere that human economic activity has the prospect of doubling its concentration within the twenty-first century, with greater increases in sight thereafter."); *see also* IPCC Historical Overview, *supra* note 17, at 108 (concluding that "emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases: CO_2, CH_4, CFCs, N_2O"); IPCC *Technical Summary*, *supra* note 17, at 23–27 (providing technical summary of increases in atmospheric carbon dioxide, methane and nitrous oxide); National Oceanic Atmospheric Administration, Global Warming: Frequently Asked Questions (Aug. 20, 2008), http://www.ncdc.noaa.gov/oa/climate/globalwarming.html#Q2 ("The global concentration of CO_2 in our atmosphere today far exceeds the natural range over the last 650,000 years of 180 to 300 ppmv. According to the IPCC Special Report on Emission Scenarios (SRES), by the end of the 21st century, we could expect to see carbon dioxide concentrations of anywhere from 490 to 1260 ppm (75–350% above the pre-industrial concentration").).

20 Pierrehumbert, *supra* note 17, at 576.

21 *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Changes in Atmospheric Constituents and in Radioactive Forcing*, *in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 99, 134 fig.2.2 (Susan Solomon et al. eds., 2007); *see also* David R. Hodas, *State Law Responses to Global Warming: Is It Constitutional to Think Globally and Act Locally?*, 21 PACE ENVTL. L. REV. 53, 61 (2003) (detailing the human connection to the rise in carbon dioxide levels since 1900).

22 *See* Karen N. Scott, *The Day After Tomorrow: Ocean CO_2 Sequestration and the Future of Climate Change*, 18 GEO. INT'L ENVTL. L. REV. 57, 58–59 (2005) (discussing the ocean as "both a natural sink and a reservoir for CO_2").

23 *See, e.g.*, *id.* at 59 ("[T]he response of the ocean carbon cycle to changes in atmospheric CO_2 levels is slow, being limited by both chemical and physical factors.").

For instance, plants are a major sink of CO_2.[24] Plants absorb CO_2 and release oxygen in a biochemical process (photosynthesis) necessary to produce energy: the fascinating converse of the process by which animals breathe in oxygen and release CO_2. Plant absorption of CO_2 has historically served as a significant means of keeping CO_2 concentrations in the atmosphere in check.[25] Because, however, development activities throughout the globe have literally cleared massive landscapes of vegetation, including some of the densest tropical rainforests, the ecosystem's ability to reduce atmospheric CO_2 concentrations has dramatically decreased at the very moment that it is most needed. Even worse, those same development activities emit huge volumes of CO_2 gas into the atmosphere by burning the vegetation, which releases the CO_2 otherwise absorbed within the vegetation's chemical makeup.[26]

Finally, the greenhouse effect is a global phenomenon, not one that occurs in some parts of the world and not others. Atmospheric concentrations of greenhouse gases are uniform throughout the atmosphere;[27] they do not differ over distinct parts of the globe. A mol-

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24 *See id.* at 58 (stating that terrestrial vegetation is a natural mechanism that removes CO_2 from the atmosphere); Food and Agricultural Organization of the United Nations, Roles of Forests in Climate Change (Feb. 4, 2009), http://www.fao.org/forestry/53459/en/.

25 *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Couplings Between Changes in the Climate System and Biogeochemistry*, *in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 514 (Susan Solomon et al. eds., 2007) (discussing plants' role in stabilizing atmospheric carbon dioxide concentrations).

26 *See* Food and Agricultural Organization of the United Nations, *supra* note 24; *see also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, LAND USE, LAND-USE CHANGE, AND FORESTRY 207–08 (Robert T. Watson et al. eds., 2000) ("Burning . . . represents a short-term transfer of carbon from grassland ecosystems to the atmosphere . . . . Increasing fire frequency over time tends to reduce grass biomass production . . . result[ing] in declines in soil carbon pools . . . ."); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Changes in Atmospheric Constituents and in Radiative Forcing*, *in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 135 (Susan Solomon et al. eds., 2007) [hereinafter IPCC *Changes*]; IPCC *Technical Summary*, *supra* note 17, at 26; Yadvinder Malhi et al., *Climate Change, Deforestation, and the Fate of the Amazon*, 319 SCIENCE 169, 170–71 (2008) (discussing the effect of forest burning in the Amazon); Márcio Santilli et al., *Tropical Deforestation and the Kyoto Protocol*, 71 CLIMATIC CHANGE 267, 269 (2005); Tom Knudson, *'Green' Storage in Forests May Be Going Up in Smoke; Study: Wildfires Emit More Global Warming Gases than Thought*, SACRAMENTO BEE, Mar. 12, 2008, at A3 (discussing the implications of the greenhouse gases emitted from California wildfires on the state's efforts to reduce emissions from human activity).

27 The impact of CO_2 emissions on climate change turns on atmospheric concentrations of CO_2 in the troposphere, which become uniform around the globe. *See* IPCC *Changes*, *supra* note 26, at 137–40; A. Denny Ellerman, *Tradable Permits for Greenhouse Gas Emissions: A Primer with Particular Reference to Europe*, 69 MIT JOINT PROGRAM ON SCI. & POL'Y GLOBAL CHANGE 2 (2000), *available at* http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt69.pdf ("A ton of CO_2 emitted or abated in Bombay will have the same effect on climate as a ton emitted or abated in Buenos Aires, Chicago, Kiev, or Stockholm."); *see also* PETER FOLGER, THE CARBON CYCLE: IMPLICATIONS FOR CLIMATE CHANGE AND CONGRESS 2 (Congressional Research Service Report, Mar. 13, 2008), *available at* http://www.usembassy.at/en/download/pdf/carbon_cycle.pdf ("[W]here fossil fuels are burned

ecule of carbon dioxide added by a source in New Zealand accordingly has the same effect on CO_2 concentrations as a molecule added by a source in Kansas, Brazil, or Sweden.[28]

What are the related lawmaking challenges? The first is that both sources of greenhouse gases and potential sinks of greenhouse gases are relevant. Laws concerned with addressing the greenhouse effect need to consider the possibility of reducing sources while also increasing the capacity of sinks. The second lawmaking challenge is that any effective climate change legislation must include, of course, domestic controls, but no domestic legislation is enough standing alone. Even if one or many nations decrease their emissions rates or their own destruction of carbon sinks, those efforts are susceptible to being overtaken by activities occurring within another nation's borders.[29] Of particular significance in the United States, a third lawmaking challenge relates to the need for land use controls. Land use controls are federal environmental law's "third rail" because of the related specter of federal interference with state and local land use planning. The prospect of such federal disruption of state and local governmental prerogatives to determine land use development patterns has derailed several efforts by the Environmental Protection Agency (EPA) over the years to address air and water pollution caused by particular uses of land.[30]

2. *Stock/Flow Nature of Atmospheric Chemistry*

One of the distinctive features of the science of climate change is the stock/flow nature of the physical and chemical processes underlying it. A stock/flow relationship is counterintuitive because it does not operate like the kind of simple, short-term, more linear relationship between cause and effect that most people (and lawmakers) assume is at work when they contemplate pollution and the options for its regulation. Unfortunately, climate change now cannot be avoided simply by reducing greenhouse gas emissions, much the same way that one could stop a teakettle from boiling by just turning down the stove.

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makes relatively little difference to the concentration of CO_2 in the atmosphere; emissions in any one region affect the concentration of CO_2 everywhere else in the atmosphere.") (emphasis omitted).

28 *See* sources cited *supra* note 27.

29 China has recently passed the United States as the single largest producer of greenhouse gas emissions, and India and Brazil are also accelerating their emissions rates. *See infra* notes 65–66 and accompanying text.

30 ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 716–18 (5th ed. 2006).

The relevant atmospheric controls for temperature are not so straightforward.[31]

The kind of stock/flow relationship that prompts climate change is instead very different. Climate change results from the buildup of greenhouse gases over time, indeed, over centuries. Unlike the pollutants in most ecological contexts, once added to the atmosphere, greenhouse gases remain there for a very long time—not just decades, or even centuries, but thousands of years. The pollutants do not naturally dissipate in significant amounts. And so long as the amount of greenhouse gases being emitted into the atmosphere is greater than the amount that naturally falls out every year, greenhouse gas concentrations increase over time. Of course, that is exactly what has been happening, and at an accelerating rate.[32]

The most accessible description of the stock/flow relationship that I have encountered is to contemplate the atmosphere as the equivalent of a bathtub that has been filling with water over time because the pipe adding water into the tub is much larger than the drain coming out of the tub.[33] In the "tub" of the atmosphere, while the metaphorical emissions pipe coming in has gotten much larger, the drain has gotten much smaller for two distinct reasons. The first, as earlier discussed, is the destruction of vegetation that would otherwise have absorbed some CO_2 from the atmosphere by way of photosynthesis. The second is the ocean, which also provides a natural sink in which some greenhouse gases like CO_2 can dissolve. As, however, the concentrations of greenhouse gases in the atmosphere have increased, the ocean's capacity to dissolve additional greenhouse gases out of the atmosphere is diminishing because the ocean is filling up beyond its chemical capacity to dissolve more gases.

The practical implications of such a stock/flow relationship are significant, particularly temporally. First, because the high concentrations of greenhouse gases in the atmosphere are the result of decades of buildup and natural drainage is very slow, those high concentrations cannot be reduced easily or quickly. It will require not just a decrease in the rate of emissions increases but in the absolute amount of emissions each year. And even if annual emissions are reduced considerably, the atmospheric concentrations will continue to increase until those annual increases are less than the annual drain-

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31 *See* John D. Sterman & Linda Booth Sweeney, *Understanding Public Complacency About Climate Change: Adults' Mental Models of Climate Change Violate Conservation of Matter*, 80 CLIMATIC CHANGE 213, 214–15, 222–28 (2007).

32 *See* Pierrehumbert, *supra* note 17, at 576–77.

33 Sterman & Sweeney, *supra* note 31, at 235.

age.[34] The bathtub may fill up more slowly but the water will still be rising.

Finally, even if one manages to achieve annual emissions that are lower than the annual drainage, it will likely take many decades to lower the atmospheric greenhouse gas concentrations. And until those concentrations are substantially lower, climate change will continue to occur. For example, for every kilogram of CO_2 added to the atmosphere today, one quarter of that amount will remain in the atmosphere for five hundred to one thousand years, and approximately 7 percent will persist in the atmosphere for hundreds of thousands of years.[35] That's a long time.

But even the stock/flow characteristic of atmospheric concentrations of greenhouse gas is only half of the time lag that renders redressing climate change problematic. A comparable stock/flow relationship exists in the atmosphere for the buildup of radiative heat. Just as greenhouse gas concentrations build up over lengthy periods of time, radiative heat does so too.[36] For that reason, there is, in effect, not just one bathtub in the atmosphere, but two: one for greenhouse gases and one for radiative heat, with the former adding heat to the latter. And here too, the heat builds up in the second bathtub so long as the amount of heat being added is greater than the heat draining out.[37]

The practical implication of adding yet one more stock/flow relationship to the global-warming equation is stark. It means that even once one achieves an absolute reduction of greenhouse gases, after decades of effort, one will not see any resulting decrease of heat. The decrease will occur only after the amount of heat being added as a result of greenhouse gas concentrations gets so low that it is less than the heat being drained.[38] A reduction in additional heat will otherwise only decrease the rate of global-warming increases, but not actually result in a temperature decrease.

What are the related lawmaking challenges? Here again, there are several.

The first challenge is that major reductions will clearly be necessary. It will not be enough to slow the rate of increases or even to

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34 *Id.* at 215–16.

35 Pierrehumbert, *supra* note 17, at 577.

36 *See* IPCC *Summary for Policymakers*, PHYSICAL SCIENCE, *supra* note 7, at 13.

37 Sterman & Sweeney, *supra* note 31, at 215; *see also* IPCC *Summary for Policymakers*, PHYSICAL SCIENCE, *supra* note 7, at 13 (referring to model experiments showing that even if all radiative forcing agents remained constant at the 2000 levels, further warming would take place primarily as a result of slow ocean response).

38 *See* Sterman & Sweeney, *supra* note 31, at 215 (noting that warming would continue until both greenhouse gas concentrations fell and global mean temperature rose enough to restore net radiative balance).

decrease absolute annual emissions. As just described, only if emissions are lower than drainage will greenhouse gas concentrations decrease, and even then reduction in atmospheric heat will not occur until the net radiative heat being added by greenhouse gases is less than the amount draining out.

The second challenge is that there will necessarily be a huge lag between the time reductions in greenhouse gas emissions occur and any mitigating effect on climate change. The time lag is at the very least longer than the lifetime of any adult. The upshot is that no one who is asked to curtail activities to reduce greenhouse gas concentrations will be likely to live long enough to enjoy the benefits of that curtailment.

The related lawmaking implication is that many of the measures that can make a significant difference for current lives are adaptation measures rather than mitigation measures designed to reduce emissions. Much of the climate change that is going to occur in our lifetimes is unavoidable. We can still reduce greenhouse gas emissions to avoid accelerating even worse effects, but all that can done about that now-unavoidable change is to address the needs of those who will be most adversely affected and develop ways to adapt to climate change that will minimize its adverse effects and perhaps take advantage of some new opportunities that it presents.

A third significant challenge is that the enormous temporal dimensions of climate change, potentially crossing multiple generations, resist easy application of the kind of cost-benefit analysis many policymakers favor for the setting of environmental protection standards. The proper role of cost-benefit analysis has long been debated in environmental law, with many commentators strongly in favor and others sharply critical of the efficacy and fairness of such analysis.[39] But, ignoring the tendency of climate change to raise the kinds of value conflicts that detractors of cost-benefit analysis claim it is ill-suited to measure,[40] the temporal dimension alone renders heavy reli-

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39 *See generally* MATTHEW D. ADLER & ERIC A. POSNER, COST-BENEFIT ANALYSIS: LEGAL, ECONOMIC, AND PHILOSOPHICAL PERSPECTIVES (2001) (reproducing a series of articles offering contrasting perspectives on the efficacy of cost-benefit analysis).

40 *See, e.g.*, RICHARD L. REVESZ & MICHAEL A. LIVERMORE, RETAKING RATIONALITY: HOW COST-BENEFIT ANALYSIS CAN BETTER PROTECT THE ENVIRONMENT AND OUR HEALTH 55–147 (2008) (detailing the "fallacies" of cost-benefit analysis); Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 U. PA. L. REV. 1553, 1562–81 (2002) (showing that the attempt of cost-benefit analysis to put prices on priceless values and to discount harms makes it a poor way to evaluate environmental protection regulation); David M. Driesen, *Distributing the Costs of Environmental, Health, and Safety Protection: The Feasibility Principle, Cost-Benefit Analysis, and Regulatory Reform*, 32 B.C. ENVTL. AFF. L. REV. 1, 64–94 (2005) (arguing that the principle requiring maximum feasible emissions reductions is a more appropriate method for considering costs in the context of most technology-based standards).

ance on cost-benefit analysis problematic at the very least. Proffering a discount rate for valuing costs and benefits that will be realized or avoided only centuries in the future and under completely uncertain societal conditions is heroic, foolish, or a mixture of both.[41] But in no event does it provide an especially solid basis for making confident policy choices today.[42]

A final lawmaking challenge that derives from the stock/flow nature of climate change is that lawmaking delays are costly. The longer one waits, the more dramatic the necessary reductions in emissions. The reason is simple. With every year of delay, greenhouse gas concentrations and radiative heat levels increase and, no less important, the economic interests in maintaining increasingly high rates of emissions get ever more deeply entrenched. Power plants, for instance, have long life spans. It is much harder to change direction after massive investments have been made in their construction and operation. This problem is present with many other parts of our nation's energy infrastructure that currently depend on the emission of huge volumes of greenhouse gases.[43]

3. *Spatial Dimension of Climate Change: Global Cause vs. Global Effect*

Although atmospheric concentrations of greenhouse gas concentrations are uniform around the globe, the impacts of those concentrations are not similarly uniform. Hence, although the Intergovernmental Panel on Climate Change (IPCC) and other scientific bodies routinely refer to increases in average global temperature, that does not mean that every part of the globe will in fact experience the same temperature increase. That "average" instead masks substantial differences in temperature increases. For some parts of the world, the temperature increase will be much greater than for other parts.[44]

Even more important, considered in isolation, temperature increases mask the much larger differences in resulting worldwide impacts. The impacts of any increase in temperature on public health,

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41 For a discussion of the challenges of discounting in the context of climate change, see ERIC A. POSNER, CASS SUNSTEIN & DAVID WEISBACH, CLIMATE CHANGE JUSTICE (forthcoming 2008) (manuscript at 127–45, on file with author).

42 *See* Regulating Greenhouse Gas Emissions Under the Clean Air Act, 73 Fed. Reg. 44,354, 44,414–16 (proposed July 30, 2008) (describing the host of limitations of economic analysis, especially cost-benefit analysis, as applied to a problem with enormous spatial and temporal dimensions like climate change).

43 Kelly Sims Gallagher, Acting in Time on Climate Change 9–10 (Sept. 18–19, 2008) (unpublished conference paper, presented at Acting in Time on Energy Policy Conference at Harvard University), *available at* http://belfercenter.ksg.harvard.edu/actingintimeonenergy/papers/gallagher-climate.pdf (describing long lifetimes of investments in energy infrastructure and impact on timing and cost of climate change policy).

44 *See* IPCC *Summary for Policymakers*, PHYSICAL SCIENCE, *supra* note 7, at 9.

welfare, and the environment are highly dependent on geographic location.[45] What might even be a potentially beneficial increase in one part of the world could be a completely devastating effect elsewhere.[46]

For instance, the impact of a given increase in temperatures turns on factors such as the ways the wind blows, water flows, and the Earth spins in its orbit around the sun.[47] For those parts of the globe where water may already be scarce, an increase in temperature can quickly result in severe droughts and famines, leading to mass migrations of hundreds of thousands, if not millions, of people.[48] For those parts of the world where people live close to the ocean in low-lying elevations vulnerable to flooding, rising sea levels could literally wipe out entire island nations and coastal cities. And for those parts of the world where, because of preexisting higher temperatures, many of the world's diseases originate, even higher temperatures could both promote the development of new diseases and increase their ability to spread further around the globe.[49]

By contrast, in other parts of the world, increased temperatures might even seem to yield some benefits, at least in the short term.[50] In higher latitudes, an increase in temperature might lengthen the growing season and thereby offer a potential boost in agricultural productivity.[51] Some scholars have made just that claim with respect to

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45 *See* IPCC *Summary for Policymakers*, IMPACTS, *supra* note 7, at 11–18.

46 *See id.* at 10 fig.1 (presenting a chart showing that increased temperatures will cause increased water availability in moist tropics but decreased water availability in mild, and some low, latitudes); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Summary for Policymakers*, *in* CLIMATE CHANGE 2007: SYNTHESIS REPORT 8–13 (The Core Writing Team et al. eds., 2007) [hereinafter IPCC *Summary for Policymakers*, SYNTHESIS], *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf (listing and discussing different regional impacts); Anthony J. McMichael et al., *Global Climate Change*, *in* 1 COMPARATIVE QUANTIFICATION OF HEALTH RISKS: GLOBAL AND REGIONAL BURDEN OF DISEASE ATTRIBUTABLE TO SELECTED MAJOR RISK FACTORS 1543 (Majid Ezzati et al. eds, 2004)

47 *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Frequently Asked Questions*, *in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 94–97 (Susan Solomon et al. eds., 2007).

48 *See* IPCC *Summary for Policymakers*, IMPACTS, *supra* note 7, at 12; IPCC *Summary for Policymakers*, SYNTHESIS, *supra* note 46, at 8–13; McMichael et al., *supra* note 46.

49 IPCC *Summary for Policymakers*, SYNTHESIS, *supra* note 46, at 8–13; *see* Pierrehumbert, *supra* note 17, at 578–79 (describing non-uniform impacts).

50 *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Food, Fibre and Forest Products*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 273, 284 (Martin Parry et al. eds., 2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter5.pdf; INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Industry, Settlement and Society*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 357, 365 (Martin Parry et al. eds., 2007) [hereinafter IPCC *Industry*], *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter7.pdf; IPCC *Summary for Policymakers*, IMPACTS, *supra* note 7, at 12.

51 INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Human Health*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 391, 411 (Martin Parry et al. eds.,

wine production.[52] Similarly, although higher temperatures in the Arctic may sound the death knell for certain species, such as the polar bear, and for certain native villages, melting ice could open up new passageways for marine transportation and access to energy resources.[53]

There is also a reason why the problem is defined not as "global warming" per se but as global *climate change*. Changes in temperature are simply the first in a chain reaction of ecosystem changes.[54] The changes in climate that result from changes in temperature are highly dependent on location.[55] Some places may get more rain; other places may get less. Some places may get more damaging weather patterns; others may not. If, as some scientists suggest, changing temperatures can shift the ocean currents, such as the Gulf Stream, and melt polar ice, the variation in global impacts will be even more pronounced.[56] To be sure, if some of the most catastrophic consequences—including dramatic sea level rises and global spread of infectious diseases—occur over the longer term, there will be significant absolute costs everywhere.[57] But, the consequences of climate change from uniform atmospheric concentration of greenhouse gases will not be the same everywhere, certainly in the nearer term and not in the distant future, which is another defining feature of the science of climate change.[58]

What are the related lawmaking challenges? Here again, there are several and all are quite formidable.

The most significant challenge is that although all parts of the world can influence global climate change, not all parts of the world will suffer equally if such change occurs. Indeed, some parts of the world will suffer potentially catastrophic effects, even with a rise of just a few degrees, while other parts of the world will suffer relatively little and may even believe that they are enjoying some short-term economic benefits. Such distributional differences will make it much harder to achieve the international cooperation and coordination necessary to address the problem.

2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter8.pdf.

52 *See, e.g.*, A. B. Tate, *Global Warming's Impact on Wine*, 12 J. OF WINE RES. 95, 96–97 (2001) (suggesting potential short-term beneficial effects of higher temperatures on wine production).

53 IPCC *Summary for Policymakers*, IMPACTS, *supra* note 7, at 15; McMichael et al., *supra* note 46.

54 *See* IPCC *Summary for Policymakers*, IMPACTS, *supra* note 7, at 17.

55 *See id.* at 13–15.

56 *See id.* at 17; Pierrehumbert, *supra* note 17, at 578–79 (describing non-uniform impacts).

57 *See* IPCC *Summary for Policymakers*, IMPACTS, *supra* note 7, at 11–12,17–20.

58 *See supra* notes 44–46 and accompanying text.

But what makes addressing the problem seemingly insurmountable is that the parts of the world that are most directly threatened are completely different from those that are the primary sources of greenhouse gases now in the atmosphere. Those parts of the globe most threatened, especially areas near the equator and of high elevation, are also some of the world's poorest and have the least-developed governments.[59] Populations in these areas, such as parts of Africa and Asia, often lack basic shelter, health care facilities, a diversified economy, and a government able to deliver basic social services in times of stress. Their ability to adapt to climate change is consequently minimal.[60]

In tragic contrast, the most highly industrialized nations that have emitted the vast majority of greenhouse gases over the past one hundred years—including the United States, Russia, and much of Western Europe—are located almost exclusively in the higher latitudes in the northern hemisphere.[61] These are, somewhat perversely, the areas that are likely to suffer the least in the short term and economic interests in these areas may even believe that they will enjoy some short-term benefits.[62]

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59 *See, e.g.*, IPCC *Industry*, *supra* note 50, at 365–66; INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Perspectives on Climate Change and Sustainability*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 821 (Martin Parry et al. eds., 2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter20.pdf; IPCC *Summary for Policymakers*, IMPACTS, *supra* note 7, at 13; *see also* Kathryn S. Brown, *Taking Global Warming to the People*, SCIENCE MAG., Mar. 5, 1999, at 1440–41; Michael Grubb, *Seeking Fair Weather: Ethics and the International Debate on Climate Change*, 71 INT'L AFF. 463, 467 (1995); Paul Reiter, *Climate Change and Mosquito-Borne Disease*, 109 ENVTL. HEALTH PERSP. 141, 142 (2001).

60 *See* IPCC *Summary for Policymakers*, IMPACTS, *supra* note 7, at 12–13; Brown, *supra* note 59, at 1441.

61 World Resources Institute, Contributions to Global Warming; Historic Carbon Dioxide Emissions from Fossil Fuel Combustion, 1900–1999, http://earthtrends.wri.org/maps_spatial/maps_detail_static.php?map_select=488&theme=3 (last visited Apr. 5, 2009).

62 *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Asia*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 469, 482 (Martin Parry et al. eds., 2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter10.pdf; INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Assessing Key Vulnerabilities and the Risk from Climate Change*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 779, 796 (Martin Parry et al. eds., 2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter19.pdf; INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Europe*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 541, 554, 556 (Martin Parry et al. eds., 2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter12.pdf; INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Global Climate Projections*, *in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 747, 782 (Susan Solomon et al. eds., 2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter10.pdf (stating that precipitation would increase in northern Europe); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *North America*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 617, 623 (Martin Parry et al. eds., 2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter14.pdf; *see also* Herman Shugart et al., *Forests and Global Climate Change: Potential Impacts on U.S. Forest Resources*, at ii, iv–v, 43 (Pew Center on Global Climate Change, Arlington, Va., Feb.

Such nations are not only the most responsible for the current problems, but they are also invariably some of the most politically and economically powerful nations on the globe. They are consequently not readily susceptible to less powerful nations' efforts to compel them to reduce their emissions. Because of their relative wealth, they are also more easily able to adopt adaptation measures and consequently suffer fewer immediate hardships.

As a result, it will prove extremely difficult in the short run to persuade the powerful nations responsible for climate change to undertake the dramatic action now needed. They will not perceive the benefits for doing so, in part because they will not in fact be the ones suffering the greatest and most immediate harm. And by the time longer-term climate change begins to adversely affect even the more powerful nations—because of political destabilization caused by massive migrations, the spread of infectious diseases, dramatic changes caused by shifts in the Gulf Stream, or melting glaciers—it will be too late to take action to avoid such greater effects. As described above, the stock/flow nature of the atmosphere precludes the normal luxury of awaiting serious and immediate adversity before taking action.[63]

There is no scientific reason why such a geographic mismatch between cause and effect has to exist. But it does. It is the result of an unwittingly perverse combination of the laws of physics and chemistry with patterns of economic industrialization around the globe. No matter how unwitting, however, the resulting obstacle to lawmaking is correspondingly huge.

Finally, there is yet one more distributional twist that makes meaningful lawmaking that much harder. Although it is the long-industrialized nations, such as the United States, Russia, and those in Western Europe, that have contributed disproportionately to greenhouse gas concentrations now in the atmosphere, there is a new set of developing nations with exploding economies that has or at least soon will surpass the developed nations in annual emissions.[64] China has become the single largest producer of greenhouse gases, beating pro-

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2003), *available at* http://www.pewclimate.org/docUploads/forestry.pdf (stating that the United States will receive short-term positive benefits from climate change in the sector of forest resources).

63 *See supra* Part I.A.2.

64 *See* Energy Information Administration, Emissions of Greenhouse Gases Report, http://www.eia.doe.gov/oiaf/1605/ggrpt/index.html#developments (last visited Apr. 5, 2009).

jections of when it would overtake the United States.[65] India and Brazil are similarly increasing their emissions at accelerating rates.[66]

The related lawmaking problem is obvious. The developed nations, like the United States, are hard pressed to dictate to countries like China and India that they should not expand their economies by increasing greenhouse gas emissions. After all, why should China and India agree to do so when the United States is primarily responsible for existing greenhouse gas concentrations and has already enjoyed decades of economic prosperity and military superiority as a result of greenhouse gas–producing industries that still produce far greater per capita emissions than sources in either China or India? At the same time, the developed nations like the United States are less likely to take unilateral action to reduce their emissions if they believe that if they do, the rapidly developing nations will simply surpass them in economic strength and simply replace U.S. greenhouse gas emissions with their own, thereby not reducing climate change at all.

B. Human Nature and Cognitive Psychology

The science of climate change creates a series of forbidding lawmaking obstacles that contribute to climate change's wickedness as a public policy problem. But one reason that those obstacles are so potentially overwhelming is because they work in tandem with human nature. Whether as a result of hard- or soft-wiring, human beings as a species tend to think in certain ways. As described by the field of cognitive psychology, we tend to favor some outcomes over others, are able to grasp some kinds of concepts more readily than others, and use a series of mental shortcuts or "heuristics" in making decisions.[67]

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65 Joseph Kahn & Mark Landler, *China Grabs West's Smoke-Spewing Factories*, N.Y. TIMES, Dec. 21, 2007, at A1; Andy Scott & Lucy Brady, *China, Top Producer of Greenhouse Gases, Looks to Tap Potential Resource*, CHINA BRIEFING NEWS, Nov. 2, 2007, *available at* http://www.chinabriefing.com/news/2007/11/02/china-top-producer-of-greenhouse-gases-looks-to-tap-potential-resource.html; *see also China Surpasses U.S. Emissions*, INT'L HERALD TRIB., June 21, 2007, LexisNexis Academic.

66 *See* U.S. GEN. ACCOUNTING OFFICE, CLIMATE CHANGE: TRENDS IN GREENHOUSE GAS EMISSIONS AND EMISSIONS INTENSITY IN THE UNITED STATES AND OTHER HIGH EMITTING NATIONS, GAO-04-146R, at 4 (2003); Energy Information Administration, Table H.1co2: World Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels, 1980–2006, http://www.eia.doe.gov/environment.html (follow "Total Emissions" hyperlink) (last visited Apr. 5, 2009); *see also* Sheryl Gay Stolberg, *Bush Proposes Goal to Reduce Greenhouse Gas: Long-Term World Target*, N.Y. TIMES, June 1, 2007, at A1 (listing China and India as other "top producers" of greenhouse gas emissions).

67 *See, e.g.*, Paul Slovic et al., *Cognitive Processes and Societal Risk Taking*, *in* COGNITION AND SOCIAL BEHAVIOR, 165, 168–74 (John S. Carroll & John W. Payne eds., 1976); Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, *in* JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES 3, 3–4, 18–20 (Daniel Kahneman et al. eds., 1982); Jeffrey J. Rachlinski & Cynthia R. Farina, *Cognitive Psychology and Optimal Government Design*, 87 CORNELL L. REV. 549, 555–58 (2002).

As applied to climate change, these cognitive tendencies and limitations produce a "massive social trap."[68]

Many of these human tendencies are directly relevant to both why climate change has occurred and, most important for current purposes, why lawmaking to address climate change has proven so hard to establish and will be even harder to maintain over time. Indeed, there is almost complete opposition between the kinds of judgments that need to be made to address climate change in a meaningful way and the kinds of judgments that our basic way of thinking favors. Several of the most prominent types of decisions relate to the temporal dimension, spatial distribution, and sheer complexity of climate change.

1. *Myopia and Climate Change's Temporal Dimension*

As described above, the central feature of climate change is its temporal dimension. Cause and effect are spread out enormously over time. It is not just a matter of hours, days, weeks, years, or even mere decades. There is a delay of many decades and then irreversible, unavoidable consequences that, once realized, can last for literally hundreds and sometimes thousands of years. Addressing climate change, accordingly, requires people to take action now to redress consequences that will not occur until far into the future. Unfortunately, this is precisely the kind of thinking and decision making in which people do not naturally engage.

We are a species characterized by myopia.[69] We "think mostly in physiological time"[70] and, because of natural selection, are subject to "the forces of psychological denial."[71] We discount future utility and put off long-term investments in favor of short-term return. We do that with decisions in our own lives. But the tendency is orders of magnitude larger when the time periods affected by those decisions extend beyond our own lives, as with climate change, to temporally distant future generations.

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68 Jeffrey J. Rachlinski, *The Psychology of Global Climate Change*, 2000 U. ILL. L. REV. 299, 300.

69 *See* Chrisoula Andreou, *Environmental Preservation and Second-Order Procrastination*, 35 PHIL. & PUB. AFF. 233, 237 (2007); Eerik Lagerspetz, *Rationality and Politics in Long-Term Decisions*, 8 BIODIVERSITY & CONSERVATION 149, 150 (1999) (defining myopic thinking and exploring the differences between that kind of thinking and other rational and irrational thinking paradigms); Dustin J. Penn, *The Evolutionary Roots of Our Environmental Problems: Toward a Darwinian Ecology*, 78 THE Q. REV. OF BIOLOGY 275, 284–85 (2003) (discussing the human tendency to discount the future).

70 Penn, *supra* note 69, at 284 (quoting E.O. WILSON, BIOPHILIA: THE HUMAN BOND WITH OTHER SPECIES 120 (1984)).

71 *Id.* at 285 (quoting Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1244 (1968)).

There are many readily available bases for our deciding to ignore climate change. Many relate to the tremendous uncertainty that is inevitably injected into the decision-making process when cause and effect are marked by the kind of extraordinary temporal distance contemplated by climate change. Such uncertainty makes it that much easier to conclude, without any obvious selfishness, that it would be foolish to undertake significant restraints on activity now to avoid consequences in the distant future. For instance, how can one ever know what consequences will occur fifty, one hundred, or one thousand years from now? Consider how much humankind has transformed in the last millennium and then what enormous arrogance it would require for anyone today to claim to know what human society, let alone environmental consequences, will look like in the far-off future.

Consider the extent to which future technology and scientific knowledge will change during the next hundreds of years. Consider how people's tastes will profoundly shift. How foolhardy for today's generations to try to anticipate what humankind and the world will look like then and purport to freeze the present in the guise of preserving the future. The wisdom of such a self-imposed seizure of human progress is certainly nowhere suggested by centuries of history of human civilization.

Addressing climate change by reducing resource consumption can also be especially difficult to accomplish. At least on an individual basis, natural selection has seemingly favored over- rather than under-consumption.[72] Sometimes described as an expression of an innate human desire to attract mates and exercise dominion, most humans seek to distinguish themselves by pursuit not of wealth in any absolute sense, but relative wealth.[73] Consumption establishes wealth and social status, whether in the form of resplendent jewels, clothes, or other extravagant goods in modern society or the simple consumption of fats and sugars in earlier times.[74]

Procrastination, not prescience, is the most likely result. The necessary laws are not likely to be enacted and, even if they are, they are likely to be riddled with exceptions or ignored, overridden by the desire to further delay their effectiveness.[75] Even worse, just as in Garrett Hardin's *Tragedy of the Commons*,[76] consumption may actually increase in the short term as each consumer seeks to obtain his or her share before the common supply is exhausted. Otherwise, the only

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72 *See id.* at 282–83.

73 *See id.*

74 *Id.*

75 *See* Andreou, *supra* note 69, at 237–43.

76 *See supra* note 71 (describing 'the tragedy of commons' as a situation in which every person is compelled to increase his or her gain "without limit—in a world that is limited").

benefit of any one person's (or nation's) unilateral temperance is no more than another person's (or nation's) increased exploitation and the relative impoverishment of the former.

2. *The Availability Heuristic, Space, and Complexity*

The "availability heuristic" describes the human tendency to judge the likelihood of an occurrence based on the relative ability to imagine its happening.[77] If one can readily imagine an occurrence—that is, the possibility is more cognitively "available"—one is apt to believe that that occurrence is more likely than it in fact is. In the field of risk regulation, some commentators have invoked this heuristic as grounds for worrying that government may overregulate private conduct in order to avoid harms that, although easily imagined, are extremely unlikely to occur. They argue that political entrepreneurs, taking advantage of "availability cascades," can enlist public support in favor of unnecessarily stringent regulation of conduct based on unrealistic fears.[78]

Climate change, however, most implicates the mirror image of the availability heuristic. There is no reason to suppose that the availability heuristic's only policy implication is the tendency to overregulate. Just as problems that can be easily imagined may in theory prompt overregulation, problems that *cannot* be easily imagined—and therefore presumably implicate an "unavailability heuristic"—may be plagued by underregulation.[79] Climate change, of course, is just such an unimaginable problem.

There are several reasons why climate change is subject to the "unavailability heuristic." First, there is climate change's spatial dimension. The cause and effect underlying climate change are spread out over enormous space. Actions on one part of the globe have consequences for other parts of the globe. Just as these consequences lack immediacy in time, they lack immediacy in space, which renders

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77 *See, e.g.*, Rachlinski & Farina, *supra* note 67, at 556 ("[W]hen making judgments about the frequency of events, people often rely on the ease with which an instance of a target event can be called to mind . . . ."). *See generally* William N. Eskridge, Jr. & John Ferejohn, *Structuring Lawmaking to Reduce Cognitive Bias: A Critical View*, 87 CORNELL L. REV. 616 (2002) (analyzing lawmaking through the lens of theories of cognitive psychology); Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 STAN. L. REV. 683 (1999) (analyzing availability cascades and suggesting reforms to avoid their potential harms); Amos Tversky & Daniel Kahneman, *Availability: A Heuristic for Judging Frequency and Probability*, 5 COGNITIVE PSYCHOL. 207 (1973) (exploring how the availability heuristic can create bias).

78 *See* Kuran & Sunstein, *supra* note 77, at 742–43, 744–46. "Availability cascades" are "social cascades . . . through which expressed perceptions trigger chains of individual responses that make these perceptions appear increasingly plausible through their rising availability in public discourse." *Id.* at 685.

79 *See id.* at 731 n.176 ("The same process can dampen public concern and discourage governmental activity with respect to dangers that happen to be very serious.").

them more difficult to imagine. Spatial gaps, like temporal gaps, inject uncertainty about whether a particular action is truly having an alleged impact in a distant location.

Spatially diffuse impacts are especially elusive for the human imagination because they inevitably render the consequences effectively invisible and therefore more abstract. Moreover, the abstraction is compounded if the impacts of climate change closer to home are dramatically different from those in distant locations. In the case of global climate change, of course, such a spatial disparity is not just a theoretical possibility; it is to be expected. Some parts of the world may actually perceive short-term benefits to their economies from climate change, while other parts of the world may suffer devastating consequences from such change. Were those who were suffering the more immediate harsh consequences the same people who were best able to address the problem in the future, the discrepancy between the two would of course present no obstacle to lawmaking. Some commentators would no doubt express worry in those circumstances that the availability heuristic would lead to overreaction to climate change. But it is just the opposite.[80] Because the greatest sources of the problem are located in nations that are likely to suffer the least in the short term, it is that heuristic's far more evil twin, the unavailability heuristic, that threatens lawmaking.

It is not, however, just climate change's spatial dimension that implicates the unavailability heuristic. The stock/flow nature of climate change, also discussed above,[81] does so as well. People have a weak intuitive understanding of stock/flow relationships. In particular, people do not intuitively grasp how stock can increase even if flow is decreasing (for example, how the water level in the bathtub can continue to increase even after one turns the faucet down).[82]

Indeed, studies have demonstrated that people do not intuitively understand stock/flow relationships in general, and that they are unable to do so in the context of the science of climate change in particular.[83] In one recent study of graduate students at an elite university, students were supplied with basic information about the science of climate change, including the stock/flow relationship, and then they were asked a series of questions to discern what kinds of steps would be necessary to reduce global warming. The students repeatedly failed to grasp how reductions in flow would not necessarily lead to

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80 *See, e.g.*, Paul L. Joffe, *The Dwindling Margin for Error: The Realist Perspective on Global Governance and Global Warming*, 5 RUTGERS J. L. & PUB. POL'Y 89, 140–41 (2007) (describing some of the difficulties involved in achieving international cooperation toward sustainable development, including the disparate concerns of various nations).

81 *See supra* Part I.A.2.

82 *See id.*

83 *See, e.g.*, Sterman & Sweeney, *supra* note 31, at 222–36.

stock reduction. Even for extremely bright students, the relationship was too complex for ready apprehension.[84]

3. *Representativeness Heuristic and Climate Change Cause and Effect*

A third tendency of human cognition is the "representativeness heuristic." This heuristic provides that people can more readily discern cause and effect if the effect of a given action seems logically related to the assigned cause.[85] It is therefore easy to understand how striking a match can lead to destruction by fire, or how breaching a dam can cause damage by flood.

But for that same reason, climate change cause and effect eludes normal human cognition. There is nothing logical or intuitive about the relationship. How can buying some extra furniture at a discount store lead to climate change? Or driving some additional miles in the family car, which happens to be a SUV? Or idling unnecessarily while waiting to pick up a child in the school parking lot? Or buying a state-of-the-art high definition television? Or using power strips and any of a host of appliances that, for sake of consumer convenience are always "on" to a certain extent and therefore more immediately usable?[86]

And, of course, it is not just discernment of the relationship between ordinary consumer behavior and climate change that would be necessary. The harmful consequences of all of this excess consumer consumption in developed nations, such as the United States, are not climate change per se. The harmful consequences are those of climate change: people literally starving for food and water in already impoverished areas of the world, especially Africa; the spread of new and more virulent infectious diseases; flash floods in parts of Asia; mass migrations of populations in search of food and water; increased civil unrest and even war as the demand for scarce resources intensifies in places such as the Middle East.[87]

The undeniable fact is that well-meaning people in developed nations, including our own, are engaging in extraordinarily wasteful and unnecessary consumption that fuels climate change.[88] None of these

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84 *Id.*

85 Tversky & Kahneman, *supra* note 67, at 11, 24–27.

86 *See generally* Michael P. Vandenbergh & Anne C. Steinemann, *The Carbon-Neutral Individual*, 82 N.Y.U. L. REV. 1673 (2007) (discussing the contributions that individual actions make to climate change).

87 *See* Thomas Homer-Dixon, *Environmental Scarcity and Intergroup Conflict*, *in* WORLD SECURITY: CHALLENGES FOR A NEW CENTURY 342–62 (Michael T. Klare & Yogesh Chandrani eds., 3d ed. 1998); IPCC *Summary for Policymakers*, IMPACTS, *supra* note 7, at 11–18; LAZARUS, *supra* note 2, at 8–15 (discussing potential implications of climate change).

88 *See* John C. Dernbach, *Harnessing Individual Behavior to Address Climate Change: Options for Congress*, 26 VA. ENVTL. L.J. 107, 144–56 (2008) (discussing legislative measures to ensure greater individual cooperation with national efforts to address climate change); Paul R. Ehrlich & Lawrence H. Goulder, *Is Current Consumption Excessive? A General Frame-*

activities would be remotely acceptable were the consequences of these actions clear. Their acceptability can be partially attributed to the clouding effect of temporal and spatial distances. But it is also because the complexity of the causal chains makes those consequences seem far removed from the actions that contributed to their occurrence.[89]

C. The Nature of U.S. Lawmaking Institutions

The nature of U.S. lawmaking institutions is the third ingredient that presents obstacles to the enactment of climate change legislation and its maintenance over time. Most simply put, the kind of law needed to address climate change is precisely the kind of law—because of its enormously redistributive implications—that our lawmaking system deliberately makes difficult to enact in the first instance. Our lawmaking system also renders such laws especially vulnerable to second-guessing and derailment over time by Congress, Executive Branch officials, and judicial review.[90] But because the structure of our lawmaking institutions is the one ingredient that is most susceptible to ready revision, this final ingredient may well be the most significant for current lawmaking purposes.[91]

1. *The Challenges of Environmental Lawmaking in General*

I have previously outlined why and how I believe environmental lawmaking is generally difficult to accomplish through U.S. lawmaking institutions.[92] These reasons include the structure of our lawmaking institutions, especially the deliberate fragmentation of lawmaking authority between sovereigns, within sovereigns, and within branches of sovereigns. The reasons also include the political processes for the election of members of the legislature and executive branch leaders,

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work and Some Indications for the United States, 21 CONSERVATION BIOLOGY 1145, 1153 (2007) (finding that consumption in many sectors of the U.S. economy is greatly distorted, leading to excessive fossil fuel usage); Vandenbergh & Steinemann, *supra* note 86, at 1699–1700 (explaining that "low-hanging fruit"—behavior change requiring little effort or cost to be effective—allows individuals to reduce greenhouse gas emissions by 60 percent).

89 Professor Jeffrey Rachlinski elaborates on two other significant human cognitive limitations potentially relevant to climate change: "biased assimilation" and a "loss aversion and the status quo bias." Rachlinski, *supra* note 68, at 304–08. The first refers to the tendency of people to see what they want to see in uncertain data, which he argues can contribute to a polarization of views on climate change; the second refers to the tendency of people to prefer maintaining the status quo, which can extend to an aversion to incurring costs for future benefit. *Id.*

90 *See infra* Part III.

91 *See id.*

92 *See generally* LAZARUS, *supra* note 2.

which are dominated by short-term election cycles and dependence on massive donations for election campaigning.[93]

The natural and deliberate effect of fragmenting authority among branches of government and between sovereign authorities is to make it more difficult to enact laws. Great effort is needed to secure the necessary congressional committee approvals; garner majority votes in both chambers; obtain presidential signature; achieve agency implementation and enforcement; and, if necessary, defeat challenges in court to the law's validity.

There is, in short, a strong structural bias within our existing lawmaking institutions in favor of government acting slowly and incrementally.[94] Whatever their ideological bent, sweeping law reforms in response to new information or values are very difficult to accomplish without institutional change, yet those same institutions that need reform resist just that possibility.

The features of environmental protection law, moreover, make reform an especially demanding undertaking. Because of environmental law's inherently redistributive thrust, there will almost always be those resisting the change who, under existing law, possess considerable resources that they will work hard to avoid losing.[95] They will also be able to base their opposition to statutory enactments on the substantial scientific uncertainty and sheer complexity surrounding ecological injury. The latter, in particular, will render the process of legislating detailed statutory provisions especially difficult.

Environmental law's inherently dynamic nature creates further obstacles in that multiple statutes, statutory amendments, and regulatory revisions are likely to be necessary over time. Securing passage of environmental law is not just a matter of exploiting one opportune moment in time. It requires multiple debates and lobbying efforts, with any one failed effort potentially leading to the aforementioned irreversible, catastrophic environmental harm. Environmental law must be flexible and responsive to new information regarding ecological cause and effect, available technology, and changing lifestyles. The essentially conservative, fragmented, and deliberately cumbersome process for lawmaking in the United States does not readily lend itself to such responsive, iterative lawmaking initiatives.

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93 I derive the discussion in this subsection from the somewhat fuller analysis in LAZARUS, *supra* note 2, at 29–42.

94 *See* Alan M. Jacobs, *The Politics of When: Redistribution, Investment and Policymaking for the Long Term*, 38 BRIT. J. POL. SCI. 193, 201 (2008) (arguing that one way to make distributional tradeoffs harder to accomplish is to spread out lawmaking power, which makes it harder to enact laws and gives more leverage to potential losers, thereby creating, in effect, a veto).

95 *See* MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS 2, 53–65 (2d prtg. 1971).

Fragmentation also makes it difficult to address issues in a comprehensive, holistic fashion. Ecological injury resists narrow redress—due to the highly interrelated nature of the ecosystem, it is almost always a mistake to suppose that one can isolate a single, discrete cause as the source of an environmental problem. A broader overview that accounts for the full spatial and temporal dimensions of the matter is needed. Failure to pursue such an overview is likely to result in an approach that is at best ineffective and at worst unwittingly destructive because of unanticipated consequences. If, however, governmental jurisdiction over the host of diverse activities affecting the ecosystem is divided among many entities, necessary coordination and overview are surprisingly difficult.

The institutional obstacle of fragmentation not only arises among the various branches, but also within them. Fragmentation of congressional committee jurisdiction over environmental issues is inevitable given the ways in which ecological cause and effect span so many diverse human activities. Environmental law will invariably implicate the interests not just of congressional committees concerned with environmental law per se, but also of most major committees concerned with various aspects of the economy and society potentially subject to environmental regulations—the tremendous spatial and temporal dimensions of ecological injury guarantee it.

Moreover, because of the separation of authorizing committees and appropriations committees in both congressional chambers, there are likely to be powerful factions on appropriations committees particularly skeptical of the thrust of environmental protection laws. Due to self-selection or their experience on other committees primarily concerned with budgetary limitations, members named to appropriations committees are likely to be especially sensitive to economic costs. For that reason, they are likely to be disproportionately concerned with the more immediate and known economic costs of environmental controls than they are responsive to the more speculative, uncertain, long-term benefits of those same controls. Accordingly, they are prone to inserting appropriations riders that preclude the meaningful implementation of previously enacted legislation that they dislike.

Nor is such a structure merely a matter of theoretical speculation. Just such an appropriations-process-driven dynamic has overridden environmental lawmaking in the federal arena for almost twenty years. Congress essentially passes no sweeping, comprehensive lawmaking through its authorization committees, which is one reason why it has proven so hard to enact climate change legislation. The congressional committees that have been the most active in actual environmental lawmaking have been the appropriations committees and their

subcommittees. Members of those committees have perfected to a high art the inclusion of appropriations riders in bills and earmarks in accompanying legislative reports that seek to micromanage environmental lawmaking in the Executive Branch on behalf of narrow, short-term economic interests to which members of those committees tend to be especially responsive.[96]

A similar division of interests is evident within the Executive Branch. Although certain agencies, primarily the EPA, have defining missions that render them especially sensitive to environmental protection concerns, the same is not necessarily so for many other powerful forces within that branch. The Departments of the Interior, Agriculture (including the Forest Service), and Commerce (including the National Oceanic and Atmospheric Administration) each have mixed missions—they both enforce certain restrictions and, because of their own resource management activities, are subject to others. As a result, a single agency often includes offices (such as the Fish and Wildlife Service and the Bureau of Land Management at the Department of the Interior) with sharply contrasting policy outlooks. Other very powerful cabinet agencies, such as the Departments of Transportation, Energy, and Defense, are mostly the targets of environmental regulation and therefore are more likely to be skeptical of tough restrictions that cabin their discretionary authority to pursue their primary agendas. And, of course, the Office of Management and Budget (OMB) within the Executive Office of the President is, at least historically, systematically focused on the near-term economic outlook and its budgetary implications.

The result is a disjunction of sorts within the federal Executive Branch. The federal Executive Branch is simultaneously the regulator and the regulated. Some portions of the Branch take an expansive, supportive view of environmental protection law, while other parts embrace a narrower, more skeptical outlook. The highly uncertain nature of ecological cause and effect and its complexity provide much fodder for disagreement, which both informs and slows down the lawmaking process.[97]

The peculiar political systems that have developed around government in the United States, especially surrounding the election of the President, members of Congress, and many state and local officials, provide another source of obstacles for environmental law. The most obvious of these obstacles is the extent to which those running for office are dependent on campaign donations from those with considerable economic resources. Clearly, because of its inherently redis-

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96 I have written at length on this shift in the dynamic of environmental lawmaking in Lazarus, *supra* note 4.

97 *See supra* Part I.A.

tributive nature, environmental protection law tends to be most threatening to those who currently have many economic resources. Such persons and entities tend, notwithstanding some notable exceptions, to be understandably opposed to laws that would reduce their existing wealth and corresponding economic clout. As a result, those advocating environmental protection laws typically face well-funded opposition.

At the same time, those persons and entities favoring stronger environmental protection laws (that is, environmentalists) are likely to face severe organizational barriers to mounting effective political campaigns. To the extent that environmentalists are dominated by those currently "losing" under the existing system of laws, they are likely to have far fewer economic resources. Furthermore, as environmentalist interests are not always economic in character but are instead often based on a moral vision regarding the proper relationship between humankind and the natural environment, environmentalists are especially unlikely to be able to enlist allies from the business community to convert their vision into the campaign coffers needed for political success.

Moreover, the tremendous spatial and temporal dimensions associated with ecological injury create tremendous impediments to effective political organization in favor of environmental protection. The pool of those adversely affected is simply too spread out over space and time to effectively organize for collective action. Future victims do not yet know of the damage; for one thing, they might not yet be born. Present victims are unlikely to understand the source of their suffering given the extraordinary complexity of the natural environment and the associated scientific uncertainty. Present victims who are aware of the source of their suffering may also take no action due to the perverse incentives generated by the prospects of "free riders," who exploit the ecosystem commons to maximize their gains or minimize their losses by relying on others to make the necessary sacrifices.

Perhaps for these reasons, those seeking elected office tend to stress the importance of economic growth and promise short-term results: new businesses, new jobs, lower taxes, and a broader tax base to support desired government services. These short-term results tend to be the catchwords and slogans of those seeking elected office in relatively short electoral cycles (typically two or four years), especially at the state and local levels. A candidate seeking elected office based on an environmental agenda that is not premised on traditional notions of economic growth but instead on the imposition of short-term limits with the prospect of widely dispersed gain in the distant future is sub-

stantially disadvantaged within the political system.[98] Whatever shortsightedness individuals have because of their basic morality, their worldview is far longer than that of the typical politician seeking reelection.[99]

Finally, our political system is inherently dependent on bargaining and the forging of compromises. The ability to compromise competing interests and thereby eliminate conflict is often the calling card of a successful politician or government official. For environmental protection, however, compromise is not always a viable option. In some settings, undertaking a series of compromises simply delays the ultimate destruction of the resource of concern. Effective environmental protection might require long-term adherence to absolute limits, not provisional objectives to be inexorably bartered away over time. Yet the economic pressures on the environment are constant and unrelenting, and such nonnegotiable environmental regulation rarely occurs. That is because coalitions are formed on the basis of short-term goals, and even a strong coalition of environmentalists can quickly be broken down by appeals to their differing interests over the longer term.[100]

2. *The Making of Climate Change Law in Particular*

Based on the preceding analysis, climate change law is no less than environmental lawmaking's worst nightmare, which is also why it warrants the "super wicked" label. By fragmenting lawmaking authority and relying on short-term election cycles, we make it almost impossible to form the political coalitions necessary to address long-term issues.[101] The combination of the science of climate change and human nature perversely triggers obstacle after obstacle.

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98 *See* Alan M. Jacobs, Democracy, Public Policy, and Timing: Toward A Theory of Intertemporal Policy Choice 9 (June 3, 2004) (unpublished manuscript, on file with author), *available at* http://www.cpsa-acsp.ca/papers-2004/Jacobs.pdf (describing how, for elected officials, the "when" of the distribution of costs and benefits associated with a proposed public policy is crucial and they naturally favor proposals with quick positive returns).

99 *See* Lagerspetz, *supra* note 69, at 159–60; William Leblanc et al., *Majority-Rule Bargaining and the Under Provision of Public Investment Goods*, 75 J. PUB. ECON. 21, 21–47 (2000) (explaining that because individuals favor short-term returns, politicians seeking to maximize votes do so even more, which leads to underinvestment in the future and overutilization of natural resources).

100 *See* Alan M. Jacobs, Ties that Bind: Institutions, Uncertainty, and Politics of Long-Term Constraint 10–11 (unpublished manuscript, on file with author), *available at* http://faculty.arts.ubc.ca/Jacobs/Jacobs%20Constraints%20Paper%20-%20Workshop.pdf (describing the shifting nature of political coalitions and how they tend to be organized around short-term concerns that are ineffective at maintaining longer term political agendas).

101 *Id.* at 10 ("[I]nstitutional fragmentation . . . renders potential long-term commitment mechanisms largely inoperative."); *see* Pierrehumbert, *supra* note 17, at 593 ("Solving

First, climate change's enormous temporal and distributional dimensions undermine the building of a powerful political coalition capable of long-term sustainability. The people most in immediate need of climate change law are not even at the lawmaking table here in the United States. They are the very poor in far-removed parts of the globe and members of future generations, whether in the United States or elsewhere, so temporally distant as to be essentially unimaginable as actual human lives. And even those who are physically available and concerned enough about climate change to support legislative action are typically bound together largely by short-term and narrowly focused interests that serve as a tenuous basis for long-term advocacy.

Second, by contrast, the entities skeptical of and opposed or even hostile to any such lawmaking will be extremely well represented and will also likely be supported by substantial political and economic power. They will include those powerful business interests that believe they have the most to lose, at least in the short term, from any significant restrictions on current economic activity for the purpose of reducing greenhouse gas concentrations in the atmosphere. They are economic interests that have settled investment-backed expectations in maintenance of the status quo and for which a long-term investment might have a five-, ten-, or perhaps even a twenty-year time horizon, but nothing approaching the temporal reach of climate change. They will also include many elected officials. Their constituents are concerned mostly with short-term, not long-term, factors, reflecting shades of Bill Clinton's celebrated campaign slogan in 1992: "It's the economy, stupid." But even apart from the constituents who actually cast ballots, elected officials are responsive to the priorities of powerful economic players who fund their political campaigns.[102]

The potential for short-term benefits from climate change in nations like the United States will fuel other climate change lawmaking skeptics. Those who believe they have something to gain, whether from predictions of enhanced agricultural productivity or access to new energy resources, will be naturally reluctant to join a coalition favoring climate change legislation.

Third, it is not just the causes of climate change that are marked by distributional disparities; the same is true for the costs of reducing greenhouse gas emissions. Some parts of the United States, some in-

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the problem of global warming demands a long-term focus that is not a natural match for the way political institutions operate.").

102 *See* Cass R. Sunstein, *Irreversible and Catastrophic*, 91 CORNELL L. REV. 841, 875 (2006) (stating that politicians will delay implementing environmental precautions if costs "will be incurred immediately, and if the benefits will not be enjoyed for many decades . . . . [because] they will face political retribution for imposing immediate costs and might well receive little or no political gain for delivering long-term benefits").

dustries, and some activities will be more adversely affected than others. This is true whether the emissions abatement is achieved by emissions allowances, carbon taxes, or technology-based emissions reduction requirements. Although

> the net cost of achieving [significant] levels of GHG abatement could be quite low on a societal basis, issues of timing and allocation would likely lead various stakeholders to perceive the costs very differently—particularly during the transition to a lower carbon economy. Costs will tend to concentrate more in some sectors than others . . . .[103]

Those who perceive that they are on the losing end of these disparities will invariably be able to create obstacles to implementation by taking advantage of the multiple opportunities provided in our fragmented lawmaking system.[104]

Fourth, joining the skeptics will be those concerned about developing nations, especially China, outpacing the United States economically if we were to diminish our economic activity to reduce greenhouse gas emissions. Even worse, any possible positive environmental impact from our emissions reductions would be quickly overwhelmed by emissions increases from sources in those other nations. Accordingly, these skeptics will be reluctant to agree to any significant emissions reduction absent enforceable commitments from nations like China to do the same.

Nor is it so easy to suppose that a grassroots movement can be maintained over the long term as necessary to overcome the powerful economic and political forces skeptical of climate change lawmaking. Instead, as explained above, human nature, or more specifically, limits on human cognition, suggest just the opposite. People will generally not perceive the consequences of their actions today in distant lands and unimaginably distant times. The consequences of activities that promote greenhouse gas emissions today are too unavailable and too

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103 JON CREYTS ET AL., REDUCING U.S. GREENHOUSE GAS EMISSIONS: HOW MUCH AT WHAT COST?, at ix (McKinsey & Co., Dec. 2007).

104 *See* J.R. DeShazo & Jody Freeman, *Timing and Form of Federal Regulation: The Case of Climate Change*, 155 U. PA. L. REV. 1499, 1546–50 (2007) (describing contrasting incentives of various types of industries regarding the structure of climate change legislation). Representative John Dingell's effort on behalf of the auto industry to prevent passage of more demanding fuel efficiency standards is emblematic of the program of such factionalization and its potentially paralyzing effect on meaningful climate change legislation. Although Representative Dingell generally expresses support of climate change legislation, he has frequently remained a stumbling block to efforts to include in such legislation tougher fuel efficiency standards that the auto industry in his congressional district oppose, notwithstanding the critical role such standards must play in reducing greenhouse gas emissions. *See, e.g.*, John M. Broder, *Hopes Dim for Measures to Conserve Energy*, N.Y. TIMES, Sept. 13, 2007, at A16 ("The mileage standard appears just in the Senate bill, having been squelched in the House by the opposition of Representative John D. Dingell, the powerful Democrat from Michigan.").

unrepresentative of those activities to allow for the sustainable political movement necessary for sustained climate change lawmaking.

II
Climate Change's Lawmaking Moment and the Propriety of Precommitment Strategies

Of course, the lawmaking obstacles just described explain not only why Congress has failed to pass climate change legislation during the past decade, but also why it will continue to be difficult for Congress to do so within the next few years. As described in more detail below, there is nonetheless good reason to suppose that domestic politics have recently shifted enough that such legislation may in fact soon be achieved.[105] It is therefore important now to consider how best to include provisions within any such statute that are capable of increasing the law's ability to achieve its objectives over the long term by limiting the ability of future legislators and officials to undermine the statute's implementation. Concerns one might otherwise have about the antidemocratic effects of such lawmaking restraints should be reduced by the need for just those kinds of restraints to preserve options for future generations.

Finally, changes in the institutional design of lawmaking related to federal climate change law are also the most promising basis for overcoming the features of the climate change problem that make it so wickedly resistant to legal redress. Three ingredients—the science of climate change, human nature, and the nature of our lawmaking institutions—have led to the current logjam precluding effective climate change legislation.[106] Those same three ingredients will continue to impede the long-term implementation of such legislation once it is finally enacted. Of the three, moreover, only one is susceptible to meaningful change in the first instance, and that is the institutional design of lawmaking institutions.[107] The science of climate change is a fixed factor. It cannot be redefined away. To be sure, as testified to by recent events, some politicians may seek to fictionalize or even literally to rewrite science to match their preferred policy views. Such politicians pretend that the evidence of climate change is more equivocal than scientific consensus now accepts.[108] Ignoring ac-

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105 *See infra* Part II.A.

106 *See supra* Parts I.A–C.

107 Stephen Breyer, Breaking the Vicious Circle: Toward Effective Risk Regulation 55 (1993) (describing how, because neither human nature nor congressional politics is susceptible to ready change, it is best to focus instead on institutional reform).

108 *See* Robert F. Rich & Kelly R. Merrick, *Use and Misuse of Science: Global Climate Change and the Bush Administration*, 14 Va. J. Soc. Pol'y & L. 223, 231 (2007) (discussing the Bush Administration's use and misuse of climate change science, in particular its efforts to "limit media access to a leading scientist and . . . edit[ ] . . . scientists' work"); Andrew C. Revkin,

tual science, however, is not a basis for addressing climate change but just for further procrastination.

Nor can we safely rely on human nature transforming on its own. Here too, we are who we are, including our limited time horizons, consumptive biases, and susceptibility to certain cognitive errors in judgment. As the Framers understood in crafting the Constitution, it is foolhardy to enact laws based on assumptions of who we ought to be rather than who we in fact are.[109] Of course, utility curves may shift and different societies can embrace very different cultural attitudes toward resource consumption and shared communities. And perhaps over the longer term, even societies like our own here in the United States may change and embrace lifestyles far less focused on the present and more sensitive to the needs of future generations. Private preferences are not static and can change significantly over time. Information disclosure laws and other techniques aimed directly at individual behavior responsible for unnecessary greenhouse gas emissions no doubt can effectively "nudge" people to embrace lifestyles that have much smaller carbon footprints.[110]

But these kinds of changes in private preferences are most likely to be driven by law.[111] Significant funds for public education and in-

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Climate Change Testimony Was Edited by White House, N.Y. TIMES, Oct. 25, 2007, at A16 (describing the Office of Management and Budget's editing of the written testimony of the director of Centers for Disease Control and Prevention, which was submitted to the Environment and Public Works Committee, as "'a misuse of science and abuse of the legislative process'") (quoting Dr. Michael McCally); Daniel Smith, *Political Science*, N.Y. TIMES, Sept. 4, 2005, § 6 (Magazine), at 36 (noting that American scientists are concerned that "'scientific conclusions, reached either within agencies or by people outside of government, are being changed for political reasons by people who have not done the scientific work'") (quoting Donald Kennedy).

109 *See infra* notes 159–62 and accompanying text; *see also* Joffe, *supra* note 80, at 97 ("To improve the world, one must work with human nature as it is and not assume it away.").

110 *See* Richard H. Thaler & Cass R. Sunstein, NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS 193–96 (2008) ("What if a way could be found to ensure that people see, each day, how much energy they have used. . . . [I]f we can find ways to make energy use visible, we'll nudge people toward reducing their energy use without mandating any such reductions."); Dernbach, *supra* note 88, at 144–56 (describing possible information disclosure and other programs directed to individual behavior); Vandenbergh & Steinemann, *supra* note 86, at 1729–34 (describing individual carbon release inventories, information disclosure on related climate change impacts, and a carbon neutral registry).

111 Legislation relating to seatbelts is illustrative. Mandatory seatbelt legislation is a classic precommitment strategy, and a seatbelt itself epitomizes an anticipatory restraint. Individuals lacked the judgment necessary to use seatbelts. Mandatory seatbelt use overcame that obstacle and eventually caused such a major shift in human behavior that for most people, any notion that this legal mandate is burdening them or constraining their liberty has long since dissipated. Private preferences have shifted in response to the legal mandate. *See* Stephen Holmes, *Precommitment and the Paradox of Democracy*, *in* CONSTITUTIONALISM AND DEMOCRACY: STUDIES IN RATIONALITY AND SOCIAL CHANGE 195, 236 n.125 (Jon Elster & Rune Slagstad eds., 1988). Similarly, low-hanging fruit exists for shifting private preferences and lifestyles in ways that can significantly reduce greenhouse gas emis-

formation disclosure will certainly be an important component of climate change legislation designed to promote just such a shift in public preferences and lifestyle choices. However, the time frame for action required by the science of climate change does not provide us with the freedom to rely on public education to achieve the significant changes necessary immediately. The cost of further delay in reducing greenhouse gas emissions is too great.

A. The Prospects of Federal Climate Change Legislation

Notwithstanding the lawmaking hurdles that have precluded enactment of federal climate change legislation to date, the time now seems ripe for its passage. For the first time, both the President and congressional leaders in both chambers support passage of significant climate change law. Indeed, never before has the occupant of the White House made passage of such legislation a primary part of his campaign for the Oval Office. President Barack Obama repeatedly stressed his support of significant climate change legislation during his campaign,[112] even referring to the urgency of addressing the climate change issue the night of his election,[113] appointed a "Climate Czar" in the White House to champion the issue,[114] and, within the first week of office, issued a memorandum to the EPA directing the Agency to revisit policy decisions made by the prior Administration that had hindered implementation of climate change law.[115]

Events outside the United States also significantly increase the likelihood of congressional action. The IPCC 2007 Report has re-

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sions with little or no impact on human enjoyment. *See* Vandenbergh & Steinemann, *supra* note 86, at 1699–1700.

112 *See* Obama for America, Barack Obama and Joe Biden: New Energy for America, http://www.barackobama.com/pdf/factsheet_energy_speech_080308.pdf (last visited Apr. 5, 2009) (proposing an 80 percent reduction in greenhouse gas emissions by 2050).

113 *See* Barack Obama, Address After Winning the Presidential Election (excerpt), *in* N.Y. TIMES, Nov. 5, 2008, at P5 (presenting excerpts from a speech by President-elect Barack Obama, who referred to "a planet in peril").

114 John M. Broder, *Title, but Unclear Power, for a New Climate Czar*, N.Y. TIMES, Dec. 12, 2008, at A28 (reporting that President Obama named Carol Browner Assistant to the President for Energy and Climate Change).

115 John M. Broder & Peter Baker, *Obama's Order Likely to Tighten Auto Standards: Signaling Policy Shift; California Leads Effort to Cut Emissions and Raise Efficiency*, N.Y. TIMES, Jan. 26, 2009, at A1 (announcing presidential memorandum to the EPA, directing the EPA to reconsider prior Administration's denial of California's application to regulate greenhouse gas emissions from new motor vehicles). On April 17, 2009, pursuant to the Clean Air Act, EPA Administrator Lisa Jackson signed formal proposed findings that emissions of greenhouse gas emissions threaten public health and welfare and that combined emissions of such gases from new motor vehicles and motor vehicle engines combine and contribute to climate change. *See* Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, (pre-publication copy, Apr. 17, 2009) (to be codified at 40 C.F.R.), *available at* http://epa.gov/climatechange/endangerment/downloads/GHGEndangermentProposal.pdf.

moved any serious doubt from the political arena whether both significant reduction in greenhouse gas emissions from human activities and concrete plans to adapt to climate change are now necessary. The long-awaited, and much-debated, scientific consensus regarding climate change cause and effect is now at hand.[116]

No less important, the pressure from other nations on the United States to act as a leader in addressing climate change is mounting to a degree that can no longer be easily ignored. Other nations, especially nations in the European Union, have begun to address the issue to a far greater extent than the United States has. However, the terms of their engagement are frequently directly linked to whether the United States will also take action.[117]

But the pressure will not just arise from other developed nations that, like the United States, have historically contributed to greenhouse gas concentrations, albeit not to the same degree as the United States. The political pressure will also be produced by events in the world's poorer nations, as they begin to suffer more visibly within their own borders and export climate change's harmful impacts on human health and welfare.[118] Wholly apart from whatever moral obligation U.S. citizens may feel to address suffering abroad caused by wasteful energy consumption within our own borders, the national security implications to the United States from the resulting destabilization of populations and governments are undeniably serious.[119] That has long been true in theory.[120] In the next few years, however, some of that theory will no longer be merely theoretical.

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116 *See supra* note 7 and accompanying text.

117 *See, e.g.*, Proposal for a Decision of the European Parliament and of the Council on the Effort of Member States to Reduce Their Greenhouse Gas Emissions to Meet the Community's Greenhouse Gas Emission Reduction Commitments up to 2020, COM (2008) 17 Final, at 4, 6 (2008) (on file with author) (proposing that the European Union commit to 30 percent greenhouse gas emissions reduction by 2020 as compared to 1990, but take no further steps toward the goal of 50 percent reduction by 2050 until other developed countries agree to comparable emissions reductions).

118 THE CNA CORP., NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE 6 (2008), *available at* http://www.SecurityAndClimate.cna.org ("Economic and environmental conditions in already fragile areas will further erode as food production declines, diseases increase, clean water becomes increasingly scarce, and large populations move in search of resources.").

119 *See* KURT M. CAMPBELL ET AL., THE AGE OF CONSEQUENCES: THE FOREIGN POLICY AND NATIONAL SECURITY IMPLICATIONS OF GLOBAL CLIMATE CHANGE 20–21 (2007) (describing climate change as "just as dangerous—and more intractable—than the arms race between the United States and the Soviet Union during the Cold War") (quoting Thomas Homer-Dixon, *Terror in the Weather Forecast*, N.Y. TIMES, Apr. 24, 2007); THE CNA CORP., *supra* note 118, at 1 ("The nature and pace of climate changes being observed today and the consequences projected by the consensus scientific opinion are grave and pose equally grave implications for our national security.").

120 *See* Jessica Tuchman Mathews, *Redefining Security*, 68 FOREIGN AFF. 162, 162 (1989) (suggesting in 1989 that "[g]lobal developments now suggest the need for another analogous, broadening definition of national security to include resource, environmental and

There will also likely be increased domestic political pressure for federal climate change legislation, and not just from environmentalists. As states increasingly act to fill the gap left by Congress, business interests will increasingly favor a national approach. Large businesses that operate in many states will far prefer one set of rules established at the national level, even if quite stringent, over an array of differing standards established by fifty state sovereigns.[121] Those businesses will no doubt make inclusion of some federal preemption rules a condition of their support for any federal legislation. Nonetheless, their desire for federal legislation of any kind will increase the odds of congressional enactment, whether or not the legislation passed ultimately includes the kind of sweeping preemption businesses may have wanted.[122]

Moreover, businesses seeking to avoid state climate change regulation will not be the only ones to favor federal legislation. Many of the larger businesses that operate in other countries and find themselves subject to climate change regulation elsewhere may favor legislation in the United States. For instance, they may wish to guard against possible competitive disadvantages that might otherwise exist. In addition, many businesses are likely to perceive economic opportunity in federal climate change legislation.[123] Federal legislation offers the prospect of substantial economic sweeteners, such as the buying and selling of tradable emission allowances or subsidies for the development of more efficient appliances or alternative energy supplies,[124] which some sectors of the economy hope to exploit to their advantage.[125]

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demographic issues," given that "[e]nvironmental strains . . . are . . . beginning to break down the sacred boundaries of national sovereignty").

121 DeShazo & Freeman, *supra* note 104, at 1530–31, 1533–38; *see* E. Donald Elliott et al., *Toward a Theory of Statutory Evolution: The Federalization of Environmental Law*, 1 J.L. ECON. & ORG. 313, 326 (1985) (describing how desire for federal preemption of state regulation of motor vehicles prompted the auto industry to support federal legislation).

122 *See* DeShazo & Freeman, *supra* note 104, at 1530–31, 1536 ("[I]ndustry demand is solely responsible for federal regulation, but [a multiplicity of] state regulation can prompt industry players to support a federal policy response sooner than they otherwise might have, increasing the likelihood of its passage.").

123 FRED KRUPP & MIRIAM HORN, EARTH: THE SEQUEL: THE RACE TO REINVENT ENERGY AND STOP GLOBAL WARMING 9–13, 250–52 (2008) (describing how the institution of a cap-and-trade system for carbon dioxide would provide innovators with billions of dollars that would "mobilize virtually every realm of economic activity").

124 *See id.* ("Only when legislators make it a regulatory certainty that global warming pollution will be limited will U.S. companies invest seriously in solar, biofuels, wave energy, and clean cars.").

125 *See* Juliet Eilperin, *150 Global Firms Seek Mandatory Cuts in Greenhouse Gas Emissions*, WASH. POST, Nov. 30, 2007, at A3 (describing how some of the world's largest businesses, including Coca-Cola, General Electric, Shell, DuPont, Nike, and Johnson & Johnson, support a "legally binding agreement [that] 'will provide business with the certainty it needs to scale up global investment in low-carbon technologies'").

Finally, it is increasingly clear that there is a significant amount of "low-hanging fruit" that will allow people and businesses in the United States to significantly reduce greenhouse gas emissions without the kind of severe economic disruption some have prophesized.[126] One of the advantages of existing energy practices that are absurdly wasteful is that tremendous efficiencies can be readily achieved by curbing those practices.[127] According to a recent widely acclaimed study jointly commissioned by leading industries and environmental organizations, the United States already possesses the technological capacity to curtail significantly our greenhouse gas emissions without ruining our economy or making enormous lifestyle sacrifices.[128] This is true for business, but is also true for individuals, whose energy-wasteful lifestyles contribute more to greenhouse gas emissions than many of the nation's largest industries.[129] By adopting readily available energy conservation measures, individuals could reduce their greenhouse gas emissions by as much as 60 percent.[130] Although the cost of achieving greenhouse gas reductions will rise substantially after the first series of wasteful behaviors are easily eliminated, those initially lower costs should make it politically easier to secure a law's passage.[131] This is one instance in which a short-term political advantage may exist for climate change legislation of human nature's myopic tendencies.

For all these reasons, the prospects seem not only better than they have ever been but even fairly good that the longstanding legislative logjam will finally be broken and federal climate change legisla-

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126 *See* Michael P. Vandenbergh et al., *Individual Carbon Emissions: The Low-Hanging Fruit*, 55 UCLA L. REV. 1701, 1705–09 (2008) (describing a "low-hanging fruit" strategy, in which legislators could try to achieve large reductions at lower costs).

127 *See* Vandenbergh & Steinemann, *supra* note 86, at 1699–1703.

128 In a report prepared by McKinsey and Company in association with DTE Energy, Environmental Defense Fund, Honeywell, National Grid, Natural Resources Defense Council, Pacific Gas & Electric, and Shell, the authors noted as their central conclusion:

> The United States could reduce greenhouse gas emissions in 2030 by 3.0 to 4.5 gigatons of [carbon dioxide equivalent] using tested approaches and high potential emerging technologies. These reductions would involve pursuing a wide array of abatement options available at marginal costs less than $50 per ton, with the average net cost to the economy being far lower if the nation can capture sizable gains from energy efficiency. Achieving these reductions at the lowest cost to the economy, however, will require strong, coordinated, economy-wide action that begins in the near future.

CREYTS ET AL., *supra* note 103, at ix (citation omitted); *see also* S. Pacala & R. Socolow, *Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies*, 305 SCIENCE 968–72 (2004) ("Humanity already possesses the fundamental, scientific, technical, and industrial know-how to solve the carbon and climate problem for the next half-century.").

129 Vandenbergh & Steinemann, *supra* note 86, at 1694.

130 *Id.* at 1700.

131 *See* Vandenbergh et al., *supra* note 126, at 1701, 1705–09 (describing how a "low-hanging fruit" strategy could achieve large reductions at lower costs and which could also facilitate a shift of public support for more aggressive regulation in the future).

tion will be enacted within the next four years. But passage of climate change legislation is one thing, while successful implementation over the decades necessary to achieve its ambitious goals is quite another. And no sooner than the ink dries on the bill signed into law by the President will the same political and economic forces that long resisted the legislation try to undermine the new law's implementation, especially as costs invariably rise.

B. The Propriety of Lawmaking Restraints in Federal Climate Change Legislation

What is largely missing from existing scholarship is direct attention to the question of how to ensure the maintenance of the necessary climate change legislation over time. To a certain extent, this inquiry is related to the question concerning the right mix of controls to be adopted in the first instance. Some types of controls are likely to have more staying power than others, either because they are less economically disruptive or otherwise more politically palatable. It would clearly be wise to favor some types of controls over others for that reason. Yet consideration of this relevant factor is no substitute for the exclusive focus of this Article's endeavor, which is to anticipate the challenges that climate change law will face and structure the entire program for its long-term success no matter which mix of controls the legislation includes.[132]

As I see it, one of the most significant lawmaking challenges we now face is to exploit the upcoming lawmaking moment to create climate change laws that are not just momentary. The requirements of federal climate change legislation have to be steadfast or "sticky" in some respects and flexible in others, which is no small feat. The legis-

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[132] Accordingly, it is not the purpose of this Article to enter directly the debate concerning the optimal mix of controls to achieve the necessary reductions and relief measures. That is, of course, the issue that dominates almost all of the current policy and lawmaking debates. Which sectors of the economy should be covered by the legislation: electric utilities, mining, transportation, major industry, and agriculture? Should the dominant regulatory tool be a carbon tax and, if so, how much should it be? Or should it be a scheme for tradable emissions akin to that utilized in the 1990 Clean Air Act Amendments for acid deposition? And, if so, how should such allowances be allocated? Based on past emissions? Or by auction? Or should the primary regulatory mechanism for achieving greenhouse gas emissions reduction be technology-based standards, as in the Clean Water Act? If so, to what extent should cost be considered in the determination of such standards, and under what deadlines must they be promulgated and subject to enforcement? These are just a very few of hundreds of first-order policy questions with which lawmakers will need to grapple and answer to craft effective climate change legislation in the near future. *See, e.g.*, Victor B. Flatt, *Taking the Legislative Temperature: Which Federal Climate Change Legislative Proposal is "Best"?*, 102 NW. U. L. REV. 123, 139–40 (2007) (noting that in crafting climate change legislation, legislators must address several policy choices). These are all clearly important questions, especially given that many address the short-term distributional consequences upon which regulated industry most immediately focuses.

lation must be sufficiently steadfast to resist, over the longer term, the constant barrage of pressures launched by economically and politically powerful interests seeking to delay and relax the law's proscriptions for their own short-term gain. But it would be no less of a mistake for the law to be wholly inflexible and not subject to revision. Precisely because the effectiveness of any climate change law depends on its success over the long term, the law must admit the possibility of significant legislative or regulatory change in light of new information and changing circumstances.

The solution to this lawmaking conundrum is the careful use of asymmetric lawmaking processes designed to make some kind of future lawmaking extremely hard to accomplish and other kinds much easier. Asymmetry will overcome the skewing that otherwise exists in our lawmaking fora that favors those with short-term interests over those with long-term interests and those outside the formal jurisdictional bounds of the relevant lawmaking entity, yet subject to their laws. Anticipatory measures that change the design of normal lawmaking processes can make it harder for those naturally more powerful to secure the change in law they seek and also make it easier for those naturally less powerful to safeguard their competing interests, including by securing the change in law that they believe is necessary.

The obvious objection to any such deliberate modifications of lawmaking processes, especially those that make future lawmaking more difficult, is that they are antidemocratic. These modifications allow the views of existing majorities to trump the views of future majorities who may well view sound public policy very differently.[133] The present generation always tends to believe that it may well be wiser than those generations who came before them or those who will come after them, and the risk is too great that allowing such restraints on future lawmaking will allow the present, in its own self-interest, to control the future.[134] The shorthand reference to this objection, of course, is that the dead hand of the past or present should not be able to govern the future.

There are, however, at least three compelling reasons for why the dead hand concern is not persuasive as applied to the need for substantial lawmaking restraints in federal climate change legislation. The first is that such restraints, notwithstanding their seemingly antidemocratic implications, have a long and widely accepted history in domestic law, ranging from the Constitution's organization of the House and the Senate to a host of existing federal statutes that seek to insulate somewhat certain decisions from politics.[135] Hence, such re-

133 *See infra* notes 145–49 and accompanying text.

134 *See id.*

135 *See infra* Part II.B.1.

straints, rather than suggest a departure from the nation's lawmaking traditions, at the very least fall well within them. Second, the lawmaking restraints in federal climate change legislation would be deliberately asymmetric in order to further the options available to future generations, not restrict them. Skewing currently exists in lawmaking in general and certain interest groups exercise undue influence at the expense of others.[136] The institutional lawmaking design features contemplated for federal climate legislation would be designed to redress that existing skewing and therefore ultimately foster and not undermine the fundamental values underlying representative government.

The final justification relates to the sheer impracticalities of failing to address over the longer term the threats that climate change now poses. Preserving the ability of future majorities to retain the full range of options necessary for self-government most likely depends on climate change legislation capable of maintaining greenhouse gas emissions reductions over the longer term.[137] Otherwise, current lawmakers will undercut the autonomy of future majorities by subjecting them to a natural environment that sharply curtails their options. In other words, cross-temporal majority effects will occur with or without climate change legislation. The question is not whether to have such cross-temporal impacts, but which ones to have. To the extent, therefore, that lawmaking restraints are a necessary component of climate change legislation that can provide future majorities with greater opportunities, they further rather than undermine democratic norms.

I discuss each of these three justifications in greater detail below.

1. *A Longstanding Tradition of Precommitment Strategies to Restrain Future Lawmaking*

Lawmaking restraints in response to some kinds of especially challenging lawmaking problems are a well-established feature of lawmaking. Political scientists, philosophers, scientists, and economists refer to such self-imposed restraints on future behavior as "precommitment" strategies.[138] Precommitment strategies are techniques we all use in our day-to-day lives to reinforce certain behavior or even

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136 *See id.*

137 *See* Pierrehumbert, *supra* note 17, at 573 ("Humans have become a major geological force with the power to commit future millennia to practically irreversible changes in global conditions."); discussion *infra* Part II.B.1.

138 *See* Samuel Freeman, *Reason and Agreement in Social Contract Views*, 19 PHIL. & PUB. AFF. 122, 143 (1990); Thomas C. Schelling, *Enforcing Rules on Oneself*, 1 J.L. ECON. & ORG. 357, 363–64 (1985); R.H. Strotz, *Myopia and Inconsistency in Dynamic Utility Maximization*, 23 REV. ECON. STUD. 165, 165, 173 (1955); Richard H. Thaler & H. M. Shefrin, *An Economic Theory of Self-Control*, 89 J. POL. ECON. 392, 396–97 (1981).

deliberately to limit our options: placing an alarm clock the night before on the other side of the room;[139] having a friend count our calories or cigarettes;[140] prepaying an annual health club membership;[141] holding a formal wedding ceremony to announce one's commitment in marriage before one's family and community; or even, in warfare, literally burning the bridge behind one's troops to be assured that retreat is not an option.[142]

One of the most famous precommitment strategies was that of Ulysses in *The Odyssey*.[143] Ulysses' challenge was to avoid the ill fate that befell those who succumbed to the seductive voices of the Sirens. The goddess Circe crafted, in effect, a precommitment strategy that would allow Ulysses to hear the Sirens yet not become their victim. Circe instructed Ulysses to have the men on his ship fill their ears with wax, tie Ulysses tightly to the mast, and then refuse to release him as he listened to the Sirens' song no matter how earnest his pleas to be unbound.[144]

Nor did the possible role of precommitment strategies escape the attention of eighteenth- and nineteenth-century political philosophers debating how best to craft a representative democracy. Many condemned the notion as fundamentally antidemocratic and foolish. Jean Jacques Rousseau proclaimed, "Il est absurdé que la volonté se donne des chaines pour l'avenir . . . ." (It is absurd for the will to lay itself under any restraint regarding the future).[145] Adam Smith similarly declared that "The earth and the fullness of it belongs to every generation, and the preceding one can have no right to bind it up from posterity."[146] Thomas Jefferson warned that "[t]he earth belongs to the living, not to the dead"[147] and "by the law of nature, one generation is to another as one independent nation to another."[148] The nineteenth-century British political philosopher Thomas B. Macaulay similarly challenged John Stuart Mills's promotion of democracy as the superior form of government. Macaulay asserted that

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139 Holmes, *supra* note 111, at 236.

140 *Id.*

141 Schelling, *supra* note 138, at 369.

142 Jon Elster, *Don't Burn Your Bridge Before You Come to It: Some Ambiguities and Complexities of Precommitment*, 81 TEX. L. REV. 1751, 1761–63 (2003).

143 HOMER, THE ODYSSEY (Rodney Merrill trans., Univ. of Mich. Press 2002).

144 *See id.* at 238.

145 JEAN-JACQUES ROUSSEAU, A TREATISE ON THE SOCIAL COMPACT OR, THE PRINCIPLES OF POLITICAL LAW bk. II, ch. 1 (London, 1795).

146 ADAM SMITH, LECTURES ON JURISPRUDENCE 468 (R.L. Meek, D.D. Raphael & P.G. Stein eds., Clarendon Press 1978); *see also id.* at 69–70.

147 THE JEFFERSONIAN CYCLOPEDIA: A COMPREHENSIVE COLLECTION OF THE VIEWS OF THOMAS JEFFERSON 219 (John P. Foley ed., 1900).

148 *Id.* at 376.

> [e]ven if we were to grant that [Mill] had found out the form of government which is best for the majority of the people now living on the face of the earth, ... [i]t would still be incumbent on Mr. Mill to prove that the interest of every generation is identical with the interest of all succeeding generations.[149]

These same debates were reflected in the early discussions surrounding the terms and proper role of our own federal Constitution, and they continue today.[150] As Stephen Holmes argues, "[t]he basic function of a constitution is to *remove* certain decisions from the democratic process, that is, to tie the community's hands."[151] The classic justification for such a restraint is that "constitutions are chains imposed by Peter when sober on Peter when drunk."[152] The enactment of a constitution is, at least in theory, a moment of reason passing limits on anticipated moments of passion. Democracy depends on such constraints to survive; otherwise, moments of majoritarian passion would backlash against and potentially destroy democracy itself.[153] Constitutionalism is therefore depicted as an effective means of balancing man's passions and the temptations of power.[154]

Humankind's cognitive limitations, especially its tendency toward myopia and susceptibility to let passion overcome reason, are a dominant theme underlying the arguments of those favoring such constitutional self-restraints. According to Holmes, a "constitution is the institutionalized cure for this chronic myopia . . . ."[155] The state must overcome the "short-sightedness of the individual citizen" and "adopt a long-term perspective and take the responsibility for those decisions that will produce benefits only in the long term."[156] Cass Sunstein has analogously explained how government may try to interfere with private preferences if they result from "motivational distortions that characterize addictions, habits, and myopic behavior."[157]

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149 Lagerspetz, *supra* note 69, at 160 (quoting T.B. Macaulay, *Mill on Government (March 1829)*, *in* JAMES MILL, POLITICAL WRITINGS, 271, 294–95 (Terence Ball ed., 1992)).

150 *See* Holmes, *supra* note 111, at 201–03.

151 *Id.* at 196.

152 Elster, *supra* note 142, at 1765 (citing JED RUBENFELD, FREEDOM AND TIME: A THEORY OF CONSTITUTIONAL SELF-GOVERNMENT 130 (2001)).

153 *See* Jon Elster, *Introduction* to CONSTITUTIONALISM AND DEMOCRACY, *supra* note 111, at 6.

154 *See* Francis Sejersted, *Democracy and the Rule of Law: Some Historical Experiences of Contradictions in the Striving for Good Government*, *in* CONSTITUTIONALISM AND DEMOCRACY, *supra* note 111, at 131, 133.

155 Holmes, *supra* note 111, at 196.

156 Lagerspetz, *supra* note 69, at 159.

157 Cass R. Sunstein, *Legal Interference with Private Preferences*, 53 U. CHI. L. REV. 1129, 1139 (1986). Professor Sunstein, however, cautions against government too readily seeking to correct its perception of such "cognitive errors." *Id.* at 1166. He contends that such governmental efforts can amount to huge intrusions on individual liberty, and governmental action can itself be skewed by irrelevancies and rent-seeking perversions of the political

The lawmaking structure and laws of the United States are riddled with precommitment strategies, many of which are clearly intended to anticipate likely errors in human judgment that might otherwise lead to systematic errors in lawmaking.[158] The Framers of the U.S. Constitution sought for this very reason to limit majority lawmaking power in significant respects.[159] James Madison, for instance, considered precommitment essential because the momentary circumstances then existing for altruistic lawmaking "created psychological conditions for trust and cooperation" that were "unlikely to endure" and Madison, accordingly, worried about instability over time.[160] Madison "expressly embraced the notion that what would separate his constitution from those that had gone before it would be a more realistic conception of human nature."[161] As the political scientist Martin Diamond, in his comments on the political science embraced by the Framers of our Constitution, observed: "[a]ncient and medieval thought and practice were said to have failed disastrously by clinging to illusions regarding how men *ought* to be. Instead, the new science would take man as he actually *is*."[162]

Our constitutional system deliberately makes lawmaking difficult for that very reason: to guard against potential overreaction to more immediate impulses of the moment.[163] Although fragmentation of lawmaking authority poses obstacles to climate change legislation, such fragmentation was designed, ironically, to prevent excessive lawmaking by present generations that would effectively bind the future.

Thus, lawmaking authority is dispersed among the Legislative, Executive, and Judicial Branches and then further fragmented within each of those branches. The Legislative Branch is comprised of two chambers to reduce the potential for impulsive lawmaking;[164] that is also why representatives within each chamber are elected for different terms and from differing jurisdictional boundaries.[165] The upper

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process. *Id.* He also argues that present generations discounting the needs of the future need not be considered irrational at all. *See id.* at 1168–69.

158 *See* Rachlinski & Farina, *supra* note 67, at 554, 589.

159 *See* Elster, *supra* note 142, at 1758 n.21.

160 Holmes, *supra* note 111, at 216.

161 Jonathan R. Macey, *Competing Economic Views of the Constitution*, 56 GEO. WASH. L. REV. 50, 55 (1987).

162 Jonathan R. Macey, *Cynicism and Trust in Politics and Constitutional Theory*, 87 CORNELL L. REV. 280, 296 (2002) (quoting Daniel Patrick Moynihan, *The "New Science of Politics" and the Old Art of Government*, 86 PUB. INT. 22, 23–24 (1987)).

163 *See* THE FEDERALIST No. 10 (James Madison), Nos. 15, 51 (Alexander Hamilton); Macey, *supra* note 162, at 296–99. These protections can be seen as counteracting heuristics and other cognitive biases. *See* Eskridge & Ferejohn, *supra* note 77, at 639.

164 Macey, *supra* note 162, at 298; *see* U.S. CONST. art. I, § 1.

165 *See* U.S. Const. art. I, § 2, 3.

chamber's longer and staggered terms "ameliorate the predictable operation of the availability and representativeness heuristics."[166]

As a further guard, the President is entitled to veto legislation, and any veto can be overcome only by a supermajority of legislators in both chambers.[167] Lawmaking is also generally separated from law execution, which guards against legislative excesses.[168] The Constitution provides that the President cannot serve more than two terms,[169] partly in recognition of the tendency of voters to reelect incumbents rather than risk an unknown.[170] The Bill of Rights is likewise riddled with limitations on democratic lawmaking designed to guard against perceived human tendencies, for instance: "to withdraw certain subjects from the vicissitudes of political controversy, to place them beyond the reach of majorities;"[171] to rush to judgment against the criminally accused;[172] to silence unpopular speech;[173] to disrespect minority religions;[174] to impose cruel and unusual punishment on the despised;[175] and to diminish private property rights of the few in order to promote the interests of the many.[176]

Finally, the Constitution promotes an independent judiciary. Although its members must be nominated by the President and confirmed by the Senate,[177] the Chief and Associate Justices have life tenure and are not subject to removal short of an impeachable offense.[178] Nor may the Legislature diminish their pay.[179] The constitutional message is clear: the Framers sought to remove the interpreters of the law and the Constitution as much as possible from the hurly-burly, short-term political pressures, and infighting often found in the other two branches. Thus, the Supreme Court does not weigh public opinion when deciding difficult constitutional cases, such as whether

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166 Eskridge & Ferejohn, *supra* note 77, at 639.

167 U.S. CONST. art. I, § 7.

168 *See* Eskridge & Ferejohn, *supra* note 77, at 640.

169 U.S. CONST. amend. XXII, 1.

170 *See* Bruce G. Peabody & Scott E. Gant, *The Twice and Future President: Constitutional Interstices and the Twenty-Second Amendment*, 83 MINN. L. REV. 565, 601 (1999); *see also id.* at 578 (quoting Thomas Jefferson saying "that his attachment to the principle of [presidential] rotation . . . was born out of a fear that 'the indulgence and attachments of the people will keep a man in the chair after he becomes a dotard, that re-election through life shall become habitual, and election for life follow that'" (quoting Letter from Thomas Jefferson to John Taylor, *in* THE POLITICAL WRITINGS OF THOMAS JEFFERSON 142 (Edward Dumbauld ed., 1955))).

171 W. Va. State Bd. of Educ. v. Barnette, 319 U.S. 624, 638 (1943).

172 *See* U.S. CONST. amends. V, VI.

173 *See* U.S. CONST. amend. I.

174 *See id.*

175 *See* U.S. CONST. amend. VIII.

176 *See* U.S. CONST. amend. V.

177 U.S. CONST. art. 2, § 2.

178 U.S. CONST. art. 3, § 1.

179 *Id.*

a First Amendment right exists not to be subject to criminal punishment for burning an American Flag.[180]

Early Supreme Court precedent commented on the Framers' intent in the Constitution to guard against the human tendency toward myopia. In *Fletcher v. Peck*,[181] Chief Justice Marshall, writing for the Court in 1810, emphasized "that the framers of the constitution viewed, with some apprehension, the violent acts which might grow out of the feelings of the moment."[182] The Constitution, accordingly, sought to guard against or at least limit the harm that could be caused by such moments of passion: "the people of the United States, in adopting that instrument, have manifested a determination to shield themselves and their property from the effects of those sudden and strong passions to which men are exposed."[183]

2. *The Propriety of Using Precommitment Strategies to Overcome Perceived Defects in Our Federal Lawmaking System*

There is also significant historical precedent for modifying our nation's normal lawmaking system in response to perceived tendencies of our particular form of representative democracy to achieve unsound results in addressing certain kinds of problems.[184] One such tendency, also implicated by climate change law, is the potential domination of lawmaking processes by those seeking to satisfy short-term, more narrowly defined interests at the expense of longer-term concerns.

For instance, Congress sometimes delegates lawmaking authority to Executive Branch agencies to remove members of Congress from especially difficult, politically controversial decisions that might upset their constituents because of the decisions' short-term and narrowly focused consequences.[185] Such delegation allows Congress, in effect, to insulate itself from the influence of powerful interests that would

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180 *See* Texas v. Johnson, 491 U.S. 397, 432–35 (1989) (Rehnquist, C.J., concurring) (stating that no matter how much flag burning offends, such an expression is protected under the First Amendment and cannot be subject to criminal prosecution).

181 10 U.S. (6 Cranch) 87 (1810).

182 *Id.* at 137–38.

183 *Id.* at 138.

184 Of course, what constitutes "unsound" results often lies in the eye of the beholder. Political science scholars have long written about the tendency of legislative majorities to seek to entrench their policy preferences in legislation or rulemaking agencies that will survive over time, including once they are no longer in the majority. *See* Terry M. Moe, *The Politics of Structural Choice: Toward a Theory of Public Bureaucracy*, *in* ORGANIZATION THEORY: FROM CHESTER BARNARD TO THE PRESENT AND BEYOND, 116, 136, 138 (Oliver E. Williamson ed., 1990); Matthew D. McCubbins et al., *Administrative Procedures as Instruments of Political Control*, 3 J.L. ECON. & ORG. 243, 261, 264–71 (1987).

185 *See* Cass R. Sunstein & Edna Ullmann-Margalit, *Second-Order Decisions*, 110 ETHICS 5, 17 (1999).

vigorously oppose those consequences.[186] For example, in the Health Insurance Portability and Accountability Act of 1996 (HIPAA),[187] Congress sought to produce detailed laws governing the privacy of individual health records in electronic form. After years of legislative stalemate, Congress determined that it did not want to allow the legislature's longstanding inability to answer difficult policy questions to continue to preclude the promulgation of necessary privacy rules.[188] In deliberate anticipation of its own continued inability to act, Congress created a two-step procedure that would ensure the establishment of the needed rule. Congress passed a law that provided for the Department of Health and Human Services to submit proposed regulations to Congress for its consideration, but if Congress failed to act within a specified period of time, then the Act mandated that the Department make those regulations final.[189]

The same policy concerns have prompted Congress to include safeguards in the organization of Executive Branch agencies, to restrain certain lawmaking options, favor others, and generally insulate the agencies from short-sightedness and other likely cognitive errors in judgment.[190] The Defense Base Closure and Realignment Act of 1990[191] is a contemporary example. The Act's stated purpose is "to provide a fair process that will result in the timely closure and realignment of military installations inside the United States."[192] The impetus for this special legislation was congressional realization that the spatially and temporally limited interests of individual representatives were precluding any kind of rational decision-making process.[193] The adverse economic consequences of military base closures to the areas

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186 Jacobs, *supra* note 100, at 13 (citing McNollgast, *The Political Origins of the Administrative Procedure Act*, 15 J.L. ECON. & ORG. 180, 180–217 (1999)).

187 Pub. L. No. 104–191, 110 Stat. 1936.

188 *See* Scope of Criminal Enforcement Under 42 U.S.C. § 1320d-6, Op. Off. Legal Counsel (2005), 2005 WL 2488049, at *7 n.12, *available at* http://www.usdoj.gov/olc/hipaa_final.htm; Peter A. Winn, *Confidentiality in Cyberspace: The HIPAA Privacy Rules and the Common Law*, 33 RUTGERS L.J. 617, 639–41 (2002) (explaining the history of the HIPAA).

189 *See* Pub. L. No. 104–191, § 264(c)(1), 110 Stat. 1936, 2033 (1996) ("If legislation governing standards with respect to the privacy of individually identifiable health information transmitted in connection with the transactions described . . . is not enacted by [August 21, 1999], the Secretary of Health and Human Services shall promulgate final regulations containing such standards not later than [February 21, 2000]."). The Fourth Circuit rejected a nondelegation doctrine challenge to this novel statutory scheme. *See* S.C. Med. Ass'n v. Thompson, 327 F.3d 346, 351 (4th Cir. 2003).

190 *See* Jacobs, *supra* note 100, at 29–30.

191 Pub. L. No. 101-510, 104 Stat. 1808. I have previously written about this statute in Richard J. Lazarus, *Environmental Law After Katrina: Reforming Environmental Law by Reforming Environmental Lawmaking*, 81 TUL. L. REV. 1019, 1049–50 (2007). I derive this discussion from that earlier description.

192 Defense Base Closure and Realignment Act of 1990, Pub. L. No. 101-510, § 2901(b), 104 Stat. 1808, 1808.

193 *See* Kenneth R. Mayer, *Closing Military Bases (Finally): Solving Collective Dilemmas Through Delegation*, 20 LEGIS. STUD. Q. 393, 398 (1995).

housing them were so serious, immediate, and focused that the political process precluded necessary closure decisions from being made.[194] The resulting patchwork of military bases around the nation both wasted limited federal dollars and undermined effective and efficient military operations.[195] Only by creating an artificially rigid and encumbered decision-making process that allowed for broader spatial and temporal considerations (both budgetary- and defense-related) to dominate could a more rational decision be made.[196]

To that end, the Act establishes a commission charged with recommending which military bases should be closed or realigned.[197] The Act also creates a carefully calibrated procedure to provide elected officials with the necessary political cover and essential deniability. The procedure includes initial recommendations to the Commission from the Secretary of Defense,[198] Commission recommendations for presidential review,[199] the President's approval in whole or in part of the Commission recommendations,[200] the possibility of a revised Commission recommendation upon presidential disapproval,[201] and finally allowance for congressional disapproval by joint resolution of both chambers.[202] The Act, however, specifically imposes significant limitations on the timing of such congressional consideration, limiting the ability of individual members to hold lengthy hearings and debates and introduce amendments.[203] The legislation identifies which congressional committees have initial jurisdiction,[204] how much time they have to consider recommendations,[205] when consideration on each chamber's floor is in order,[206] how much time is allowed for floor debate,[207] and how any amendments are barred.[208] The joint resolution is a straight up or down vote on the Commission recommendations as a whole.[209] Although the Act does not necessarily bar Congress from changing those self-imposed limitations, it deliberately makes it harder for Congress to do so. The Act is a restraint that Congress plainly welcomes because it is deliberately designed to

194 *See id.* at 396.
195 *See id.*
196 *See id.* at 396–98.
197 *See* Defense Base Closure and Realignment Act of 1990 § 2902(a).
198 *See id.* § 2903(c).
199 *See id.* § 2903(d).
200 *See id.* § 2903(e).
201 *See id.* § 2903(e)(3).
202 *See id.* § 2904(b).
203 *See id.* §§ 2903(b), 2908.
204 *See id.* § 2908(b).
205 *See id.* § 2908(c).
206 *See id.* § 2908(d)(1).
207 *Id.* § 2908(d)(2) (allowing two hours for floor debate).
208 *Id.*
209 *See id.* § 2908(d).

limit Congress' perceived accountability for decisions that may be unpopular in the short term.[210]

No doubt one of the most ambitious and strikingly innovative exercises of such lawmaking authority was the creation of the Federal Reserve Board by the President and Congress in the early twentieth century. With rapid technological growth and economic expansion, the nation needed a reliable, stable national banking system. Several banking crises, including the Panic of 1907, made clear the urgency of federal governmental intervention.[211] Yet national leaders struggled between reliance on private banks responsive exclusively to short-term profit maximization forces and a national, public bank susceptible of being captured by political leaders promoting their own competing short-term goals.[212]

The Federal Reserve System was born out of this often quite heated debate with congressional enactment of the Federal Reserve Act in 1913.[213] It was the result of a remarkable collaborative effort spearheaded by newly-elected President Woodrow Wilson, formerly a political science professor, Secretary of State William Jennings Bryan, congressional leaders, and academics.[214] Today, such independent central banks are routinely considered to be classic instances of precommitment strategies.[215]

The Federal Reserve Board of Governors, Federal Open Market Committee, and twelve regional banks together wield tremendous power over the nation's economy. The Board controls the size of the money supply by buying and selling federal government securities, regulating the amount of money that member banks must keep in reserve, and adjusting the interest rates that are charged to banks that seek to borrow money from the Federal Reserve System.[216] The regional banks serve as fiscal agents for the U.S. Treasury, but they are

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210 *See* Mayer, *supra* note 193, at 397, 405–06.

211 *See* ROGER T. JOHNSON, HISTORICAL BEGINNINGS . . . THE FEDERAL RESERVE 16–30 (1999), *available at* http://www.bos.frb.org/about/pubs/begin.pdf.

212 *See id.*

213 Federal Reserve Act, 12 U.S.C. §§ 221–522 (2006). *See generally* Federal Reserve Bank of Kansas City, History of the Federal Reserve, FED101: The Fed. Reserve Today, http://www.federalreserveeducation.org/fed101/History/index.cfm (last visited Apr. 5, 2009) (offering an interactive history of the Federal Reserve System from 1775 to 2003).

214 *See* JOHNSON, *supra* note 211, at 22–26; Federal Reserve Bank of Kansas City, *supra* note 213.

215 *See, e.g.*, JON ELSTER, ULYSSES AND THE SIRENS: STUDIES IN RATIONALITY AND IRRATIONALITY 90 (1979); Sunstein & Ullmann-Margalit, *supra* note 185, at 13.

216 *See* BD. OF GOVERNORS OF THE FED. RESERVE SYS., THE FEDERAL RESERVE SYSTEM: PURPOSES AND FUNCTIONS 3 (9th ed. 2005), *available at* http://www.federalreserve.gov/pf/pdf/pf_complete.pdf.

not themselves agencies of the federal government. They are each run by a nine-member board of directors.[217]

To insulate Board members from shorter-term political influences, the President appoints them to fourteen-year terms, which necessarily cut across administrations; the Chair and Vice Chair have four-year terms, subject to possible reappointment. The Board also has one distinctive advantage over ordinary Executive Branch and independent agencies: it is not subject to the congressional appropriations process. The Board is self-financed by its own financial transactions. So although the Board remains subject to congressional oversight and Congress may, of course, amend the Federal Reserve Act at any time (subject to either the President's signature or veto override), the Board enjoys virtually unparalleled insulation from budgetary limitations, appropriations riders, and other techniques that members of Congress routinely utilize to micromanage the work of federal agencies on behalf of narrow congressional constituencies.[218]

3. *The Practical Consequences of Global Climate Change and Their Impact on Future Generations*

Ironically, however, perhaps the most compelling argument in favor of precommitment strategies in federal climate change legislation can be found in the arguments historically made against their legitimacy. The principal argument against precommitment strategies is that the present should not be able to bind the future.[219] No doubt that argument has force in some contexts. But no less certainly it possesses comparatively little force if the very purpose of using precommitment strategies is, as in federal climate change law, to *preclude the present from binding the future.*

After all, the purpose of climate legislation is not to protect the present at the expense of the future; precisely the opposite. Climate change legislation seeks primarily to protect the *future* at the expense of the *present.* The most serious threat that the present poses to the future is not climate change legislation that is later hard to unravel. The far greater threat to the future is the potential devastation and global destablization that can occur in the *absence* of legislation with such precommitment strategies.

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217 *See* 12 U.S.C. § 248 (2006); BD. OF GOVERNORS OF THE FED. RESERVE SYS., *supra* note 216, at 10; The Federal Reserve Board, The Structure of the Federal Reserve System: The Board of Governors of the Federal Reserve System (July 8, 2003), http://www.federalreserve.gov/pubs/frseries/frseri.htm; *see also* David Masci, *The Federal Reserve: The Issues*, 10 THE CQ RESEARCHER 675, 676 (2000).

218 *See* 12 U.S.C. § 244; BD. OF GOVERNORS OF THE FED. RESERVE SYS., *supra* note 216, at 2–3.

219 *See supra* notes 132–83 and accompanying text.

Cross-temporal majorities are to a certain extent unavoidable. Any law passed now invariably limits the prerogatives of future majorities.[220] At the very least, the future inherits the laws of the present and therefore has the affirmative burden of the cumbersome process of amending existing law. So too, the future inherits the legal obligations and responsibilities incurred by earlier lawmakers, which cannot be easily shed. The future likewise inherits the natural environment, the bounty of which can be irreparably damaged by prior generations.[221]

Nor is passage of laws the only way that the present may, as a practical matter, bind the future. Inaction as well as action may have irreversible consequences that dramatically limit the options available to future generations. The failure to enact and maintain climate change laws is just such an inaction. The catastrophic global destabilization threatened by climate change would not only as a practical matter bind future generations but also potentially undermine their ability to govern themselves using the full range of options required for greater autonomy. It would therefore be tragically wrong to posit that protection of the political prerogatives of the future precludes current generations from adopting laws that seek to preserve the options of future generations. Sometimes lawmaking limits do weaken the future. But sometimes, such limits strengthen the future instead.[222]

III
PRECOMMITMENT STRATEGIES FOR FEDERAL CLIMATE CHANGE LEGISLATION

Institutional design for lawmaking matters. As described above, by structuring the "mechanisms of democracy" within our lawmaking processes, we can and routinely do influence not only how decisions are made, but the issues and judgments that are reached.[223] We can promote the soundness as well as the fairness of decisions, which sometimes requires that we embrace new institutional designs for par-

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220 *See* Michael J. Klarman, *Majoritarian Judicial Review: The Entrenchment Problem*, 85 GEO. L.J. 491, 504–05 (1997) (acknowledging that "virtually any action taken by today's majority may (deleteriously) affect the future").

221 *See* Eric A. Posner & Adrian Vermeule, *Legislative Entrenchment: A Reappraisal*, 111 YALE L.J. 1665, 1672, 1686–88 (2002).

222 Holmes, *supra* note 111, at 227 ("Limits do not necessarily weaken; they can also strengthen.").

223 ADRIAN VERMEULE, MECHANISMS OF DEMOCRACY: INSTITUTIONAL DESIGN WRIT SMALL 4 (2007) ("[M]echanisms of democracy are small-scale rules that structure the process by which laws are made . . . ."); *see also* Adrian Vermeule, *Submajority Rules: Forcing Accountability upon Majorities*, 13 J. POL. PHIL. 74, 75–76 (2005) (describing a variety of lawmaking institutions, including Congress and the Supreme Court, that use submajority voting in certain contexts to ensure that minority interests have voices in agenda-setting).

ticular lawmaking challenges in anticipation of our own human nature and the perceived tendencies of existing lawmaking processes.[224] We can also design lawmaking processes to make it harder to unravel legislative bargains once struck and, in effect, to "stack the deck" in favor of certain interests and to the detriment of others as the statute is implemented over time.[225]

For federal climate change legislation, asymmetric precommitment strategies will be necessary because of the tremendous lawmaking challenges presented by the science of climate change in combination with human nature. Some strategies should be focused on making it harder for otherwise disproportionately powerful short-term economic interests to undermine the legislation's implementation. Other strategies should, conversely, be designed to make the law's terms susceptible to influence by disproportionately politically weaker groups, in particular those seeking to protect the diffuse interests of future generations. In this manner, these contrasting design features operate not unlike chutes and ladders.[226] A chute is deliberately designed to place a player at a disadvantage and a ladder is intended to make it easier to achieve one's objective.

Described below are some preliminary ideas, many of which are traceable to strategies that Congress has previously embraced in other contexts. Some are directed to congressional lawmaking and others to Executive Branch implementation because the risks are present in both branches. The ideas include tools such as *interagency, scientific advisory, and stakeholder consultation requirements* to promote certain voices; *statutory and regulatory hammers* to keep statutory implementation on track; *federal preemption and non-preemption triggers* to provide for regulatory innovation and to recognize state sovereign prerogatives; and *limited and enhanced judicial review provisions* to promote the effectiveness of oversight by potentially underrepresented interests and to diminish the power of those who are potentially unduly influential.

Absent these kinds of asymmetric precommitment strategies, climate change legislation will most likely be eroded by the daily economic and political pressures that cannot long countenance imposing immediate costs in return for benefits so removed temporally and spatially from the present. The erosion will be quiet yet far-reaching in effect. It will happen in the chambers of Congress, in the form of compliance extensions, budgetary shortfalls, appropriations riders,

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224 *See, e.g.*, Penn, *supra* note 69, at 292–95 (noting, in the context of ecological conservation, the importance of observing limits on human altruism in making social policy).

225 Moe, *supra* note 184, at 136–38; McCubbins et al., *supra* note 184, at 261–63, 264–71 (describing ways to "stack the deck" to favor policy entrenchment and prefer certain interests over others in statutory implementation).

226 *See supra* note 6 and accompanying text.

and earmarks, and it will happen in the vast hallways of the federal bureaucracy, in the form of delays in the promulgation of regulations, agency interpretations of statutory mandates as nonmandatory, generous agency settlements, and simple nonenforcement of the law.

A. Congress

The most significant restraint on Congress' ability to enact sweeping revisions to federal climate change legislation is already in place. The same fragmented system of lawmaking in Congress that the Framers supplied, further fragmented by the dizzying array of congressional committees with overlapping jurisdiction over climate change, that made legislation difficult to pass in the first instance makes it difficult to pass comprehensive amendments to that law once passed. It is much harder to achieve congressional passage of a significant law than to prevent its passage; there are many opportunities within existing legislative procedures for less powerful political interests to block a statute's enactment, even a statute supported by powerful political constituencies.[227] That is why, for instance, even a highly controversial law such as the federal Superfund law,[228] which has been widely criticized by business and political leaders for its harsh liability scheme, has largely escaped significant amendment since its passage in 1980.[229] Similarly, efforts to lift restrictions on oil exploration in the Arctic National Wildlife Refuge foundered in Congress even when the political party controlling both chambers of Congress and the White House had made ending that ban a priority.[230] There is a strong tendency in our existing legislative lawmaking framework against destabilization of existing laws, including laws that may have been highly controversial when originally enacted.[231]

Some have speculated that Congress could do even more and could formally prevent amendment of an existing law by a future Congress.[232] Based on that view of the entrenchment power of a legislature, Congress could constitutionally provide that an existing law

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227 Rui J. P. de Figueiredo, Jr., *Electoral Competition, Political Uncertainty, and Policy Insulation*, 96 AM. POL. SCI. REV. 321, 322 (2002) ("Because of the multiplicity of veto points in the legislative process under a separation of powers system, new laws are extremely difficult to pass, for a minority can block new legislation.").

228 "Superfund" is the popular name for the federal Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601–9675 (2006).

229 *See* LAZARUS, *supra* note 2, at 150.

230 *See* Felicity Barringer & Carl Hulse, *Arctic Drilling Opponents Cheer Nip-and-Tuck Vote*, N.Y. TIMES, Dec. 22, 2005, at A30.

231 *Cf.* William N. Eskridge, Jr. & John Ferejohn, *Super-Statutes*, 50 DUKE L.J. 1215, 1216 (2001) (describing how super-statutes "'stick' in the public culture").

232 *See, e.g.*, Posner & Vermeule, *supra* note 221, at 1666, 1673–85 (suggesting that it is not only constitutional but also normatively attractive to allow legislatures to bind their successors).

could not be amended and, accordingly, render that law absolutely binding on future Congresses, which would be powerless to change the law. Whatever the merit of that theory of legislative entrenchment authority, which is at least subject to serious constitutional challenge,[233] any such proposal for formal entrenchment would plainly be a poor idea for federal climate change legislation for two reasons.

The first reason is entirely practical. Any effort to include such an extraordinarily far-reaching assertion of congressional authority in federal climate legislation would by itself be so controversial as to likely doom the initial legislative effort. Any restraints on future lawmaking proposed for inclusion in federal climate legislation will no doubt themselves be subject to considerable debate, and their legitimacy should not become the lightening rod of controversy that itself perversely prevents the legislation's initial passage or significantly weakens its ability to achieve its substantive goals.[234] Indeed, one of the primary political advantages of modifications of lawmaking processes is supposed to be their susceptibility to flying under the radar of close scrutiny.[235]

The second reason is that absolute entrenchment of federal climate change law would be poor public policy even if within constitutional bounds. The temporal reach of federal climate change legislation is too great and there is far too much surrounding uncertainty regarding the best way to approach the problem to warrant such a drastic legislative step. Those supporting certain dramatic steps to address climate change may prove to be the Sirens that Ulysses must resist.[236] It is sometimes harder than one realizes to know for sure

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233 *See, e.g.*, John O. McGinnis & Michael B. Rappaport, *Symmetric Entrenchment: A Constitutional and Normative Theory*, 89 VA. L. REV. 385, 390–415 (2003); John C. Roberts & Erwin Chemerinsky, *Entrenchment of Ordinary Legislation: A Reply to Professors Posner and Vermeule*, 91 CAL. L. REV. 1773, 1782–95 (2003) (addressing the constitutional issues that legislative entrenchment raises).

234 *See* B. Dan Wood & John Bohte, *Political Transaction Costs and the Politics of Administrative Design*, 66 J. POL. 176, 179 (2004) ("Building a winning coalition often depends on making compromises that place onerous restrictions on bureaucracies or result in weak administrative designs.").

235 It is sometimes easier politically to make laws that change lawmaking structures and processes rather than directly change substantive law, even though the former results in the latter. Substantive policy proposals are more transparent and, as a result, can be more quickly buried in debates among competing special interests; matters of institutional design can sometimes mask policy differences and cut across otherwise divergent interests. *See* Neal Kumar Katyal, *Internal Separation of Powers: Checking Today's Most Dangerous Branch from Within*, 115 YALE L.J. 2314, 2323 (2006) (arguing that broad design choices are sometimes easier to attain by fiat or legislative inertia than by specific policies because policy proposals may get mired in special interest competitions).

236 *See* Jeremy Waldron, *Banking Constitutional Rights: Who Controls Withdrawals?*, 52 ARK. L. REV. 533, 547 (1999) ("What one man calls 'greed,' another will call 'entitlement.' . . . And what one faction calls 'rage' or 'panic,' another will call 'righteous anger' or 'prudence.'").

who the Sirens are,[237] or if Peter is sober rather than drunk.[238] Certainly environmental law has not been immune from moments when moral outrage rather than cool analysis has dominated lawmaking efforts.[239] Congress therefore plainly needs to retain authority to amend any legislation, like federal climate change legislation, that purports to achieve its objectives over hundreds of years.[240]

There are, however, ways that one could deliberately make more difficult the subsequent passage of legislative amendments designed to undermine the law's ability to achieve its objectives, while still allowing for the possibility that a whole new policy approach might be necessary. This flexibility could be accomplished by making the political cost of such amendments high enough to ensure that they could be enacted only with widespread and fairly overwhelming political support and therefore beyond the easy reach of powerful political forces driven by only short-term interests.

One potentially powerful technique would be to couple domestic climate change legislation with the United States' agreement to international treaty obligations by making clear that the former was intended to comply with obligations under the latter. These could be obligations related to the kind of multilateral agreements that will be negotiated in Copenhagen in 2009.[241] Or, more easily, such obligations could even be tied to multilateral agreements with a smaller subset of nations. In either event, such international treaty obligations, although subject to abrogation, would significantly raise the political cost of any retreat from domestic legislation designed to fulfill those international obligations. As a result, both Congress and the Executive Branch would be especially cautious about any appearance of a retreat and oversight of domestic implementation of climate change legislation would, as a practical matter, extend to governments overseas.

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237 *See* Louis Michael Seidman, *Ambivalence and Accountability*, 61 S. CAL. L. REV. 1571, 1591 n.64 (1988) (suggesting that an individual's will or desire is often context-dependent).

238 JED RUBENFELD, FREEDOM AND TIME: A THEORY OF CONSTITUTIONAL SELF-GOVERNMENT 130 (2001) (describing how "Peter sober" legislating for "Peter drunk" may turn out to be "Peter drunk" legislating for "Peter sober"); *see also supra* note 152 and accompanying text.

239 Christopher H. Schroeder, *Cool Analysis Versus Moral Outrage in the Development of Federal Environmental Criminal Law*, 35 WM. & MARY L. REV. 251, 253–57 (1993) (presenting "cool analysis" and "moral outrage" as two competing approaches to environmental policy).

240 *Cf.* Sunstein, *supra* note 102, at 858–59, 866 (contrasting precommitment value with option value of keeping future options open to change directions in light of better information).

241 *See* Michael von Bülow, *The Countdown to Copenhagen*, UNITED NATIONS CLIMATE CHANGE CONFERENCE, Jan. 23, 2009, http://en.cop15.dk/news/view–ews?newsid=578.

Another possibility would be to design federal climate legislation in a manner that would create a powerful political constituency with a strong economic incentive favoring the legislation's preservation. For instance, one reason for the failure of regulatory reform efforts launched during the 104th Congress to cut back on air, water, and hazardous waste control laws was that, by that time, much of the economy had already been effectively "greened" in response to those laws.[242] New businesses had emerged and economic values, including property values, had formed in reliance on the environmental protections promised by those laws.[243] As a result, there were powerful business interests and other constituencies that found value in the tough pollution control requirements and strongly resisted their undoing.[244]

Federal climate change legislation could include provisions deliberately designed to create such constituencies. Such provisions should not be difficult to create. The tradable emissions program is expected to generate billions of dollars in revenue from the sale of emissions rights.[245] Those revenues will in turn be allocated to address climate change concerns, ranging from efforts to develop more efficient technologies capable of reducing greenhouse gas emissions to assistance to persons and places likely to suffer from both the climate change no longer avoidable and dislocations caused by a shift to an economy that produces lower emissions.[246] Recipients of those funds will have a strong incentive to resist legislative amendments that threaten the continued availability of such financial support.

A more finely tuned design feature to resist future amendments proposed by narrow interest groups to relax the law's requirements would be to include language in the original bill that directly impeded the passage of such amendments or at least limited their effectiveness once passed. Requiring that amendments to relax emissions reduction requirements be passed by supermajorities would no doubt be

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242 *See* LAZARUS, *supra* note 2, at 161.

243 *See id.* (noting "by the mid 1990s, [environmental protection laws had] been in place for virtually a generation" and that "[p]owerful economic interests had, during that time, invested millions if not billions of dollars in compliance with those laws").

244 *Id.* at 161–62 (arguing that many large companies who had "internalized environmental law" by the late 1990s "no longer so naturally welcomed the destabilization and legal uncertainty that would likely result from widespread reinvention and reformation efforts" and noting that by 2000, the market for the pollution control industry in the United States was more than $200 billion and accounted for more than 1.4 million jobs).

245 *See* Peter Crampton & Suzi Kerr, *Tradeable Carbon Permit Auctions: How and Why to Auction Not Grandfather*, 30 ENERGY POL'Y 333, 334 (2002) (discussing the revenue-generating possibilities of a tradable emissions permit auction and contending that such a system could raise $125 billion per year).

246 *See, e.g.*, Lieberman-Warner Climate Security Act of 2008, S. 3036, 110th Cong. tits. V, VI, IX; H.R.__, 110th Cong., tits. I (§§ 724–29), VI (Discussion Draft, as reported by H. Comm. on Energy & Commerce, Oct. 7, 2008) [hereinafter Dingell-Boucher Discussion Draft].

too controversial, even if the provision avoided the most serious constitutional issue by also making clear that a future Congress could lift that requirement based on a majority vote. But there are other possibilities, analytically similar though likely less controversial. For instance, the original legislation could provide that future efforts to relax emissions reduction requirements would be legal only if accompanied at the time of congressional consideration by a congressionally delegated entity's formal analysis of the impact of the proposed relaxation on the law's ability to achieve its goals. Such a procedural hurdle, in the form of a consideration and information disclosure requirement, would undoubtedly make it harder to enact an amendment. And the most serious constitutional objections to such a requirement could be addressed by making clear in the initial legislation that a future Congress would retain authority by majority vote to lift that procedural requirement completely or as applied to a particular amendment.[247]

A lesser, but also potentially effective, limitation would be for the original legislation to declare a canon of construction for the statute's interpretation. For instance, the law could provide that any future amendments designed to relax the law's requirements for particular activities would be presumed to last no more than a statutorily specified number of years, unless the amendment expressly provided otherwise. Such a canon could, as a practical matter, limit the impact of future efforts to undermine the law's ability to achieve its objectives. Here too, the provision could avoid the most serious potential constitutional objections by making clear that a future Congress could, of course, eliminate the canon by a simple majority vote in the same manner as any other law. As described above, however, what is theoretically possible to accomplish legislatively is much harder, as a practical matter, to do.

A different tack would be to limit more directly the lawmaking avenue most susceptible to being used by powerful, narrowly focused interests seeking to gain short term economic advantage: the appropriations process. To the great detriment of environmental law, it is the appropriations process that has most lent itself to such efforts by riddling environmental law with appropriations riders and earmarks.[248] One possible anticipatory response would be to include the above procedural hurdles or canons of statutory construction but target them directly to laws enacted exclusively through the appropriations process. The justification would be the shared understanding that the appropriations process does not lend itself to the careful de-

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247 For a discussion of potential constitutional objections relating to "entrenchment" of legislation, see *supra* notes 232–43 and accompanying text.

248 *See supra* note 96 and accompanying text.

liberations generally warranted for major changes in substantive law.[249]

A far bolder move, however, would be to insulate parts of the greenhouse gas emissions reduction and climate change adaptation programs from the appropriations process altogether. What Congress did with the Federal Reserve Board provides the legislative precedent. Congress allowed the Federal Reserve Board to retain revenue it generated in its operations in order to shield the Board from the politics of the congressional appropriations process.[250] The same could be done in the context of climate change. Implementation of federal climate change legislation will, assuming a tradable emissions program, generate billions of dollars in revenue.[251] Some of that revenue could be used to insulate the especially vulnerable aspects of the greenhouse gas regulation program from the appropriations process and therefore the short-term economic interests that tend to dominate that particular lawmaking avenue.

B. Executive Branch Lawmaking

There are many ways to design climate change legislation in anticipation of problems that may arise in the Executive Branch's administration of the law. Some measures could be designed to insulate agency officials to some extent from political pressures, especially those pressures likely to derive from short-term economic concerns, which undermine the law's effectiveness.[252] Other measures could be crafted to enhance the influence of interest groups that are concerned about protecting future generations but which otherwise lack the necessary economic or political clout. Some of the possibilities worthy of consideration are catalogued and described below.

1. *Insulating (Somewhat) Agency Officials from Politics*

A variety of measures could be used to try to insulate agency officials from the short-term political pressures that could undermine a climate change statute's effective, fair, and impartial administration. None purports to achieve complete insulation, nor should they. Polit-

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249 *See* Lazarus, *supra* note 4, at 632–33 (arguing that because of a rise of appropriations legislation in the environmental context, "Congress has displayed no ability to engage in the deliberate policymaking essential to thoughtful resolution of the difficult economic, social, and moral issues raised by environmental lawmaking").

250 *See supra* note 218 and accompanying text.

251 *See* Crampton & Kerr, *supra* note 245, at 334 ("[A]n efficient auction could raise $125 billion annually."); Robert N. Stavins, *A Meaningful U.S. Cap-and-Trade System to Address Climate Change*, 32 HARV. ENVTL L. REV. 293, 317 n.94 (2008) (citing U.S. Energy Information Administration data for the proposition that an economy-wide emissions permit auction could generate annual revenue in excess of $100 billion).

252 *See* BREYER, *supra* note 107, at 62–63 (discussing the advantages of insulation of agencies in terms of "rules, practices, and procedures").

ical influence is neither all bad nor all inappropriate. Quite often, some political accountability is necessary for a law's legitimacy, especially if, as would no doubt be true for climate change law, all discretionary decisions are not susceptible to being answered by objective factual inquiry divorced from broader policy considerations.[253] The purpose of such insulating measures is to temper, not eliminate, the influence of politics on statutory implementation.[254]

For instance, federal climate change legislation could define in some detail the qualifications and tenures of specific agency officials charged with particularly important and sensitive statutory responsibilities. There is no reason for Congress to delegate complete discretion on such potentially important matters to the President, cabinet secretary, agency head, or other agency officials. Several possibilities are described below.

a. *Staggered terms of agency official appointment* that cut across presidential administrations and thereby promote political autonomy represent a classic legislative technique for reducing political influence. The staggered term alone sends a strong message both to the President and the Senate, which is responsible for the confirmation process, that the person to be chosen is not a standard political appointee for whose appointment the President is owed heightened political deference.[255] The individual's qualifications are instead intended to transcend political loyalty to the current presidential administration and reflect an expertise grounded more directly in the statutory responsibilities and fiduciary responsibilities of the agency position under consideration.[256]

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253 *See id.* at 77 ("[S]ince many risk-related choices are, and must remain, inherently political, to insulate totally the group's major policy decisions from those of politically responsible officials is neither desirable nor possible.").

254 *See id.* at 77–78.

255 *See* Wood & Bohte, *supra* note 234, at 185–86 (noting the effect of staggered terms, as well as other devices, on agency autonomy versus "political responsiveness").

256 There is already plenty of precedent for such an approach to appointment of agency officials. The Federal Reserve Board is an obvious example. *See supra* note 218 and accompanying text. Under the Federal Reserve Act, the President, with the advice and consent of the Senate, appoints members of the Board generally to fourteen-year terms, which extend far beyond the term of any President, even assuming reelection to a second term. 12 U.S.C. § 241 (2006). From those on the Board, the President can pick a Chairman and Vice Chairman who, again upon Senate confirmation, serve for four-year terms, which may well cross presidential administrations. *Id.* § 242. The Director of the Federal Bureau of Investigation is another example. By statute, the President appoints the Director to a ten-year term, subject to Senate confirmation. *See* 28 U.S.C. § 532 (2006) (commenting in a historical note that the Director's term shall be ten years). Many other examples exist. The commissioners of the Securities and Exchange Commission, Federal Communications Commission, and Federal Election Commission each have terms fixed by statutes. FEC commissioners serve for single six-year terms that are deliberately staggered by three two-year intervals. *See* 2 U.S.C. § 437c(a)(2)(A) (2006). SEC commissioners serve

b. *Length of the agency official appointment* is an important related design feature for promoting agency autonomy. The longer the appointment, the more a government official will potentially feel insulated from political pressures surrounding the implementation of the law for which she is responsible.[257] It takes no great imagination to appreciate that someone with a two-year term will feel more accountable to political pressures than someone with a fourteen-year appointment, as in the case of the Federal Reserve Board. That is precisely why members of Congress are elected every two years—so that they will feel constant accountability—and members of the Federal Reserve Board generally have fourteen-year terms—so that they will not. For the purposes of implementing climate change law, in particular, longer agency-official terms are quite important because they are more in keeping with the longer-term agenda of climate change.[258] A longer term of appointment also sends a strong message to Congress that this is not a standard political appointment, but rather one that warrants a more searching inquiry into a nominee's background and expertise for such a position.[259]

c. *Grounds for agency official removal* are another potentially effective design feature. For instance, the President can remove members of the Federal Reserve Board from their position only "for cause."[260] This sharply limits the President's authority and leverage over the agency decisionmaker. Even absent a formal statutory declaration that removal is available only for cause, just providing a lengthy term of appointment persuades some courts to infer a "for cause" requirement,[261] and may, as a practical matter, render the political cost of

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for five-year terms. 15 U.S.C. § 78d (2006). FCC Commissioners also have five-year terms. 47 U.S.C. § 154(c) (2006).

257 *See* Wood & Bohte, *supra* note 234, at 186 (noting the potential effect of term length on the level of agency autonomy).

258 *See* Amihai Glazer & Vesa Kanniainen, *Short-Term Leaders Should Make Long-Term Appointments*, 14 INT'L TAX PUB. FIN. 55, 56–57 (2007) (discussing the importance of long-term appointments in general).

259 *Id.* at 55–57.

260 12 U.S.C. § 242.

261 For the FEC, FCC, and SEC, however, none of three federal governing statutes expressly provide the grounds, if any, for presidential removal of a commissioner. *See, e.g.*, 2 U.S.C. § 437c; 15 U.S.C. § 78d; 47 U.S.C. § 154(c). The courts, however, have generally accepted the notion that even if a federal statute is silent on the grounds for presidential removal of an agency official, the statute may be read, in light of the purpose and structure of the commission, to allow for removal only for cause. *See* Wiener v. United States, 357 U.S. 349, 354–55 (1958) (holding that tenure protection may be inferred from statutory silence in the context of the War Claims Commission); FEC v. NRA Political Victory Fund, 6 F.3d 821, 826 (D.C. Cir. 1993) (concluding that the FEC was "likely correct" that "the President can remove the commissioners only for good cause, which limitation is implied by the Commission's structure and mission as well as the commissioners' terms"); SEC v. Blinder, Robinson & Co., 855 F.2d 677, 681 (10th Cir. 1988) ("[F]or the purposes of this case, we accept . . . that it is commonly understood that the President may remove a commissioner [of the SEC] only for 'inefficiency, neglect of duty or malfeasance in office.'");

removing an official too high.[262] Because political pressure on agency officials implementing climate change law is especially great, there might even be reason to limit their removal by procedural mechanisms beyond the substantive requirement of "for cause." There is no judicially established constitutional requirement that an agency official be subject to the President's plenary power to remove.[263] Accordingly, there are myriad ways that this design feature could be crafted to narrow the grounds for removal while maintaining the safety valve that allows for removal in case of an extreme circumstance of dereliction of duty or judgment.[264]

d. *Agency official qualifications and disqualifications* could also be statutorily prescribed. Such express qualifications and disqualifications help to ensure that the best-qualified individual receives an appointment. The qualifications (and disqualifications) serve to limit significantly those who can be brought to the President's attention as possible nominees, empower the Senate to take more seriously its role in confirmation, and provide Senators with a touchstone for evaluating credentials. There is plenty of analogous congressional precedent, ranging from requirements that the Solicitor General of the United States be "learned in the law"[265] to requirements that the Di-

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see also Lebron v. Nat'l R.R. Passenger Corp., 513 U.S. 374, 398 (1995) (suggesting by direct negative comparison that "commissioners of independent regulatory agencies" are "removable by the President for cause," although incorrectly suggesting that such removal for cause is set forth "by the explicit terms of the statute" for the SEC and FCC).

262 For example, federal law nowhere provides that the President must find cause to remove the FBI Director, and the President is legally free to remove the FBI Director at any time. The mere fact, however, that the federal statute creates a presumptive ten-year term serves as a significant political constraint on the President's doing so. As one member of Congress explained at the time the ten-year tenure rule was adopted, "the setting of a 10-year term of office by Congress would, as a practical matter, preclude—or at least inhibit—a President from arbitrarily dismissing an FBI Director for political reasons, since a successor would have to be confirmed by the Senate." 122 CONG. REC. 23,809 (1976) (statement of Sen. Byrd). President Bill Clinton's ongoing dispute with FBI Director Louis Freeh, who openly criticized the President and pointedly did not resign from office until after President Bush assumed office, illustrates the political limits on the president's authority to control the Director's position. *See, e.g.*, *The Federal Bureau of Independence*, N.Y. TIMES, Dec. 18, 1997, at A26; *Mr. Freeh Retires*, N.Y. TIMES, May 4, 2001, at A24.

263 *See* Humphrey's Executor v. United States, 295 U.S. 602, 626–27 (1935) ("[T]o hold that . . . the members of the commission continue in office at the mere will of the President, might be to thwart, in large measure, the very ends which Congress sought to realize by definitely fixing the term of office.").

264 A statute might, for instance, describe the removal grounds in some detail to make it clear that the grounds are not entirely open-ended. One could also go further and create a procedure for considering a claim that grounds for removal were present and provide for a board to review the merits of that claim. The board members themselves could represent a cross-section of relevant perspectives, including those more likely to be sensitive to longer term concerns. A simple majority might not even be enough to sustain the claim that removal is warranted.

265 Act of June 22, 1870, ch. 150, § 2, 16 Stat. 162 ("[T]here shall be in said Department an officer learned in the law, to assist the Attorney-General in the performance of his

rector of the Park Service have "substantial experience and demonstrated competence in land management and natural or cultural resource conservation."[266] Congress could well be within its bounds in prescribing relevant professional background and expertise for agency officials with significant responsibility for implementing climate change law. Congress could also, as it has often done elsewhere, proscribe qualifications and disqualifications intended to promote bipartisanship[267] or to avoid financial conflicts of interest that could skew agency decision making.[268]

2. *Structuring the Implementation Process to Diminish the Influence of Short-Term Interests Likely to Be Unduly Influential and to Promote Consideration of Longer-Term Interests Otherwise Unlikely to Receive Their Due Weight*

A second category of institutional design features pertains to techniques for ensuring that certain kinds of factors are given due consideration and that others are not given undue weight during the Executive Branch's implementation of climate change legislation. These techniques can be used to promote accountability, deliberativeness, impartiality, and transparency in general.[269] Alternatively, they can be shaped to ensure that specific factors that are anticipated to be

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duties, to be called the solicitor general . . . ."). Of historical interest, before Congress added the position of Solicitor General, the Attorney General was required to be "learned in the law." Judiciary Act of 1789, ch. 20, § 35, 1 Stat. 73, 92–93 ("And there shall . . . be appointed a meet person, learned in the law, to act as attorney-general for the United States . . . .").

266 16 U.S.C. § 1 (2006). Members of the FEC are to be selected based upon "their experience, integrity, impartiality, and good judgment." 2 U.S.C. § 437c(a)(3) (2006). The entire institutional design of the Foreign Service within the State Department is intended to promote the establishment of a bureaucracy of elite federal employees proud of their substantive expertise, autonomy, and independent judgment in service of the long-term interests of the nation in foreign affairs. *See* Katyal, *supra* note 235, at 2328–31.

267 For instance, members of the FCC, FEC, and SEC must represent different political parties. No more than three of the five members of the SEC "shall be members of the same political party and in making appointments members of different political parties shall be appointed alternately as nearly as may be practicable." 15 U.S.C. § 78d(a) (2006). The FEC similarly includes a three-out-of-six member ceiling for the same political party and also expressly provides for staggered terms for pairs of appointees from two different political parties. 2 U.S.C. §§ 437c(a)(1)–(2). The applicable provision for the FCC provides only that "[t]he maximum number of commissioners who may be members of the same political party shall be a number equal to the least number of commissioners which constitutes a majority of the full membership of the Commission." 47 U.S.C. § 154(b)(5) (2006).

268 Federal law lists a series of such disqualifications based on financial interests for FCC Commissioners, 47 U.S.C. § 154(b)(2), a general prohibition for SEC Commissioners, 15 U.S.C. § 78d(a), and an extensive prohibition on any employment by the executive, legislative, or judicial branches of the federal government for the FEC, 2 U.S.C. § 437c(a)(3).

269 *See* VERMEULE, *supra* note 223, at 4–5 (proposing mechanisms that advance these core values of democratic constitutionalism).

undervalued instead receive their due. Several possibilities are described below.

a. *Interagency consultation requirements* are one standard mechanism for Congress to promote a fuller consideration of relevant factors and therefore reduce the prospects of a narrow, short-term interest hijacking a law's implementation.[270] If, for instance, there is reason for concern that the agency may fail to provide adequate weight to the requirements of a particular federal statute to which it is subject, it has become fairly routine to require that agency to consult formally with another agency that shares the same primary mission of the federal statute.[271] That formal consultation not only provides the action agency with relevant information that may prompt the agency to reach a different decision, but it also places the consultant agency's views in the administrative record.[272] As a result, should the agency taking action ignore the consultant agency's counsel or refuse to engage in the consultation altogether, it may very quickly find itself vulnerable to a successful lawsuit brought by those disappointed by the agency's decision.[273]

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270 Interagency consultation requirements are a regular feature of environmental statutes. For instance, the Endangered Species Act (ESA) requires that federal agencies subject to section 7 of the Act consult with the Secretary of the Interior (for terrestrial wildlife or plants) or the Secretary of Commerce (for marine life) if they believe that an endangered or threatened species may be adversely affected by a contemplated agency action. *See* 16 U.S.C. § 1536(a)(1) (2006). The consultation results in a formal biological opinion by the Fish and Wildlife Service (for the Secretary of the Interior) or National Marine Fisheries Service (for the Secretary of Commerce). *See id.* § 1536(b)(3)–(4). The biological opinion considers the potential for such an adverse effect to occur and whether reasonable alternatives exist for its avoidance. *See id.* Another example of an existing, effective interagency consultation requirement is section 309 of the Clean Air Act, which requires federal agencies preparing environmental impact statements pursuant to the National Environmental Policy Act to provide the EPA with an opportunity to review their draft impact statements. 42 U.S.C. § 7609 (2006) ("The Administrator shall review and comment in writing on the environmental impact of any matter relating to duties and responsibilities granted pursuant to this chapter or other provisions of the authority of the Administrator . . . ."). The Council on Environmental Quality regulations similarly require consultation with offices in other agencies of the federal government with relevant expertise. 40 C.F.R. § 1502.19(a) (2008) (requiring agencies to circulate the entire draft to "[a]ny Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved").

271 *See* J. R. DeShazo & Jody Freeman, *Public Agencies as Lobbyists*, 105 COLUM. L. REV. 2217, 2261–63, 2288–92, 2295–2300 (2005) (describing the impact on agency decisions of congressionally mandated interagency consultation, including potential enhanced consideration of environmental concerns).

272 *See id.*

273 *See, e.g.*, Am. Bird Conservancy, Inc. v. FCC, 516 F.3d 1027, 1031 (D.C. Cir. 2008) (striking down the FCC categorical exclusion of communication towers from National Environmental Policy Act analysis for failing to provide for required consultation with the Fish and Wildlife Service); Sierra Club v. U.S. Army Corps of Eng'rs, 701 F.2d 1011, 1019–24 (2d Cir. 1983) (relying on negative comments in the administrative record supplied by the EPA, National Marine Fisheries Service, and Fish and Wildlife Service regard-

Such an interagency consultation requirement might well be appropriate for climate change legislation given the wide-ranging implications of climate change rules and therefore the number of other agency offices with potentially relevant expertise. It could also be deliberately enlisted to make it difficult for any one agency to create exceptions or otherwise modify climate law's requirements. For instance, the statute could provide a strict process for any relaxation of legal requirements. In short, the purpose of this statutorily created body would, in some respects, be the opposite of the purpose of the body created by Congress in the Endangered Species Act—referred to as the "God Squad"—which was to allow the lifting of restrictions necessary to prevent a species from extinction.[274] The interagency conclusion process in climate change legislation could, by contrast, be aimed at making it harder to create an exemption, rather than easier.[275]

b. *Creation of a new expert governmental entity* would be an even more direct way for Congress to ensure that certain interests are given due weight during agency implementation of climate change legislation. This office would provide an authoritative voice guided by career government experts who were more insulated from political pressures.[276] Such an office would have either the right to consult and comment on proposals or affirmative authority to oversee the statute's implementation. For climate change, Congress could take the bold step of creating an office with the formal responsibility of safe-

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ing the U.S. Army Corps of Engineers' proposal to grant a wetlands development permit associated with construction of a major highway).

274 *See* 16 U.S.C. § 1536(e), (g), (h) (describing the broad powers given to the Endangered Species Committee to exempt certain federal agency activities from Endangered Species Act restrictions on federal agency activities that jeopardize the continued existence of endangered or threatened species); John Copeland Nagle, *Playing Noah*, 82 MINN. L. REV. 1171, 1172 (1998) (describing the operation of the Endangered Species Committee and its frequent characterization as the "God Squad").

275 The Clean Water Act actually contains a limited absolute bar on relaxing certain requirements of discharge permits. *See* 33 U.S.C. § 1342(o) (2006) (supplying an antibacksliding provision).

276 *See* BREYER, *supra* note 107, at 70–71 (describing the insulation of the French Conseil d'Etat). To some extent, this proposal resembles what EPA Administrator William Reilly did at the close of his tenure. He created the EPA Administrative Appeals Court, which hears and decides appeals of challenges to rulings by EPA administrative law judges. Such rulings had previously been subject to appeal to the EPA Administrator, where the risk was much greater that politics would influence the outcome in fact or in appearance. Decisions of the Appeals Court are not subject to Administrator review unless the Appeals Court seeks such review. Instead they are subject to review only by the federal judiciary. *See* 40 C.F.R. § 1.25(e) (2008). Administrator Reilly adopted this reform for the purpose of "inspiring confidence in the fairness of Agency adjudications." Changes to Regulations to Reflect the Role of the New Environmental Appeals Board in Agency Adjudications, 57 Fed. Reg. 5320 (Feb. 13, 1992).

guarding the interests of future generations.[277] That office could be provided with a range of authorities and responsibilities, from mere reporting authority and formal consultation rights to actual veto authority over certain kinds of decisions. No obvious domestic analogue currently exists,[278] although the Council on Environmental Quality within the Executive Office of the President is certainly expected to provide a voice within that Office for environmental concerns in general. There have, however, been past proposals to establish such an office in the United States,[279] and at least a few other nations have done so.[280]

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277 This idea finds an interesting parallel in previous suggestions of other commentators that human cognitive limits, in particular the "availability heuristic," might warrant a lawmaking design feature to guard against the human tendency to exaggerate and overreact to certain perceived threats. *See* Rachlinski & Farina, *supra* note 67, at 556. The recommendation was to counter this tendency by requiring federal agencies to use peer scientific review or to consult a website providing neutral information concerning risk. Another recommendation was to increase the power of the Office of Management and Budget's Office of Information and Regulatory Affairs to review a federal agency's decision based on the former's own risk assessment. *See* Kuran & Sunstein, *supra* note 77, at 754–58; *see also* BREYER, *supra* note 107, at 60 (proposing "creation of a small, centralized administrative group, charged with a rationalizing mission"). My proposal is similar in that it looks to institutional design but is very differently derived and directed. My concern in the context of climate change finds its origins in the potential for an "unavailability heuristic" and the corresponding need to guard against underregulation rather than overregulation.

278 An extremely rough analogue in existing domestic law might be the Office of Inspector General, which currently exists within most Executive Branch agencies. Congress created the Inspectors General to serve as watchdogs to guard against anticipated abuse or neglect of statutory agency duties and authorities. *See* Inspector General Act of 1978, Pub. L. No. 95-452, 92 Stat. 1101 (establishing the Office of Inspector General and listing its purpose and duties). *See generally* PAUL C. LIGHT, MONITORING GOVERNMENT: INSPECTORS GENERAL AND THE SEARCH FOR ACCOUNTABILITY (1993) (discussing the influence of Inspectors General on government). Each Inspector General is deliberately insulated from the politics of the Administration and has control over his or her own professional staff. *See* Katyal, *supra* note 235, at 2347. An Inspector General report can be highly influential because it can expose wrongdoing within an agency that the agency cannot easily ignore. *See, e.g.*, David Johnston & Eric Lipton, *Gonzalez Met with Advisors on Dismissals: Record Seems at Odds with Past Comments*, N.Y. TIMES, Mar. 24, 2007, at A1 (discussing investigation into Attorney General Alberto Gonzalez carried out by Inspector General); Philip Shenon, *Inspection Notes Errors in Terror List*, N.Y. TIMES, Sept. 7, 2007, at A24 (discussing errors found by an Inspector General in a Justice Department terrorist watch list and the resulting outcry); David Stout, *F.B.I. Head Admits Mistakes in Use of Security Act: Data Wrongly Obtained; Report Details Improper Demands for Records—Bipartisan Anger*, N.Y. TIMES, Mar. 10, 2007, at A1 (reporting the FBI Director's acknowledgment of improper use of the Patriot Act following an Inspector General's report).

279 *See* EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY 124–26 (1989).

280 *See id.* In Germany, there is an advocate within the government whose focus is on long-term policies and protection of the interests of future generations. *See* Günter Krings, Member of the Bundestag, Address at European Sustainability Berlin: Linking Policies and Implementation: Making SD Strategies a Case for Parliamentary Activities (June 3–5, 2007), *available at* http://www.eeac-net.org/workgroups/pdf/ESB07/ESB07_Dinner_speech_Krings_07-06-03.pdf. In Sweden, there is an "Institute of Future Studies," which is responsible for producing reports that focus on the future to ensure its general considera-

c. *Provisions for consideration of more neutral, objective scientific expertise* during statutory implementation can also provide a means for Congress to guide a statute's future implementation within the Executive Branch. Expert scientific consultation can both diminish the influence of politically powerful short-term economic interests and promote consideration of longer-term consequences if supported by scientific evidence. There are a wide variety of techniques that Congress could use, and has used in prior laws,[281] to provide for consideration of such expert scientific advice in federal climate legislation. Congress could provide merely for the production of a report unattached to any particular agency rulemaking, or a narrowly focused review by an expert group of scientists of a specific agency decision. The scope of such a report or review could range from an entire set of rules to a specific environmental protection requirement. The agency itself (or a separate office within the agency) could employ the scientists or the scientists could be formally outside the agency's employment in order to promote independent scientific judgment.

The Fish and Wildlife Service and the National Marine Fisheries Service are examples of agency-employed scientific expertise. Examples of non-agency-employed expert scientists whom Congress has charged to provide an agency with formal advice include the Clean Air Science Advisory Committee, created by Congress to provide the EPA with advice in the implementation of the Clean Air Act,[282] and

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tion in governmental lawmaking. *See* Sandrine Paillard, *Futures Studies and Public Decision Making in Sweden*, 8 FORESIGHT 56, 57–58 (2006). The Israeli Knesset includes a Commission on Future Generations. *See* KNESSET, COMMISSION FOR FUTURE GENERATIONS, http://www.knesset.gov.il/sponsorship/future/eng/future_index.htm (last visited Apr. 14, 2009). And in Hungary, there is a Parliamentary Commissioner for Future Generations. *See* PARLIAMENTARY COMMISSIONER FOR FUTURE GENERATIONS: ABOUT THE OFFICE, http://www.jno.hu/en/col1=&menu=about (last visited Mar. 18, 2009). Some writers have also recently suggested the possibility of electing to the legislature formal representatives of future generations, with varying suggestions concerning the qualifications of candidates for election and whether they should be allowed two votes rather than the normal single vote. *See* Andrew Dobson, *Representative Democracy and the Environment*, *in* DEMOCRACY AND THE ENVIRONMENT 124, 124–39 (William M. Lafferty & James Meadowcroft eds., 1996) (advocating two votes for future generation representatives); Kristian Skagen Ekeli, *Giving a Voice to Posterity: Deliberative Democracy and Representation of Future People*, 18 J. AGRIC. & ENVTL. ETHICS 429–50 (2005) (advocating that voters elect both regular representatives and future generation representatives); Tine Stein, *Does the Constitutional and Democratic System Work? The Ecological Crisis as a Challenge to the Political Order of Constitutional Democracy*, 4 CONSTELLATIONS 420–49 (1998) (describing an "ecological council" elected by the legislature, with longer terms than regular legislators and with power to delay legislation).

281 *See generally* SHEILA JASANOFF, THE FIFTH BRANCH: SCIENCE ADVISERS AS POLICYMAKERS (1990) (describing widespread use of science advisors in federal agency lawmaking).

282 Under the Clean Air Act, the EPA Administrator is instructed to appoint "an independent scientific review committee" to review the science and make recommendations concerning the establishment of national ambient quality standards. 42 U.S.C. § 7409(d)(2)(A) (2006). The statute describes some of the membership qualifications, including at least one physician and a member from the National Academy of Sciences. *Id.*

the "committee of scientists" created by Congress in the National Forest Management Act to provide the Forest Service with advice for developing environmental principles for the management of the nation's forests.[283] The Food and Drug Administration (FDA) utilizes a dizzying array of expert federal advisory committees of scientists and medical experts in administering its regulatory authority.[284]

Agencies that ignore the advice of congressionally designated scientific experts do so at their legal and political peril.[285] But, given those stakes, safeguards are often needed to protect against the natural tendency of special interests to seek to capture the scientific review process itself. In recent years, there has been rising concern that occasions for expert scientific review have become just another forum for adversarial debates between experts funded by opposing sides of policy disputes rather than true opportunities for informed scientific discussion, deliberation, and consensus.[286] There are nonetheless ways to craft the selection of scientists that reduce that risk and create incentives to diminish the influence of biased, advocacy science.[287] The commendable success of the IPCC over decades in providing the world with careful, deliberative assessments of the state of climate science is a wonderful example.[288] There also exist within the United

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The statute requires the committee to make formal recommendations to the Administration on several matters, including "new national ambient air quality standards and revisions of existing criteria and standards as may be appropriate." *Id.* § 7409(d)(2)(B).

283 16 U.S.C. § 1604(h)(1) (2006).

284 *See generally* INST. OF MED., FOOD AND DRUG ADMIN. ADVISORY COMMS. (Richard A. Rettig et al. eds., 1992) (listing and evaluating the external advisory committees used in administrative decision making); JASANOFF, *supra* note 281, at 152–79 (detailing the FDA's advisory network).

285 *See* Felicity Barringer, *Report Says Interior Official Overrode Work of Scientists*, N.Y. TIMES, Mar. 29, 2007, at A19 ("A top-ranking official overseeing the Fish and Wildlife Service at the Interior Department rode roughshod over agency scientists, and decisions made on her watch may not survive court challenges . . . ."); Juliet Eilperin, *EPA Tightens Pollution Standards: But Agency Ignored Advisers' Guidance*, WASH. POST, Mar. 13, 2008, at A1 ("[The administrator's] decision to set a lower but still less-restrictive limit than what the EPA's advisory committees had recommended sparked a backlash from Democratic lawmakers, public health advocates and his own independent advisers."); *see also* Holly Doremus, *Scientific and Political Integrity in Environmental Policy*, 86 TEX. L. REV. 1601, 1603–17 (2008) (describing a series of controversies involving alleged political manipulation of science in the administration of environmental laws).

286 *See* THOMAS O. MCGARITY & WENDY E. WAGNER, BENDING SCIENCE: HOW SPECIAL INTERESTS CORRUPT PUBLIC HEALTH RESEARCH 7–12 (2008) (describing the negative impact of advocacy groups on the use of scientific data in regulatory law).

287 *See id.* at 259–60, 262–69, 283–90 (making a series of institutional reform proposals designed to promote independent scientific advice to agency decision making).

288 *See supra* notes 7 and 138 and accompanying text. The IPCC itself is a terrific example of how, by institutional design, lawmakers can be provided with expertise critical to their formulation of laws. The IPCC was awarded the Nobel Peace Prize in 2007 along with former Vice President Al Gore. *See* Walter Gibbs & Sarah Lyall, *Gore Shares Peace Prize for Climate Change Work: Nobel Also Honors Panel of Scientists from the U.N.*, N.Y. TIMES, Oct. 13, 2007, at A1.

States itself reputable institutions, such as the National Academies of Sciences and more narrowly focused organizations such as the Health Effects Institute,[289] which focuses on automobile emissions, that demonstrate that it can be done.

With the necessary safeguards, federal climate change legislation should be able to offer multiple opportunities for Congress to build into the implementation process expert scientific consultation requirements that keep the statute on its long-term track and prevent its short-term derailment.[290] Such expert scientific advice can serve, moreover, as an especially important check to ensure that any future efforts to significantly redirect the statutory focus based on a newly discovered understanding of climate science or available technology find support in actual scientific advances rather than political science fiction.[291]

d. *Participatory rights for selected stakeholders* can also be expressly provided for in the lawmaking process in order to ensure that important but less politically powerful voices are heard during statutory implementation. There is much statutory precedent for such a feature. Some precedents are in the form of federal advisory committees and provide for an advisory function with varying degrees of actual influence.[292] Other bodies' formal authority exists within the statutorily prescribed lawmaking process, such as the scientific committees just described.[293] The Clean Air Act,[294] Taylor Grazing Act,[295] and the

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289 The Health Effects Institute, in Boston, Massachusetts, is jointly funded by the EPA and the automobile industry and is widely credited with providing important, objective, and impartial scientific expertise to regulators. *See* MCGARITY & WAGNER, *supra* note 286, at 262–65 (contrasting the Health Effects Institute with other scientific bodies in advisory positions); JASANOFF, *supra* note 281, at 208–26 (discussing the success of the Health Effects Institute as a model for science policy reform).

290 Although not focused on the particular challenges of climate science, Professor Holly Doremus has recently published an excellent article that proposes ways to structure agency decision making to promote greater scientific integrity in environmental policymaking. *See* Doremus, *supra* note 285, at 1640–52.

291 *See id.* at 1643–44 (advocating for neutral expert advice to enhance integrity in environmental policymaking).

292 See Federal Advisory Committee Act, 5 U.S.C. App. 1 (2006).

293 *See supra* notes 281–91 and accompanying text.

294 Under the Clean Air Act, there are "interstate transport commissions" made up of representatives of state governments and the EPA with authority to make recommendations for strategies to address interstate air pollution. 42 U.S.C. § 7506a–c (2006).

295 Under the Taylor Grazing Act, as supplemented by the Federal Land Policy and Management Act, resource advisory councils consisting of members "representative of the various major citizens' interests concerning the problems relating to land use planning or the management of the public lands" are provided certain formal advisory responsibilities. 43 U.S.C. § 1739(a) (2006). These responsibilities are also provided to "grazing advisory boards" that concern the development of allotment management plans and the distribution of rangeland-betterment funds. *Id.* § 1753.

Magnuson-Stevens Fishery Conservation and Management Act[296] all provide instances when Congress sought to provide stakeholders outside the federal government with significant authority in the implementation of a federal statute. The results, especially with the Magnuson-Stevens Act, have been mixed, resulting in encumbered lawmaking that has been inefficient and slow in making recommendations.[297]

As applied to climate change legislation, however, this kind of design feature would need to be structured completely differently and could be far more effective in promoting its objective. In these prior statutory schemes, Congress provided additional political leverage to already-powerful interests, such as the large commercial fishing interests, which no doubt helped secure the legislation's initial passage.[298] The concern for climate change legislation, however, should be just the opposite (as perhaps it should have been for the Magnuson-Stevens Act): not that long-term interests will trump short-term, but that

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296 Pursuant to the Magnuson-Stevens Act, eight regional fishery management councils play a critical role in the Act's administration. *See* 16 U.S.C. § 1852 (2006). These councils have the primary responsibility for both proposing and then initially allocating individual tradable rights in most fisheries, known as individual tradable quotas. *See id.* § 1854(c)(3). Their recommendations become law upon review and approval by the Secretary of Commerce. *Id.* § 1854(a). There are a specified number of voting and nonvoting members for each council and the statute sets forth in some detail the general qualifications. *See id.* §§ 1854(a), (b). In addition to the Regional Director of the National Marine Fisheries Service for the relevant geographic area, *id.* § 1852(b)(1)(B), the Secretary appoints to the council "individuals who, by reason of their occupational or other experience, scientific expertise, or training, are knowledgeable regarding the conservation and management, or the commercial or recreational harvest, of the fishery resources of the geographical area concerned." *Id.* § 1852(b)(2)(A). The Secretary of Commerce is further required to ensure, "to the extent practicable, . . . a fair and balanced apportionment . . . of the active participants (or their representatives) in the commercial and recreational fisheries under the jurisdiction of the Council." *Id.* § 1852(b)(2)(B).

297 The regional councils of the Magnuson-Stevens Act were designed to promote the fishing industry's acceptance of what was expected to be a controversial regulatory scheme, especially transferable fishing rights, by promising commercial interests a powerful seat at the lawmaking table. Industry would not be limited to commenting on proposed rules but rather was provided a formal role in the crafting of the substance of those rules in the first place. In practice, however, it proved very hard for the different commercial interests to forge agreements in what was often a zero-sum game of allocating fishing rights. One reason that the councils have not been even slower than they are in reaching agreement is that they are dominated by the larger, more economically powerful sectors of the fishing industry. Katrina Miriam Wyman, *From Fur to Fish: Reconsidering the Evolution of Private Property*, 80 N.Y.U. L. REV. 117, 177–81 (2005). The particular structure created by the Magnuson-Stevens Act also invites a series of potential vetoes that in practice make further lawmaking obstacles. The Secretary of Commerce retains formal power of approval, disgruntled interests can seek judicial review of approved measures, and, most significantly to date, special interest groups can prompt individual senators to block regional council recommendations by appropriations riders and other narrowly focused legislative enactments. *Id.* at 181–85. In the 1990s, a handful of senators successfully imposed a four-year moratorium on transferable quota programs approved by both the Secretary's National Marine Fisheries Service and regional councils. *Id.* at 184–88.

298 Wyman, *supra* note 297, at 184–88; *see, e.g.*, 16 U.S.C. § 1852.

long-term interests will get bargained away over time by a steady barrage of short-term pressures.

For this same reason, the kind of stakeholders that would warrant a heightened role in the lawmaking process for climate change would be those who give voice to long-term interests of future generations[299] and not representatives of industry who do not otherwise lack influence in lawmaking fora.[300] These voices could, as described above, be given a formal office within the government.[301] Or they could instead be included as nongovernmental employees on councils more like those contemplated by the Magnuson-Stevens Act,[302] albeit with a quite different policy focus.[303]

Finally, the role of such stakeholder councils in the implementation of climate change law could also be substantially modified. In the Magnuson-Stevens Act, their role is to initiate the lawmaking process by making recommendations on certain policies.[304] That is, of course, not the only possible role of a stakeholder council. A council might be alternatively designed to ensure that statutory implementation stays on track, that is, to provide the oversight necessary to make sure it is not derailed. A council could also be designed to ensure that if new scientific information surfaces indicating that even tougher measures are required, the statute's implementation would be modified accordingly.

Of course, this is similar to the kind of role that an internal (to the government) or external committee of scientists might serve. The only difference is the precise makeup of the council or committee. Given the nature of some of the decisions to be made, however, there is reason to believe that a science-driven group may lack the necessary breadth of perspective that other stakeholder leaders might supply,[305]

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299 Jacobs, *supra* note 94, at 218–19 (commenting on how organized interest groups can "represent one of the few mechanisms forcing governments to take long-run outcomes seriously").

300 *See* Noah D. Hall, *Toward a New Horizontal Federalism: Interstate Water Management in the Great Lakes Region*, 77 U. COLO. L. REV. 405, 455 (2006) (noting that representatives of industry have a sphere of influence in Congress).

301 *See supra* notes 276–80 and accompanying text.

302 16 U.S.C. §§ 1801–84.

303 Heads of philanthropic foundations, nonprofit organizations, university presidents, or former governmental leaders could, by dint of their professional outlook and past experience, be anticipated to have the essential broader, longer-term focus and perspective. These, of course, are the kind of seasoned veterans, no longer preoccupied by personal ambition, on whose judgment the nation frequently relies in times of crisis. The 9/11 Commission and the Iraq Study Group are two obvious recent examples, although their ultimate work product was limited to reports that included recommendations. *See* 9/11 COMMISSION REPORT, at xv-xviii (2004); IRAQ STUDY GROUP REPORT 6–8 (2006).

304 *See* 16 U.S.C. § 1852(h).

305 *See* Sheila Jasanoff, *Transparency in Public Science: Purposes, Reasons, Limits*, 68 LAW & CONTEMP. PROBS., 21, 43 (2006) (noting that "both lay and professional viewpoints" might

which is why a stakeholder council is a further design feature worthy of consideration.

3. *Maintaining and, if Necessary, Accelerating the Executive Branch's Implementation of Climate Change Legislation*

A third category of design features anticipates the many roadblocks that will occur during the process of statutory implementation within the Executive Branch, especially over the long term. These features deliberately build into the original statutory scheme mechanisms that directly limit the effectiveness of the roadblock. These features accomplish that end sometimes by creating lawmaking shortcuts that circumvent the roadblock and other times simply by eliminating the roadblock altogether. The statutory objective is to prevent the Executive Branch, either intentionally or negligently, from frustrating congressional objectives by delaying the law's implementation.

a. For instance, Congress can create a lawmaking shortcut that allows *lawmaking to be made in the absence of Executive Branch action within a specified time period.* This can occur if Congress would actually prefer Executive Branch lawmaking but anticipates that roadblocks may prevent the agency from acting in a sufficiently expeditious manner. Both to encourage the agency to act, and to ensure that law is made without undue delay, Congress can create a lawmaking scheme that is triggered by default in the event that the agency fails to act by the statutorily specified deadline. Moreover, an especially demanding congressional scheme that is triggered by default provides powerful economic interests that might normally have been seeking to delay agency lawmaking efforts with every incentive to ensure that the agency meets its deadline.

Congress embraced such a design feature in the Hazardous and Solid Waste Act Amendments of 1984,[306] which amended the Resource Conservation and Recovery Act (RCRA).[307] Under section 3004 of RCRA, Congress required the EPA to promulgate pretreatment standards for a series of categories of hazardous wastes prior to their disposal on land.[308] But Congress was also aware that the EPA had violated similar deadlines in environmental statutes in the past, sometimes because of agency intransigence but just as likely because of regulated industry lawsuits.[309] The result was years of regulatory

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be needed to ensure the breadth of perspective that would represent the interests of citizens in government decisions).

306 Pub. L. No. 98-616, 98 Stat. 3221.

307 42 U.S.C. §§ 6901–6992 (2006).

308 Resource Conservation and Recovery Act § 3004 (codified in scattered sections of 42 U.S.C.).

309 *See* Richard J. Lazarus, *The Tragedy of Distrust in the Implementation of Federal Environmental Law*, 54 LAW & CONTEMP. PROBS. 311, 323–25 (1991).

delay and an undesirable vacuum of environmental protection standards.[310]

To avoid that happening again, in 1984, Congress added what have been euphemistically referred to as "soft" and "hard" "hammers" that call for automatic imposition of extraordinarily harsh pretreatment standards in the event that the EPA misses the statutorily prescribed deadlines for promulgation of pretreatment standards.[311] The soft hammer, triggered by a miss of an initial deadline, is a very tough standard set forth by the statute. The hard hammer, triggered by missing a final deadline, is an absolute prohibition of the disposal of the waste in question on land.[312]

Congress' establishment of a default standard completely changed the lawmaking dynamic. Not only did the EPA have an overriding incentive to meet the deadlines, but regulated industry also had an incentive to ensure the agency's compliance. Industry could not, accordingly, risk legal challenges or other action that might prompt the agency to miss the deadlines. Not surprisingly, the EPA met essentially all of the applicable deadlines.[313]

Drafters of climate change legislation might well want to consider including comparable lawmaking shortcuts that precommit to certain climate change emissions reduction requirements in the absence of the necessary subsequent action taken by the Executive Branch agency charged with the law's implementation. The potential is considerable that those resisting imposition of climate change emissions reduction requirements will seek to delay their implementation. But by anticipating that potential and precommiting to certain legal standards in the event of delays greater than a specified time period, climate change legislation can effectively both reduce the incentive for such obstructionist efforts and ensure that a lengthy legal vacuum does not result.

b. Congress could also create a lawmaking shortcut by separating the policy question of what standard should apply in a particular factual circumstance from the distinct factual inquiry of whether that cir-

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310 *See id.* at 355–56.

311 42 U.S.C. § 6904; *see* Julie M. Kane, *The Resource Conservation and Recovery Act (RCRA), in* BASICS OF ENVIRONMENTAL LAW 295, 316–17 (PLI Real Estate Law & Practice Course Handbook Series No. 373, 1991); James J. Florio, *Congress as Reluctant Regulator: Hazardous Waste Policy in the 1980's*, 3 YALE J. ON REG. 351, 351 (1986) (noting that Congress "established self-enforcing standards to be implemented in the absence of agency action"); Michael P. Vandenbergh, *An Alternative to Ready, Fire, Aim: A New Framework to Link Environmental Targets in Environmental Law*, 85 KY. L.J. 803, 839 (1997).

312 42 U.S.C. § 6924(d)–(e), (g); *see* Kane, *supra* note 311, at 316–17; Arlene Elgart Mirsky et al., *The Interface Between Bankruptcy and Environmental Laws*, 46 BUS. LAW. 623, 678–79 (1991) (discussing the restrictions on land disposal under the Resource Conservation and Recovery Act).

313 LAZARUS, *supra* note 2, at 194.

cumstance is actually present. A *statutorily prescribed standard triggered by a subsequent agency finding* allows Congress to dictate what the regulatory requirements or other regulatory measures must be to address different degrees of environmental hazards but then leave to another entity the responsibility (and potential political heat) of making the finding that triggers the standard. Congress, in effect, precommits to a series of lawmaking standards that someone else then triggers.

The nonattainment provisions of the Clean Air Act Amendments of 1990 illustrate this possibility.[314] Here again, Congress sought to take away the EPA's discretion to decide what regulatory measures were necessary to address varying degrees of nonattainment of national ambient air quality standards. Accordingly, Congress set forth in exhaustive detail programs that became increasingly prescriptive for sources of air pollution as an area of the country went from just barely out of compliance to extremely out of compliance.[315] The specific statutory designations were "Marginal," "Moderate," "Serious," "Severe," and "Extreme" nonattainment.[316] Congress therefore was not itself responsible for deciding which parts of the country warranted which designation, which allowed it to avoid political pressures that otherwise might have made it more difficult to prescribe stringent requirements. Under the Act, the EPA was responsible for designating whether an area in nonattainment was marginal, moderate, serious, severe, or extreme.[317]

Climate change legislation could also utilize this kind of precommitment device. Congress could precommit to increasingly stringent standards depending, for instance, on the degree of greenhouse gas emissions reductions deemed necessary. This precommitment would allow Congress to make the critical policy determination regarding which kinds and combinations of regulatory measures and economic incentives would be best to achieve different levels of emissions reduction. But at the same time, Congress could leave to a more detached, politically insulated body the decision regarding how serious the climate change problem truly was, how much temperature could rise, and therefore how much reduction of emissions was in fact necessary. Such a scheme has the added benefit of simultaneously allowing for steadfastness in the overall policy objective, for an established legislative decision regarding the distribution of compliance costs, and for flexibility for change in applicable legal requirements in response to the latest scientific information about climate change.

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314 *See* 42 U.S.C. §§ 7501–15.

315 *See id.* §§ 7511–7512.

316 *Id.*

317 *Id.* § 7407(d).

In addition, although Congress delegated the determination of the relative seriousness of the problem to the EPA in the Clean Air Act Amendments of 1990, Congress might decide to delegate the relevant fact-finding trigger in climate change legislation to a more politically autonomous body. As described above, such a decision-making body could take any of a variety of forms, including a committee of governmental or nongovernmental scientists or a specially crafted commission or committee dominated by individuals appointed based on their ability to maintain the necessary longer-term perspective.[318] Congress could make such a more politically autonomous body responsible for any of a host of findings—(1) current greenhouse gas emissions; (2) current atmospheric concentrations of greenhouse gas emissions; (3) current forecasts of temperature increases; (4) current percentage emissions reductions necessary to achieve prescribed goal of atmospheric concentrations or temperature change; or (5) the presence or absence of comparable greenhouse gas reduction efforts by other developed or developing nations—that could in turn trigger a wave of statutory requirements, or even relax them.

c. A statutory provision for *non-, limited-, or conditional federal preemption* of state climate change law could be another effective technique for ensuring that federal climate change legislation stays on track over the long term. The extent to which federal law preempts state climate change law is likely to be one of the most significant policy disputes in the drafting of the federal legislation during the next four years.[319] Industry's desire for federal preemption of state climate law is one of the reasons why many in the industry affirmatively want federal legislation: to eliminate the potential burden of having to comply with multiple and varying state law requirements.[320] Both the states and many environmentalists, however, believe no less strongly that state police power authority to address climate change should not be preempted, especially in light of what they perceive as decades of foot-dragging on the issue by the national government.[321]

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318 *See supra* Part III.B.2.

319 *See* Daniel A. Farber, *Climate Change, Federalism, and the Constitution*, 50 ARIZ. L. REV. 879, 900–10, 921–23 (2008) (discussing preemption in the context of climate change law).

320 *See* William W. Buzbee, *Asymmetrical Regulation: Risk, Preemption, and the Floor/Ceiling Distinction*, 82 N.Y.U. L. REV. 1547, 1569–70 (2007) (discussing "industry support for federal legislation broadly preempting state and local regulation of greenhouse gases"); Eric Lipton & Gardiner Harris, *In Turnaround, Industries Seek U.S. Regulations: A Broad Tactical Shift; Trying to Fend Off Suits, Foreign Competitors and State Efforts*, N.Y. TIMES, Sept. 16, 2007, at A1 ("While businesses often oppose requirements by saying they are unnecessary as it is already in their interest to produce safe products, at other times they have asked for them to avoid a patchwork of state regulations, to ensure that competitors must meet the same standard or to provide legal protection.").

321 *See* Lisa Heinzerling, *Climate, Preemption, and the Executive Branches*, 50 ARIZ. L. REV. 925, 925–29 (2008) (suggesting that "state regulation of greenhouse gases . . . would benefit from equal attention to the role of state executive agencies in asserting power to regu-

Congress could draft a federal preemption provision that both strikes a balance between these competing concerns and serves as a very significant check on the federal government's implementation of climate change legislation. For instance, not only could any such provision narrowly define the scope of federal preemption to leave significant room for state law that supplements and in no manner conflicts with federal requirements, but the federal statute could make the ultimate scope of federal preemption expressly dependent on the success of federal efforts. Congress could use any number of benchmarks to measure success or lack of success. The statutory trigger required for preemption, limited preemption, or nonpreemption could be a formal finding or action by a designated federal government official,[322] a designated committee of individuals within or outside the government with relevant expertise, or even the states themselves. An example of this last option could be a federal preemption provision that would be lifted in the event of a state establishing the existence of specified circumstances. Alternatively, the trigger could be a statutorily specified number of states taking certain action, including the passage of their own requirements addressing a particular issue. Congress could consider just the fact of action by a large number of states to be sufficient evidence that there was something remiss in the federal effort.[323] The lifting of federal preemption, or the mere threat of a lifting of federal preemption, might well be enough to provide federal officials and industry with the incentives necessary to jumpstart a stalled federal program.

d. Finally, lawmaking design features could even seek to remove altogether anticipated litigation roadblocks to statutory implementation by *limiting judicial review* of some kinds of agency decisions and *promoting judicial review* of other kinds of agency decisions. Congress could define these limits by focusing on types of decisions or types of plaintiffs in determining which kinds of lawsuits threaten timely im-

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late even in the face of federal resistance"); Felicity Barringer & William Yardley, *Bush Splits on Greenhouse Gases with Congress and State Officials*, N.Y. TIMES, Apr. 4, 2007, at A1.

322 For instance, the current Clean Air Act expressly preempts state regulation of motor vehicle emissions but makes an exception for California based upon a finding by the state that the state standards will be "at least as protective of public health and welfare" as applicable federal standards. 42 U.S.C. § 7543(b). Thus, EPA must grant California a preemption waiver unless the EPA Administrator affirmatively finds that the State's determination is "arbitrary and capricious," not justified by "compelling and extraordinary circumstances," or " not consistent" with the federal standards. *Id.* § 7543(b). The Clean Air Act also allows other states to adopt the California standards if they are in noncompliance with relevant national air quality standards. *Id.* § 7507.

323 *See* Howard A. Learner, *Restraining Federal Preemption When There Is an "Emerging Consensus" of State Environmental Laws and Policies*, 102 NW. U. L. REV. 649, 651 (2008) (arguing that "an emerging state consensus" should "influence a reviewing court's application of federal preemption principles").

plementation and which kinds of lawsuits are, by contrast, necessary to spur timely implementation.

Statutory analogues exist in other contexts. For instance, the Anti-Injunction Act forbids a federal court from issuing an injunction to stay state court proceedings in the absence of express congressional authority.[324] The Tax Anti-Injunction Act limits the authority of courts to enjoin the imposition of federal taxes.[325] In the Norris-La-Guardia Act of 1932,[326] Congress sought to limit the authority of federal courts to enjoin labor strikes. More recently, in the Comprehensive Environmental Response, Compensation, and Liability Act, Congress limited judicial review of administrative agency orders and remedies to clean up hazardous waste sites in order to prevent lawsuits from slowing the cleanup process.[327] There may well be aspects of the implementation of climate change legislation that are at least as urgent and for which Congress may want to ensure implementation is not delayed as a result of lawsuits brought by certain kinds of aggrieved plaintiffs. Any such limitation on judicial review, however, should be considered a fairly drastic lawmaking restraint and embraced at all only in narrowly tailored and bounded circumstances. As a practical matter, moreover, any broad effort to limit judicial review is likely to be politically unpalatable, as witnessed during the Bush Administration's recent effort to include such a provision in federal bailout legislation.[328]

Conversely, Congress may decide that judicial review is precisely what is necessary to eliminate statutory roadblocks, including agency enforcement, that Congress anticipates will arise within the Executive Branch. To that end, Congress can authorize certain kinds of plaintiffs with certain kinds of claims to bring *citizen suits* seeking a court order that the agency comply with statutory mandates or judicial relief against a source of greenhouse gas emissions in violation of federal requirements. Of course, such citizen-suit provisions are already one of modern environmental law's hallmark achievements. Congress has included citizen suit provisions in almost every modern pollution control statute in anticipation of federal agency recalcitrance to implement or fully enforce pollution control requirements in the face of powerful political and economic resistance. The resulting citizen law-

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324 28 U.S.C. § 2283 (2006).

325 *See* 26 U.S.C. § 7421(a) (2006).

326 Ch. 90, § 1, 47 Stat. 70 (codified at 29 U.S.C. §§ 101–115 (2006)).

327 *See* 42 U.S.C. § 9613(h).

328 *See* Andrew Ross Sorkin, *A Bailout Above the Law*, N.Y. TIMES, Sept. 23, 2008, at C1 (quoting the proposed bill as saying, "Decisions by the Secretary pursuant to the authority of this Act are non-reviewable and committed to agency discretion, and may not be reviewed by any court of law or any administrative agency.").

suits have filled what would otherwise have been a significant gap in compliance.[329]

Citizen-suit provisions will likely need to play a similarly important function in climate change legislation to guard against anticipated Executive Branch hesitance.[330] Because, however, of the tremendous ecological complexity and scientific uncertainty surrounding the sheer mechanics of climate change harm, plaintiffs alleging climate change harm will sometimes be hard pressed to establish the kind of "imminent, concrete injury," "causal nexus," and "redressability" required for Article III standing. But the Supreme Court has suggested that Congress can help plaintiffs overcome those standing hurdles by providing citizen-suit provisions specifically aimed at authorizing such lawsuits. In particular, the Court has ruled that Congress can create injuries, define causal chains, and provide for legal redress in a manner that allows for a lawsuit that would otherwise fall short of Article III.[331] Congress could therefore include in federal climate legislation language designed to allow citizen suits by those seeking to vindicate the interests of future generations in avoiding catastrophic climate change.

CONCLUSION

Lawmaking moments do not happen very often, at least for environmental law. The last major environmental lawmaking moment was almost twenty years ago, when Congress passed the Clean Air Act Amendments of 1990[332] after a thirteen-year legislative logjam arising out of the distributional battles surrounding acid rain. Soon, however, the nation is likely to have an exceedingly important lawmaking moment with the passage of long-overdue domestic climate change

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329 *See* LAZARUS, *supra* note 2, at 190–91.

330 The climate change context no doubt creates heightened concerns about citizen-suit plaintiff Article III standing in light of the often enormous spatial and temporal dimensions of climate change cause and effect. The Supreme Court has already established, however, that Article III standing requirements do not preclude a citizen suit based on climate change. *See* Massachusetts v. EPA, 549 U.S. 497, 526 (2007). Moreover, there are other innovative ways for Congress to create, in effect, a category of plaintiffs with the requisite interest for Article III standing. *See* Cass R. Sunstein, *What's Standing After* Lujan*? Of Citizen Suits, "Injuries," and Article III*, 91 MICH. L. REV. 163, 229–35 (1992) (suggesting ways that Congress may "alter [the] outcomes" in "cases in which the Court has previously rejected standing").

331 549 U.S. at 516 ("'Congress has the power to define injuries and articulate chains of causation that will give rise to a case or controversy where none existed before.'") (quoting Lujan v. Defenders of Wildlife, 504 U.S. 555, 580 (1992) (Kennedy, J., concurring in part and concurring in judgment)); Summers v. Earth Island Institute, 128 S.Ct. 1142, 1153 (2009) (Kennedy, J., concurring) ("This case would present different considerations if Congress had sught to provide redress for a concrete injury 'giv[ing] rise to a case or controversy where none existed before.'") (quoting same).

332 Pub. L. No. 101-549, 104 Stat. 2399.

legislation. All the political ingredients seem well in place for that moment sometime during the next four years.

The ultimate success of that legislation, however, depends on advance recognition by Congress that lawmaking moments are only that—"moments." Congress should, accordingly, include within climate change legislation institutional design features, such as precommitment strategies, that deliberately make it hard for powerful, short-term political and economic pressures to undo that legislation. Institutional design of lawmaking processes always matters, but it matters most if, as is true for climate change law, long-term implementation is essential to the law's success.

In application to climate change legislation, moreover, any per se objection to precommitment strategies based on concerns about their antidemocratic effects should go unheeded. Such precommitment strategies are a well-established design feature of our lawmaking processes, embraced both by the Framers of our Constitution and by prior Congresses. They are embedded in the traditions of our form of government and in no manner represent an anathema. If, as here, the impact on future generations of present generations' failing to address climate change is so potentially devastating, the greater threat to future generations by far would be the failure of present generations to restrict lawmaking to safeguard the future.

The challenge to develop the right mix of precommitment strategies is considerable and the risk of any particular law being perversely hijacked can never be eliminated. But through the kind of asymmetric hurdles and shortcuts that I have described, Congress could diminish the risk of short-term pressures undermining whatever legislation it passes and increase the chance that the concerns of future generations would be not be forgotten during the decades required for the new law's ambitious objective to be achieved. That would be truly momentous.[333]

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[333] As of the time of this Article's going to press (early 2009), none of the major climate change bills pending before Congress included any significant or systematic efforts to enlist precommitment strategies in the form of either hurdles or shortcuts in anticipation of problems likely to plague the law's subsequent implementation. During the 110th Congress, Senate Bill 2191 contemplated the creation of several new governmental entities (Carbon Market Efficiency Board, Climate Change Credit Corporation, and Climate Change Technology Board) and sets for terms of office (up to fourteen years), qualifications (including representation of both business and consumer interests), and bipartisanship, and provides for a science advisor for the Carbon Market Efficiency Board. *See* S. 2191, 110th Cong. tits. II, IV (2007). A draft discussion bill promoted by Representative John Dingell during the 110th Congress similarly contemplated creation of new governmental entities (International Climate Change Commission, Office of Carbon Market Oversight, National Climate Change Adaptation Council), lengthy terms for some positions (up to twelve years), and bipartisanship requirements. *See* Dingell-Boucher Discussion Draft, *supra* note 246, §§ 403, 602, 784. The most sweeping, recent legislative initiative, is the discussion draft bill informally circulated by Representatives Henry Wax-

man and Edward Markey on March 31, 2009, entitled the "American Clean Energy and Security Act of 2009." *See* H.R. __, 111th Cong. (2009) (discussion draft), http://energycommerce.house.gov/Press_111/20090331/acesa_discussiondraft. pdf. This latest discussion draft does include some promising examples of precommitment strategies, including (1) the creation of an advisory council the members of which have longer terms, required scientific expertise, and assigned lawmaking authorities, *id.* §§ 731–33 (describing the "Offsets Integrity Board"); (2) inclusion on a corporation board established by the Act of a representative from nonprofit environmental organizations, *id.* § 114(b) (describing membership on a "Carbon Storage Research Corporation); (3) legislative declaration of specific numerical standards to be established for percentage electricity savings, *id.* § 611(d)(1)(B), greenhouse-gas reduction in emissions, *id.* at 327–28, and total annual emission allowances, *id.* § 721(e); (4) provisions for persons to petition the EPA Administrator to undertake certain regulatory action coupled with requirements that the Administrator must act within specified deadlines, *e.g.*, *id.* § 711(c)(6); and (5) potentially expansive citizen suit provisions plainly designed to overcome Article III standing hurdles suggested by recent Supreme Court precedent, by defining "harm" to include "risk" of injury, "incremental exacerbation" of risk of injury, "widely shared" risk, harm causd by agency action that "slows the pace of implementation of this Act," and the possibility of compensation for the citizen plaintiff in the form of "beneficial mitigation projects." *Id.* §§ 336, 862. These are all promising isolated initiatives, but all of these bills currently under discussion still fall far short of anticipating and addressing the need for the kind of systematic precommitment strategies, discussed in this Article, to avoid the law's derailment and to increase the odds of its achieving its long-term goals.