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**Policymaking Under Pressure:
The Perils of Incremental Responses to Climate Change**

Cary Coglianese* and Jocelyn D'Ambrosio**

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* Associate Dean for Academic Affairs, Edward B. Shils Professor of Law and Professor of Political Science, and Director of the Penn Program on Regulation, University of Pennsylvania Law School.

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Executive Summary

Federal policymakers' reluctance to enact a comprehensive climate change policy during the past decade has coincided with increased awareness of the inevitability and severity of the problems from global climate change. Thus, it is no surprise that piecemeal, sub-federal policies have garnered considerable support. Bolstered by the political science literature on the promise of incrementalism and democratic experimentalism, many proponents of climate change action favor incremental steps in the hope that they will improve the environment or at least serve as a basis for more comprehensive policies. Against this hopeful view, we explain why ad hoc responses to climate change may well be no better than, and possibly will be worse than, no action at all. Incremental climate change policies can give rise to predictable and nontrivial problems, such as non-effect, leakage, climate side effects, other side effects, lock-in, and lulling. Such problems not only can undermine the interim policies themselves but also may delay the adoption of a more comprehensive climate change policy. We present an upstream cap-and-trade policy as one such comprehensive alternative, showing how it would prove less susceptible to the kinds of policy failures that afflict incremental policies. Only by resisting the pressures to act immediately, and investing the necessary time and resources to craft a comprehensive solution, will environmental policymakers be able to guard against the perils that afflict ad hoc policymaking.

Policymaking Under Pressure: The Perils of Incremental Responses to Climate Change

Cary Coglianese and Jocelyn D'Ambrosio

In the absence of a comprehensive federal climate change policy in the United States, every state has adopted its own climate change policies, as have many local governments.¹ Scholars and other policy observers have treated these incremental developments by states and localities as commendable, at least insofar as they serve as stepping stones to a broader national or international response.² This positive posture is certainly understandable. After all, when faced with potentially catastrophic consequences from global warming, surely it would seem that *some* action is better than *no* action at all. It has even been suggested recently that when it comes to addressing climate change, “smaller environmental contracts, deals, and ad hoc arrangements may do more good” than waiting to forge comprehensive national or international solutions.³

¹ David Hodas, *State Initiatives*, in GLOBAL CLIMATE CHANGE AND U.S. LAW 343, 343 (Michael B. Gerrard ed., 2007) (“As of July 2006, every state in the country has adopted some sort of law or policy to address climate change.”). For example, California has been at the forefront of climate change efforts. Enacted in 2006, California’s seminal climate legislation, AB 32, is intended to reduce GHG emissions in the state to 1990 levels by 2020. By 2050, the state hopes to achieve reductions of 80 percent below 1990 levels. See California Environmental Protection Agency, Air Resources Board, Climate Change, <http://www.arb.ca.gov/cc/cc.htm> (last visited July 14, 2008).

² See, e.g., Cinnamon Carlarne, *Notes from a Climate Change Pressure-Cooker: Sub-Federal Attempts at Transformation Meet National Resistance in the USA*, 40 CONN. L. REV. (forthcoming 2008) (chronicling a series of recent “sub-federal” legal decisions and policy developments responding to global climate change as important steps on the path to “inevitable” federal regulation); Kirsten H. Engel, *Harmonizing Regulatory and Litigation Approaches to Climate Change Mitigation: Incorporating Tradable Emissions Offsets into Common Law Remedies*, 155 U. PA. L. REV. 1563, 1564 (2007) (“Both [state climate change regulation and state-initiated litigation] can function as an intermediate step between no regulation and a federal program.”); Edna Sussman, *Reshaping Municipal and County Laws To Foster Green Building, Energy Efficiency, and Renewable Energy*, 16 N.Y.U. ENVTL. L.J. 1, 3 (2008) (“Actions taken by local governments can provide an important step towards conquering global warming and provide a necessary supplement to any federal or state measures.”).

³ Eric W. Orts, *Closing Statement, in Debate: Collaborative Environmental Law: Pro and Con*, 156 U. PA. L. REV. PENNUMBRA 289, 300, 304–05 (2007), <http://www.pennumbra.com/debates/pdfs/collabenvlaw.pdf>; see also BARRY G. RABE, STATEHOUSE AND GREENHOUSE: THE EMERGING POLITICS OF AMERICAN CLIMATE CHANGE POLICY, at xi–xii (2004) (“American states have enacted multiple policies that show considerable promise of reducing greenhouse gases.”); *Id.* at 27 (“[S]tates may be unusually well equipped to fashion reduction strategies that make sense, given their particular mix of economic and

State and local climate change policies raise the important question of whether to laud the blooming of climate change policy “flowers” across the land. Should citizens and policymakers support further incremental policy efforts to respond to climate change, at least until a coalition can be forged to secure a more comprehensive strategy? An affirmative answer no doubt garners considerable support from the urgency of the health, environmental, and welfare concerns created by climate change. It also finds support in political science accounts of policymaking and recent arguments in favor of democratic experimentalism. In his classic work on political decisionmaking, for example, political scientist Charles Lindblom argued that policymaking inevitably proceeds incrementally.⁴ More recently, scholars have celebrated decentralized, self-consciously incremental approaches to environmental problems, arguing that they result in more legitimate, innovative, and effective solutions.⁵ Both of these streams of scholarship imply that immediate, albeit incremental and decentralized, policies on climate change will necessarily be better than waiting to develop, analyze, and build political support for a comprehensive policy strategy for climate change.⁶

governance realities and the fact that no government or private entity has mastered ‘how to do’ climate change policy.”).

⁴ Charles E. Lindblom, *The Science of “Muddling Through,”* 19 PUB. ADMIN. REV. 79, 84 (1959).

⁵ See, e.g., DANIEL J. FIORINO, *THE NEW ENVIRONMENTAL REGULATION* 221 (2006) (arguing that “an incremental but conceptual and learning-based strategy for change offers the best alternative for speeding up the transition to a new environmental regulation”); DEWITT JOHN, *CIVIC ENVIRONMENTALISM: ALTERNATIVES TO REGULATION IN STATES AND COMMUNITIES* 272 (1994) (arguing that states hold the advantage of being better able “to customize their policies to local circumstances, to engage citizens and organizations, and to span interagency and professional boundaries”); David L. Markell, *States as Innovators: It’s Time for a New Look to Our “Laboratories of Democracy” in the Effort To Improve Our Approach to Environmental Regulation*, 58 ALB. L. REV. 347, 355 (1994) (lauding “the existence of fifty state governments” which “inherently creates both numerous ‘innovation centers’ and the opportunity to try a wide variety of approaches simultaneously or within short periods of time”); Charles Sabel et al., *Beyond Backyard Environmentalism*, in *BEYOND BACKYARD ENVIRONMENTALISM* 3, 9 (Joshua Cohen & Joel Rogers eds., 2000) (proposing a new system of environmental regulation that takes advantage of local autonomy as an alternative to “the notorious inflexibility of centralized command systems”); Richard B. Stewart, *A New Generation of Environmental Regulation?*, 29 CAP. U. L. REV. 21, 133–34 (2001) (noting proponents’ argument that “any solution to current concerns with the U.S. environmental regulatory system is likely to be and is best served by an incremental approach”).

⁶ The Supreme Court’s decision in *Massachusetts v. EPA* employs this line of reasoning. See *Massachusetts v. EPA*, 127 S. Ct. 1438, 1457 (2007) (“Agencies, like legislatures, do not generally resolve massive problems in one fell regulatory swoop. . . . They instead whittle away at them over time, refining their preferred approach as circumstances change and as they develop a more-nuanced understanding of how best to proceed.” (citation omitted)).

We disagree. Whatever the merits of decentralized experimentalism in other contexts, it is not well-suited for reducing global emissions of carbon dioxide and other greenhouse gases [GHGs].⁷ Perhaps not all global problems require a comprehensive, global solution—but reversing the trajectory and effects of GHG emissions most assuredly does.⁸ Contemporary policy developments occurring at the state level, as well as those occurring elsewhere in the world, raise the potential of hidden perils as much as they hold out promise of incremental or eventual improvement. Rather than signifying valuable policy progress, or even serving as potential stepping stones toward a more comprehensive solution, existing piecemeal state, federal, and even regional climate change policies pose nontrivial risks of policy failure.⁹ In some cases, the policies themselves could lead to problems at least as severe as the ones the policies originally aimed to solve.

In this article, we elaborate on the problems associated with incremental policymaking as applied to climate change. Specifically, we focus attention on six types of problems that we label: (1) Non-effects; (2) Leakage; (3) Climate Side Effects; (4) Other Side Effects; (5) Lock-in; and (6) Lulling. Our aim in chronicling the perils of incrementalism is not to argue against taking meaningful and appropriate policy action to address climate change; rather it is to temper the impulse to act with a frank elicitation of

⁷ Cf. Daniel C. Esty, *Revitalizing Environmental Federalism*, 95 MICH. L. REV. 570, 625–26 (1996) (noting that despite the advantages of decentralization “global concerns such as ozone layer depletion and possible climate change due to the accumulation of greenhouse gases” give rise to “transboundary harm [that] demands some form of overarching governmental action across the scope of the harm”).

⁸ See, e.g., Jonathan B. Wiener, *Think Globally, Act Globally: The Limits of Local Climate Policies*, 155 U. PA. L. REV. 1961, 1962 (2007) (“[L]ocal action is not well suited to regulating mobile global conduct yielding a global externality.”); Jason Scott Johnston, *Climate Change Hysteria and the Supreme Court: On the Likely Economic Consequences of Global Warming for America and the Adverse Impacts and Ineffectiveness of Regulating Greenhouse Gases under the Clean Air Act 1–2* (Reg-Mkts. Ctr., Working Paper No. 08-06, 2008), available at http://aei-brookings.org/admin/authorpdfs/redirect-safely.php?fname=../pdffiles/WP08-06_topost.pdf (reasoning that because of the global nature of climate change, even a unilateral national response is unlikely to mitigate climate change).

⁹ Cf. Jonathan Baert Wiener, *Designing Global Climate Regulation*, in CLIMATE CHANGE POLICY: A SURVEY 151, 151 (Stephen H. Schneider et al. eds., 2002) (“Climate change is complex on many dimensions, frustrating simple and hasty regulatory responses.”); Victor B. Flatt, *Taking the Legislative Temperature: Which Federal Climate Change Legislative Proposal is “Best”?*, 102 NW. U. L. REV. COLLOQUY 123, 150 (2007), <http://www.law.northwestern.edu/lawreview/colloquy/2007/32/LRColl2007n32Flatt.pdf> (“Climate change legislation is complex . . . and without examining all of the issues together, incorrect choices will be made.”).

the perils of acting impulsively. Citizens and policymakers should not confuse the pace of action with its ultimate wisdom. Some of the uncoordinated policy developments taking place now, under the pressure for action, may well be worse than making no legal change at all until a well-considered and comprehensive global (or at least national) strategy on climate change can be forged.

I. The Promise of Incrementalism

In his celebrated conception of incremental policymaking, Charles Lindblom explained that because decisionmakers act without perfect information, policymaking tends to proceed via a series of iterative adjustments.¹⁰ Policymakers, in other words, move in small steps based on accessible knowledge. Lindblom offered the incremental model to contrast with the rational-comprehensive or synoptic model, in which policy begins with policymakers stating their values and goals, identifying all possible means of achieving these goals, and systematically comparing the alternatives to arrive at an approach that maximizes intended values.¹¹

Incrementalism is attractive because of the difficulties of synoptic policy analysis.¹² Rather than urging policymakers to attempt to consider and respond to all issues comprehensively, incrementalists prefer that policymakers exclude some considerations from their analysis and take action before they can assess fully the possible consequences. This method relies on new information derived from policy experiments (“trial and error”) to help public policy evolve over time. Experimentation can thus also generate and illuminate solutions that may not have even been known when

¹⁰ See Lindblom, *supra* note 4, at 84 (explaining that limits on both available information and cognitive ability cause policymakers to approach problem solving systematically); see also CHARLES E. LINDBLOM, *POLITICS AND MARKETS: THE WORLD’S POLITICAL-ECONOMIC SYSTEMS* 314 (1977) (“Since people cannot intellectually master all their social problems . . . they depend on various devices to simplify problem solving.”).

¹¹ See Lindblom, *supra* note 4, at 79 (proposing alternate ways to formulate policy).

¹² Incrementalists argue that in approaching any policy, there are barriers to a comprehensive understanding. These barriers to synopsis include: (1) policy problems which by their very nature tend to escape complete cognition; (2) policies that often cannot be effectively compared because there is no set of agreed upon criteria upon which we judge all policies; and (3) problem solvers who naturally tend toward non-synoptic techniques, such as excluding certain value considerations to reach a result. LINDBLOM, *supra* note 10, at 322.

the policy was proposed.¹³ The ability to learn from each round of experiments is viewed as one of the primary benefits of incrementalism. In this way, incrementalism also provides a type of insurance against large-scale policy disaster. If problems are addressed bit by bit, and if solutions can be modified over time, the negative consequences of policy mistakes will be neither extensive nor long-lived.

Incrementalism embraces two distinct types of policy variation and change. First, policies can be *spatially* incremental by focusing regulation on a smaller scale.¹⁴ Ad hoc state and local experiments are incremental because the limited jurisdiction to which they apply ensures they can never be more than a step toward more synoptic, encompassing policies for problems that cross jurisdictional boundaries. Second, policies can be *focally* incremental if they focus on only part of what causes a policy problem. In this way, even jurisdictionally large policies (that is, those adopted at the national or international level) can be incremental if their focus is constrained. For example, adopting a national motor vehicle emissions standard to address climate change would be more spatially comprehensive than many of the individual state policies currently in effect, in that it would apply to vehicles across the country; however, such a policy would still be focally incremental because automobiles are only one source of greenhouse gas emissions.¹⁵

¹³ *Id.* at 257–58, 316.

¹⁴ See Carlarne, *supra* note 2 (describing “[t]he flood of independent and collaborative climate change law and policy-making activities taking place at the state and local level” and acknowledging that these state and local measures are not “comprehensive, robust regulatory structures for climate change”).

¹⁵ In addition to spatial and focal incrementalism, there is a third, temporal dimension to incrementalism. The IPCC appears to have had this temporal dimension in mind when, in its fourth report, it explained that “[r]esponding to climate change involves an *iterative* risk management process that includes both mitigation and adaptation.” INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 64 (2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf (emphasis added). To some extent, temporal incrementalism can be said simply to grow out of the recognition that, in principle, policies always can be modified. When doing so would correct policy failures or otherwise improve overall outcomes for society, policy changes should be made. In some cases, temporal incrementalism might even support the use of sunset provisions as part of new policies, so as to require renewed attention and re-analysis by policymakers at designated intervals if policies are to remain in effect. However, as our discussion of the pitfalls of incrementalism in the next part of this article should make clear, we think a strong version of temporal incrementalism that favors quicker decision-making over more labored attempts at synopticism, and that relies on the inherent opportunity to modify policy as part of the justification for making quicker (and potentially more error-prone) decisions, represents a fundamentally misguided approach to the problems associated with climate change. Such a strong version of temporal incrementalism, which Lindblom advocated, also dovetails with

Proponents of democratic experimentalism encourage both of these types of incremental policies. Because they favor giving discretion to local entities to set, and experiment with, their own standards, the policies emanating from democratic experimentalism are spatially incremental.¹⁶ Democratic experimentalism “replaces central command regulation with a combination of local experimentation and centralized pooling of experience.”¹⁷ National policymakers compile information and help diffuse innovations, but locals choose their own performance targets and means of redress. This means that many experimentalist policies will also be focally incremental.

Both democratic experimentalists and incrementalists favor local knowledge and learning by trial and error, even for some of the largest scale problems such as climate change.¹⁸ As such, intellectual enthusiasm for incremental policymaking appears fused, for the moment at least, with the current piecemeal policy trajectory with respect to climate change. Many climate change innovations are being pursued in ways that are either spatially or focally incremental—or both.

II. The Perils of Incrementalism

This current path is not as promising as incrementalists or experimentalists might lead us to believe. While incrementalism may well be appropriate for many important

the case for both spatial and focal incrementalism that we highlight in the text, since it is usually easier and quicker to make decisions that affect smaller domains (or fewer actors) or that implicate only part of a larger, more complex problem.

¹⁶ See generally Michael C. Dorf & Charles F. Sabel, *A Constitution of Democratic Experimentalism*, 98 COLUM. L. REV. 267 (1998) (envisioning a system in which power is decentralized, allowing citizens and local organizations the opportunity to fashion solutions to societal problems based on their individual circumstances); Sabel et al., *supra* note 5, at 6–8 (envisioning a “rolling rule” framework that would replace regulation based on central commands, with a combination of local experimentation and centralized pooling of experience).

¹⁷ Sabel et al., *supra* note 5, at 7.

¹⁸ See, e.g., *id.* at 14–15 (noting that under the authors’ proposed rolling-rule regime the local actors that implement policies are able to conduct monitored experiments that help shape responses to larger, more diffuse problems); Orts, *supra* note 3, at 304–05 (stating that “global climate change provides an example of why scholars and policymakers should not bind themselves too closely to traditional lawmaking” and urging that “smaller environmental contracts, deals, and ad hoc arrangements may do more good in this context”).

public problems, it does not necessarily work for all problems.¹⁹ Some problems require more than can be achieved with successive small steps, or simply cannot be divided into small steps that produce a meaningful result.²⁰ Sometimes nothing short of a large-scale, focally comprehensive policy will do.

Climate change appears to fall into this category. Not only might it be impossible to solve the climate change problem through incremental steps, but when policymakers proceed incrementally, they do so with a degree of peril.²¹ Rather than providing insurance against catastrophic consequences, incremental approaches to climate change could either contribute to or fail to prevent catastrophic consequences altogether. Consider the following six perils of incremental climate change policymaking.

A. Non-effect

Incremental state and federal policies are unlikely to reverse climate change. Even in the aggregate, their limited scope and focus can make it difficult, if not impossible, to produce large improvements in this global problem. State and local programs may change behavior within their jurisdiction, but unabated rates of emissions growth from other areas can cancel out even seemingly significant effects within a single jurisdiction. Greenhouse gases accumulate in the atmosphere for years, making the problem bound to continue unless there are widespread, coordinated reductions throughout the world.²²

Even national-scale programs that have a narrow focus, such as the recently

¹⁹ For a critique of incremental policymaking, see Paul R. Schulman, *Nonincremental Policy Making: Notes Toward an Alternative Paradigm*, 69 AM. POL. SCI. REV. 1354, 1354–67 (1975), which contends that for some policies, including large-scale undertakings in response to major problems, the incrementalist approach of successive limited comparisons is inadequate.

²⁰ *Id.*

²¹ Cf. Jonathan Baert Wiener, *Managing the Iatrogenic Risks of Risk Management*, 9 RISK: HEALTH, SAFETY & ENVT. 39, 70–71 (1998) (pointing to the folly of Lindblom’s incrementalist approach in the context of risk regulation).

²² See Pierre Friedlingstein, *A Steep Road to Climate Stabilization*, 451 NATURE 297, 297–98 (2008), available at <http://www.nature.com/nature/journal/v451/n7176/pdf/nature06593.pdf> (explaining the difficulty of stabilizing atmospheric GHG concentrations because as air concentrations decrease land and ocean ecosystems might actually absorb fewer emissions, thus requiring still greater emissions reductions).

revamped Renewable Fuel Standard [RFS],²³ are unlikely to have much of an effect on climate change in the absence of more global reform. Although vehicle emissions do constitute a large portion of the emissions that cause climate change, because of the confluence of factors that contribute to climate change, limiting this one source of emissions is not likely to be sufficient. Thus by definition, the limited scope of focally as well as spatially incremental policies make it unlikely that they will be able to put a dent in the emissions reductions necessary to reverse global warming.

B. Leakage

Not only is it likely that incremental policies will do little or nothing to affect global warming, but certain incremental policies, including state-level efforts like the Regional Greenhouse Gas Initiative [RGGI],²⁴ might also worsen the global climate change problem because of leakage from other jurisdictions.²⁵ By “leakage,” we mean to refer to situations where a stringent climate change policy unintentionally induces an increase in emissions in another jurisdiction with a less stringent or nonexistent policy.

Leakage can occur for a number of reasons.²⁶ For example, if the supply of energy is restricted via regulation, the price of goods and services will increase, sparking

²³ See Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 202(a)(2), 121 Stat. 1142, 1521–23 (2007) (increasing the previously enacted renewable fuels mandate to require thirty-six billion gallons of renewable fuels, twenty-one billion gallons of advanced biofuels, and sixteen billion gallons of cellulosic biofuel by 2022). For more information on the Renewable Fuel Standard and subsequent EPA regulations, see U.S. Environmental Protection Agency, Renewable Fuel Standard Program, <http://www.epa.gov/otaq/renewablefuels/> (last visited Mar. 21, 2008).

²⁴ RGGI, Regional Greenhouse Gas Initiative: An Initiative of the Northeast and Mid-Atlantic States of the U.S., www.rggi.org (last visited July 14, 2008). Some have postulated that regional initiatives are highly beneficial because of their ability to take advantage of economies of scale, create a more unified response, and place more pressure on other states and the federal government. [Carlarne](#), *supra* note 2.

²⁵ See, e.g., *The Magnificent Seven: States Take the Lead on Global Warming*, ACEEE’S GRAPEVINE ONLINE, Jan. 17, 2006, <http://www.aceee.org/about/0601rggi.htm> [hereinafter *The Magnificent Seven*] (noting model results indicating that leakage could offset sixty to ninety percent of RGGI’s carbon reductions); see also Nicholas Inst. for Envtl. Pol’y Solutions, *Northeast Plan To Extend Climate Cap Raises Constitutional Questions*, IN THE NEWS, July 19, 2006, <http://www.env.duke.edu/institute/news-neclimate.html> (noting the key problem facing RGGI is leakage from increased production in non-RGGI states for export to the regulated area).

²⁶ For a discussion of different types of leakage, see Jonathan Baert Wiener, *Protecting the Global Environment*, in RISK VERSUS RISK: TRADEOFFS IN PROTECTING HEALTH AND THE ENVIRONMENT 193, 214 (John D. Graham & Jonathan Baert Wiener eds., 1995).

an increase in supply from non-regulated sources. This supply-style leakage could be a concern for RGGI as it is possible that non-RGGI states will increase production and export “dirtier” energy to RGGI states. Some estimates indicate that leakage due to increased imports from other states could offset as much as sixty to ninety percent of RGGI-related reductions, substantially undermining the initiative’s objectives.²⁷

Leakage can also occur if incremental regulations greatly increase the cost of production in some states or regions. Facing such a cost increase, industry might be tempted to move to an area where costs are lower because of less stringent regulations.²⁸ The states in which firms re-locate may choose to avoid or reduce the stringency of their regulations to attract additional firms, thus exacerbating the leakage. Once relocated, industry will have an incentive to keep the cost of production low and can be expected to lobby against climate regulations. If many industries relocate to one unregulated jurisdiction, they will likely constitute a more powerful anti-regulatory coalition there than before.²⁹

Leakage can reduce, and potentially even reverse, the effects of proactive efforts wherever there are gaps in the geographic areas, fuels, or industries that are regulated. Even global programs, like the Kyoto Protocol, create the possibility of leakage when they do not cover all major developed and developing nations.³⁰

C. Climate side effects

In the rush to take action, policymakers have tended toward discrete, politically popular plans, including greenhouse gas targets, energy efficiency regulations, and renewable fuels standards. Yet when these hastily adopted policies are not subjected to

²⁷ See *The Magnificent Seven*, *supra* note 25 ELEC. POWER RESEARCH INSTITUTE, PROGRAM ON TECH. INNOVATION: ECONOMIC ANALYSIS OF CALIFORNIA CLIMATE INITIATIVES: AN INTEGRATED APPROACH 3–15 (2007), <http://www.epriweb.com/public/000000000001014641.pdf> (estimating leakage of up to eighty-two percent in response to California’s climate change regulation).

²⁸ Wiener, *supra* note 8, at 1968.

²⁹ See *id.* at 1972; see also Richard Schmalensee, *Greenhouse Policy Architectures and Institutions*, in *ECONOMICS AND POLICY ISSUES IN CLIMATE CHANGE* 137, 146 (William D. Nordhaus ed., 1998).

³⁰ See Wiener, *supra* note 8, at 1967 (“Even the Kyoto Protocol is not sufficiently global, because it omits emissions limits on the world’s largest sources—the United States and China, as well as Australia, India, Brazil, and others.”).

careful analysis, they can carry with them the risk of unintended consequences.³¹ As now appears to be the case with policies requiring or encouraging the expansion of biofuels, some of these unintended consequences may even exacerbate the problem of climate change itself.

Biofuels have played a major role in first-generation climate policies. In the United States, biofuel incentives feature prominently in the federal Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007,³² and have emerged in various state climate change policies.³³ They have also played a large role in the European Union's climate change proposals, which relied on biofuels as the primary means of limiting greenhouse gases from the transportation sector.³⁴ However, a recent re-examination of biofuels has uncovered that not all ethanol is created equal. Depending on whether producers of biofuels use diesel trucks, apply nitrogen fertilizer, or plant where there once was rainforest, biofuels might actually leave a negative carbon footprint.³⁵ In response to these discoveries, the EU is now drafting legislation to ensure

³¹ See Richard B. Stewart & Jonathan B. Wiener, *The Comprehensive Approach to Global Climate Policy: Issues of Design and Practicality*, 9 ARIZ. J. INT'L COMP. L. 83, 84 (1992) ("When policy formulations hastily target one of many interrelated variables, they often ignore lower-cost options to achieve better results and produce unintended side-effects that can confound the best-intended policy.").

³² Energy Policy Act of 2005, Pub. L. No. 109-058, § 1501, 119 Stat. 1067-68 (amending § 211(o) of the Clean Air Act to require the use of renewable fuels); Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 202, 121 Stat. 1521-1528 (same).

³³ See, e.g., Alternative Fuels Incentive Act, 73 P.S. § 1647.1 (2004); *Testimony on the Increased Use of Biofuels, Governor Edward G. Rendell's PennSecurity Fuels Initiative: Hearing Before the Pennsylvania S. Comm. on Environmental Resources & Energy* (Sept. 19, 2007) (statement of Dennis C. Wolff, Pa. Sec'y of Dep't of Agriculture and Kathleen A. McGinty, Pa. Sec'y of Dep't. of Env'tl. Prot.), available at <http://www.depweb.state.pa.us/dep/cwp/view.asp?a=3&q=529350>; Press Release, Governor Rendell Unveils Energy Independence Strategy to Save Consumers \$10 Billion Over 10 Years, Reduce Reliance on Foreign Fuels (Feb. 1, 2007), available at <http://www.depweb.state.pa.us/energindependent/lib/energindependent/documents/pr-020107.doc>; *State Ethanol Mandates Inching Ahead*, GREEN CAR CONGRESS, Mar. 20, 2006, http://www.greencarcongress.com/2006/03/state_ethanol_m.html.

³⁴ James Kanter, *Amid Doubts, Europe May Ban Some Biofuels*, N.Y. TIMES, Jan. 15, 2008, at C1, available at LEXIS, News Library, NYT File.

³⁵ See Jocelyn D'Ambrosio, *Alternative Fuels: An Evaluation of Corn Ethanol, Cellulosic Ethanol, and Gasoline*, 37 ENVTL. L. REP. 10615 (2007) (showing that use of biofuels could increase net carbon output); Joseph Fargione et al., *Land Clearing and the Biofuel Carbon Debt*, 319 SCIENCE 1235, 1237 (2008) (explaining that biofuels' ability to reduce emissions is directly related to how they are produced); Jörn P.W. Scharlemann & William F. Laurance, *How Green Are Biofuels?*, 319 SCIENCE 43, 44 (2008) (finding that "[n]ot all biofuels are beneficial when their full environmental impacts are assessed" and urging governments to be selective when encouraging their use); Michael Grunwald, *The Clean Energy Scam*,

it encourages the right kind of biofuels,³⁶ yet the infrastructure for the wrong fuels has already begun to take hold. Rainforests have been clear-cut and producers have made the investments necessary to keep up with the estimated demand.³⁷ Even if EU and American authorities were to issue a moratorium on carbon intensive or high footprint biofuels, the deforested land and newly invigorated biofuel industry will not disappear. Producers might simply seek out less environmentally conscious markets for these alternative fuels. Although policymakers may well learn from this experiment, the mistake's effects are not easily undone.³⁸

D. Other side effects

Not only can incremental policies generate side effects in terms of climate change, they can create other side effects in terms of general health and welfare.³⁹ To reduce energy usage, for example, the Energy Independence and Security Act of 2007 requires light bulb manufacturers to meet energy efficiency standards that currently can

TIME, Apr. 7, 2008, at 40–45 (“It turns out that the carbon lost when wilderness is razed [for growing biofuel crops] overwhelms the gains from cleaner-burning fuels.”); Elisabeth Rosenthal, *Studies Call Biofuels a Greenhouse Threat*, N.Y. TIMES, Feb. 29, 2008, at A9, available at LEXIS, News Library, NYT File (“Almost all biofuels used today cause more greenhouse gas emissions than conventional fuels if the full emissions costs of producing these ‘green’ fuels are taken into account, two studies being published Thursday have concluded.”); Robert Hahn & Caroline Cecot, *The Benefits and Costs of Ethanol* (AEI-Brookings Joint Ctr for Regulatory Studies Working Paper No. 07-17, 2007), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1027692 (showing that for ethanol fuel policies “costs are significantly higher than the total benefits”).

³⁶ Kanter, *supra* note 34.

³⁷ *Id.*

³⁸ In light of the EU's experience, as well as the recent scientific reports disclosing the fuels' negative footprint, there is growing movement against biofuels in the United States. While Congress is not yet rethinking the Renewable Fuel Standard in the 2007 Energy Act, environmentalists recently sent a letter to the President and the Speaker of the House urging an EU-style revision. Rosenthal, *supra* note 35; Biofuels Digest, Science Magazine Reaction: US Scientists Write to President Bush, Speaker Pelosi; Berkeley Professor Says Recent Policy Decisions Moving in the Right Direction, <http://biofuelsdigest.com/blog2/2008/02/14/science-magazine-reaction-us-scientists-write-to-president-bush-speaker-pelosi-berkeley-professor-says-recent-policy-decisions-moving-in-the-right-direction/> (Feb. 14, 2008, 10:03 EST).

³⁹ Although we used biofuels in the preceding part to illustrate climate side effects, the production of biofuels may cause other side effects as well, such as the depletion of water supplies or the creation of water pollution. *Ethanol and Water: Don't Mix*, ECONOMIST, Feb. 28, 2008, available at LEXIS, News Library, ECON File; Brenda Goodman, *Pollution Is Called a Byproduct of a 'Clean' Fuel*, N.Y. TIMES, Mar. 11, 2008, at A12, available at LEXIS, News Library, NYT File.

only be met with compact fluorescent light bulbs.⁴⁰ Yet compact fluorescent light bulbs contain mercury.⁴¹ As such, broken or disposed of bulbs could cause problems of mercury contamination. While producers claim the bulbs only contain small amounts of mercury, the amount is enough to require special disposal procedures.⁴² As the EPA cautions, once a bulb is broken, the user is supposed to don protective plastic gloves before collecting the broken glass with stiff cardboard, not a broom or vacuum cleaner (which could disperse the mercury).⁴³ The user must seal the collected glass in air-tight plastic bags before disposing of it.⁴⁴ Because of the potential for contamination, some states prohibit disposing of mercury-containing glass in landfills.⁴⁵ To remedy this problem, some manufacturers offer customers the option of shipping the bulbs back to the factory, adding, of course, to the carbon footprint.⁴⁶ Even so, it is questionable whether all consumers will take advantage of companies' return policies. Additional amounts of mercury are likely to make their way into the nation's waste stream and pose increased risks of mercury contamination. Although replacing incandescent light bulbs can reduce energy demand and decrease greenhouse gas emissions,⁴⁷ in its zeal to focus on one

⁴⁰ The standards require certain light bulbs to use twenty-five to thirty percent less energy than today's products, beginning in 2012. Energy Independence and Security Act of 2007, 110 Pub. L. No. 110-140, § 321, 121 Stat. 1573-87 (2007); *see also* Marianne Lavelle, *FAQ: The End of the Light Bulb as We Know It*, U.S. NEWS & WORLD REPORT, Dec. 19, 2007, *available at* LEXIS, News Library, USNEWS File; ALLIANCE TO SAVE ENERGY, 2007 ENERGY BILL DETAILED SUMMARY 10 (2007), http://www.ase.org/files/4172_file_energy_bill_2007_summary.pdf.

⁴¹ *See* ENERGY STAR, EPA, FREQUENTLY ASKED QUESTIONS: INFORMATION ON COMPACT FLUORESCENT LIGHT BULBS (CFLS) AND MERCURY (Feb. 2008), http://www.energystar.gov/ia/partners/promotions/change_light/downloads/Fact_Sheet_Mercury.pdf ("Mercury currently is an essential component of CFLs and is what allows the bulb to be an efficient light source.").

⁴² U.S. Environmental Protection Agency, Mercury: Spills, Disposal and Site Cleanup: What to Do if a Fluorescent Light Bulb Breaks, <http://www.epa.gov/mercury/spills/index.htm#fluorescent> (last visited Feb. 12, 2008).

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *See id.* ("Check with your local or state government about disposal requirements in your specific area. Some states prohibit such trash disposal and require that broken and unbroken mercury-containing bulbs be taken to a local recycling center.").

⁴⁶ Steven Mufson, *Power Switch; The New Energy Law Will Change Light Bulbs, Appliances and How We Save Electricity in the Home*, WASH. POST, Jan. 20, 2008, at F01, *available at* LEXIS, News Library, WPOST File.

⁴⁷ The EPA estimates that replacing incandescent light bulbs with compact fluorescent bulbs could "save enough energy to light more than 3 million homes for a year, more than \$600 million in annual energy costs, and prevent greenhouse gases equivalent to the emissions of more than 800,000 cars."

environmental problem, Congress has taken an incremental step that will likely add to another environmental problem.⁴⁸

In addition to the possibility of creating other environmental problems, incremental climate change policies pose nontrivial economic risks. By increasing energy costs, climate change policies can obviously induce dramatic welfare and distributional effects.⁴⁹ The widely expressed concern that biofuel mandates have contributed to increases in global food prices shows how climate policies may induce economic effects that spread far beyond the price of energy.⁵⁰

E. Lock-in

In addition to creating side effects, incremental policies can create a path dependence that prevents or inhibits the development of better alternatives.⁵¹ Implementing, monitoring, and maintaining any policy requires start-up costs, making it

Energy Star, Compact Fluorescent Light Bulbs, http://www.energystar.gov/index.cfm?c=cfls.pr_cfls (last visited Mar. 24, 2008).

⁴⁸ To its credit, Congress at least recognized this potential side effect and called for the Department of Energy and the EPA to prepare for Congress within one year “a report describing recommendations relating to the means by which the Federal Government may reduce or prevent the release of mercury during the manufacture, transportation, storage, or disposal of light bulbs.” Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 321(h) (2007).

⁴⁹ One study estimated that abating 3.0 gigatons of annual GHG emissions in the United States by 2030 would entail capital investments of \$50 billion annually (excluding operating expenses). MCKINSEY & CO., THE CONFERENCE BOARD, REDUCING U.S. GREENHOUSE GAS EMISSIONS: HOW MUCH AT WHAT COST? 26 (2007), http://www.mckinsey.com/clientervice/ccsi/pdf/US_ghg_final_report.pdf. To put a 3.0 gigaton reduction into context, consider that pending federal legislative proposals would aim to achieve reductions roughly on the order of 3.5 to 5.2 gigatons by 2030. *Id.* at 17. The capital costs would be “highly concentrated in the power and transportation sectors” and would result in “the likelihood of upward pressure on rates and vehicle prices.” *Id.* at 26; *see also* CHAD STONE & MATT FIELDER, CTR. BUDGET & POLICY PRIORITIES, THE EFFECTS OF CLIMATE-CHANGE POLICIES ON THE FEDERAL BUDGET AND THE BUDGETS OF LOW-INCOME HOUSEHOLDS: AN ECONOMIC ANALYSIS 7–8 (2008), <http://www.cbpp.org/10-24-07climate.pdf> (analyzing the potential economic and distributional impacts of climate change policies).

⁵⁰ *See, e.g.*, Mark Clayton, *As Global Food Costs Rise, Are Biofuels to Blame?*, CHRISTIAN SCI. MONITOR, Jan. 28, 2008, <http://www.csmonitor.com/2008/0128/p03s03-usec.html> (quoting Siwa Msangi of the International Food Policy Research Institute that “[m]ore people are coming to the conclusion that there is a food-fuel link”); National Public Radio, *World Bank Chief: Biofuels Boosting Food Prices*, Morning Edition, Apr. 11, 2008, www.npr.org/templates/story/story.php?storyId=89545855 (quoting World Bank President Robert Zoellick that demand for biofuels has been a “significant contributor” to increases in global food prices).

⁵¹ *See* Stewart & Wiener, *supra* note 31, at 98 (“Experience shows that, once adopted, piecemeal initiatives rarely evolve into a comprehensive strategy.”).

harder to change policies mid-stream.⁵² The learning required to work within any new policy framework makes the regulated entities (and regulators) less likely to favor changing to an unfamiliar approach. When legislators and voters think an issue has already been addressed, it requires a lot of political heavy lifting to change established policies. And perhaps most importantly, those who have an interest in the status quo under an incremental policy can be expected to resist policy change—including the regulators, the regulated companies that make compliance investments, and the advocates of the initial incremental approaches.⁵³

The biofuels saga shows that those who make investments in response to a new policy, such as biofuels producers, have an interest in continuing to market their products. Companies that have built expensive ethanol distilleries, for example, will not readily abandon their investments for different technologies. Nor can it be expected that politicians will eagerly want to force ethanol producers to shut down operations that both employ thousands of constituents and address, if only symbolically, a pressing environmental problem.⁵⁴ Consequently, as Jeff Bingaman, Chair of the U.S. Senate Committee on Energy and Natural Resources, noted in commenting on the federal Renewable Fuel Standard, “there is little room in the RFS for technological advance.”⁵⁵

The factors that contribute to policy lock-in can also inhibit national efforts to displace the patchwork of state climate change policies and programs. Over the past decade alone there have been 157 efforts by states, including eight regional compacts, to reduce global warming.⁵⁶ Although many suggest we can learn from these state

⁵² See Schulman, *supra* note 19, at 1356 (“Nonincremental policies in particular must expand greatly if they are to expand at all. Only then can they overcome the inertia, external resistance, or internal start-up problems which act as barriers to policy expansion.”).

⁵³ ROBERT REPETTO, NATIONAL CLIMATE POLICY: CHOOSING THE RIGHT ARCHITECTURE Pt. C (2007), available at <http://www.climateactionproject.com/docs/Repetto.pdf>.

⁵⁴ Cf. Grunwald, *supra* note 35, at 44. Of course, we recognize that Congress and state legislatures could still retreat from their policies promoting renewable fuels, and perhaps one or more of these institutions will. Our point is simply that doing so will not be easy.

⁵⁵ Press Release, U.S. Senate Comm. on Energy & Natural Res., Bingaman on RFS Effects on Energy Markets (Feb. 7, 2008), available at <http://energy.senate.gov/> (follow “More Democratic News” hyperlink; then follow “Bingaman on RFS Effects on Energy Markets” hyperlink).

⁵⁶ See Carlarne, *supra* note 2 (noting that “forty-two states have greenhouse gas inventories; twenty-eight states have adopted climate action plans; twenty states have public benefit funds; thirteen states have

experiments, perhaps modelling a national response on some of these efforts, legal scholar Jonathan Wiener reminds us that “the flip side of experimentation is that a proliferation of different GHG policies and allowance markets in different states—and across countries—may generate conflicting approaches and vested interests that are difficult to reconcile and mesh in a larger national or international regime.”⁵⁷ The sheer number of climate change efforts, with every state having some climate change policy or law, suggests that displacing them at the national or global level will not be easy.⁵⁸

F. Lulling

Finally, incremental policies may lull the public into thinking climate change is being addressed, thus dampening demand for the costly and comprehensive policies that will achieve the most meaningful results. In the wake of a proliferation of incremental policies, comprehensive solutions must garner additional support in order to overcome bias toward the status quo.

Alternatively, since incremental policies are inherently less effective in addressing global problems, the failures of incremental climate change policies might breed increased cynicism about whether any policy solution can work. When small commitments fail to produce large policy pay-offs, policies can become harder, not easier, to expand.⁵⁹ Moreover, because the risks of climate change are not yet palpable⁶⁰—there has been no massive coastline loss, for example—the necessity of more

adopted greenhouse gas emission targets; twenty-two states have renewable energy portfolio standards; eleven states have adopted greenhouse gas emission standards for automobiles; five states have mandatory CO₂ reporting programs; eight states have formed climate change advisory boards; thirty-six states are participating in one or more of eight existing regional climate change initiatives”).

⁵⁷ Wiener, *supra* note 8, at 1974.

⁵⁸ See David Hodas, *State Initiatives*, in *GLOBAL CLIMATE CHANGE AND U.S. LAW* 343, 343 (Michael B. Gerrard ed., 2007) (“As of July 2006, every state in the country has adopted some sort of law or policy to address climate change.”).

⁵⁹ See Schulman, *supra* note 19, at 1366 (arguing that once a policy has overcome the initial hurdles of passage and implementation, “[w]ithout major mobilizing commitments (such as landing a man on the moon and returning him safely) these policies simply cannot generate and sustain the support required for their collective payoffs”).

⁶⁰ Cf. Cary Coglianese, *Social Movements, Law, and Society: The Institutionalization of the Environmental Movement*, 150 U. PA. L. REV. 85, 88 (2001) (contrasting the “tangible environmental

comprehensive action might not be immediately obvious.

III. Toward Comprehensive Climate Change Policy

The perils of incrementalism in the face of climate change are certainly not inconsequential. Despite the evident support for piecemeal climate change policies, policymakers should carefully consider the types of harms we have outlined whenever they are confronted with proposals for ad hoc state or national prescriptions. Given the risks of error in climate change policy, it will almost certainly be better to pass on adopting piecemeal policies today to wait to develop alternative, comprehensive policies less prone to the types of perils we have outlined.

Ironically, some of the perils of incrementalism stem from the very policymaking constraint that incrementalism is designed to help overcome: limited information.⁶¹ We agree that this constraint is real.⁶² Indeed, that is precisely why policymakers should take the time needed to develop more comprehensive climate change responses, gathering more information and conducting more careful analyses. Rather than adopting a series of ad hoc, piecemeal policies and trying eventually to learn something through trial and error, the better way in this context is to invest additional time and resources up front in policy analysis and robust deliberation, so as to increase the probability of maximizing policy effectiveness and minimizing side effects and policy failures. Of course, we also recognize that waiting forever is not an optimal strategy. The challenge is to design a comprehensive policy response that is both manageable and does not demand omniscience of policymakers.

An upstream cap-and-trade policy is an example of the type of comprehensive policy that would fare better than the myriad piecemeal reforms under way and would be

problems” addressed by early environmental legislation with the “less palpable” problem of climate change).

⁶¹ For a discussion of limited information as a basis for an incrementalist approach, see *supra* Part I.

⁶² See Cary Coglianese et al., *Seeking Truth for Power: Informational Strategy and Regulatory Policymaking*, 89 MINN. L. REV. 277, 277 (2004) (noting that “information is the lifeblood of regulatory policy”).

well worth closer inspection by policymakers.⁶³ Such a policy would be best implemented globally, in a way that covers all nations and all greenhouse gases, but even a cap-and-trade policy at the national level in the United States would be better than the uncoordinated status quo. Under a domestic upstream cap-and-trade approach, the federal government would establish a national cap on the production and sale of carbon-based and other GHG fuels, but would allow energy companies to trade and bank fuel allowances. As described in a recent policy analysis by economist Robert Stavins, such a comprehensive upstream cap-and-trade would encompass the entire economy, phase in caps over time to allow for planning and encourage innovation, and would accommodate uncertainties by allowing banking and trading as well as by using multi-year compliance periods.⁶⁴

Capping fuels upstream has several advantages. Perhaps most importantly, it is administratively feasible, while capping emissions “downstream” is not, due to the millions of emissions sources that would need to be monitored. In addition, because a comprehensive upstream cap-and-trade would cover the entire economy, it would prevent leakage in a way that piecemeal approaches cannot.⁶⁵ Yet as with piecemeal approaches, an upstream cap-and-trade recognizes that central policymakers lack full information. The flexibility built into a cap-and-trade system gives private actors, who have better information, the ability and the incentive to find new ways to adapt to fuel constraints.

To be sure, private actors might respond to the flexibility of a cap-and-trade system by adopting technologies that pose new kinds of risks.⁶⁶ For example, one could easily imagine market actors converting the nation’s lighting to fluorescent light bulbs,

⁶³ Our discussion of an upstream cap-and-trade policy in this part of the article illustrates simply one promising policy we think would be less prone to the perils of incrementalism we have highlighted in this article. Given space constraints, our discussion clearly does not reflect the type of comprehensive policy *analysis* that should precede selection of a cap-and-trade proposal or any other policy over other potential alternatives, such as fuel or emissions taxes.

⁶⁴ ROBERT N. STAVINS, A U.S. CAP-AND-TRADE SYSTEM TO ADDRESS GLOBAL CLIMATE CHANGE 14 (2007), http://www.brookings.edu/~media/Files/rc/papers/2007/10climate_stavins/10_climate_stavins.pdf.

⁶⁵ *Id.* at 18–19.

⁶⁶ For a discussion of the risks that can arise in response to an upstream cap-and-trade system, see David M. Driesen & Amy Sinden, *The Missing Instrument: Dirty Input Limits*, 32 HARV. ENVTL. L. REV. (forthcoming 2009), SSRN manuscript at 38–40, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1102299.

with the same kind of side effects that would result from a focally incremental prescription imposed by a central policymaker. As such, vigilance will still be needed. Policy makers need to continue to monitor for such side effects from the introduction of unsafe products. But these side effects will be easier to address through ordinary regulatory oversight of market activities because they would arise from market innovation rather than legislative prescription. Unsafe technologies that are “locked-in” by legislation require new legislation to address them; such technologies introduced by private actors require only responsive action by regulatory agencies charged with administering their normal safety missions.

Lulling will be less of a concern too. Once there is support for a comprehensive cap-and-trade program, the regulated firms themselves determine and implement their own response, without the need for building additional public support. By designing the system to include increasingly more stringent limits over time on the production and sale of carbon-based and other GHG fuels, an upstream cap-and-trade system would continually give economic actors the incentive to search for better solutions.

Although a coordinated approach like an upstream cap-and-trade regime will better avoid the perils associated with incrementalism, we can imagine several responses from adherents of incrementalism and democratic experimentalism. First, some incrementalists might fully support an upstream cap-and-trade, but nevertheless argue that the current incrementalist path is the only (or the quickest) way to see it implemented.⁶⁷ Current ad hoc policies, it might be suggested, both signal intense public demand for a response to climate change and also change the political dynamic in Washington. Under this view, as disjointed policies proliferate, industry can be expected to support a centralized approach over the minefield of diffuse, ad hoc policies. Despite the plausibility of this argument, we find it unconvincing for reasons we have already discussed, such as the countervailing lock-in effect.⁶⁸ Moreover, taking more action at

⁶⁷ See Engel, *supra* note 2, at 1564–65 (arguing that state-initiated climate change litigation is likely to be just as effective if not more effective than positive regulation and that third-party GHG emissions offsets can function well until a federal regulatory program is adopted).

⁶⁸ See *supra* Part II.E.

the state level hardly seems necessary to generate additional support for comprehensive federal legislation. It is hard to imagine climate change gaining more prominence on the political agenda in Washington or climate change policies eliciting more political support than they have right now. National policymakers no longer debate the question of whether climate change is a problem. Indeed, candidates from both parties in pursuit of the White House in 2008 have pledged to address climate change.⁶⁹ Because those in Washington, the public, and industry are already clamoring for a definitive response, each additional incremental response will bring only marginally more pressure on the center—and as we have suggested, incremental responses can also quite likely to undermine further action if the public becomes lulled into thinking the problem is getting solved through numerous ad hoc responses.⁷⁰

Second, incrementalists might object that it is risky to do nothing while waiting for a comprehensive cap-and-trade solution, since support for such a solution might never materialize, even under the most supportive political conditions. Incrementalists might argue that piecemeal state policies, even if some of the policies are largely symbolic, at least represent *something*—and something is better than nothing.⁷¹ Yet an incremental “something” is hardly appealing if it locks in ineffective programs that will be difficult to displace.⁷² Furthermore, side effects from myopic policies, either on climate change or

⁶⁹ See Hillary for President, Powering America’s Future: Hillary Clinton’s Plan to Address the Energy and Climate Crisis, <http://www.hillaryclinton.com/files/pdf/poweringamericasfuture.pdf> (last visited May 22, 2008); McCain, Climate Change, <http://www.johnmccain.com/Informing/Issues/da151a1c-733a-4dc1-9cd3-f9ca5caba1de.htm> (last visited May 22, 2008); Obama ’08, Energy & Environment, <http://www.barackobama.com/issues/energy/> (last visited May 22, 2008); see also Scott Horsley, 2008 Election Issues: Climate Change, NPR, Jan. 30, 2008, <http://www.npr.org/news/specials/election2008/issues/climate.html> (mapping the candidates’ approach to climate change).

⁷⁰ See *supra* Part II.F.

⁷¹ See, e.g., *Massachusetts v. EPA*, 127 S. Ct. 1438, 1458 (2007) (reasoning that concerns over the potential ineffectiveness of a motor vehicle emission standard are unfounded because any “reduction in domestic emissions would slow the pace of global emissions increases, no matter what happens elsewhere”).

⁷² See Wiener, *supra* note 8, at 1974 (explaining that while experiments might be helpful, if the state policies are not compatible, experiments might also “generate conflicting approaches and vested interests that are difficult to reconcile and mesh in a larger national or international regime”).

other societal concerns, can set back progress, sometimes significantly.⁷³ When scientists predict that the catastrophic effects of global warming loom just over the horizon, there is little time to learn and adjust in response to the trials and errors of incremental experiments.⁷⁴

Conclusion

Although it may seem to take more time to develop an effective, coordinated system than to adopt piecemeal approaches, the total time to make meaningful improvements in climatic conditions may prove to be less than if we continue to proceed on a piecemeal basis. Settling on a comprehensive solution through trial-and-error will demand significant time due to the need to evaluate and adjust incremental policies. A better alternative appears to be analyzing and building support for a comprehensive, upstream cap-and-trade that is able to achieve some of the benefits of incrementalism by allowing market actors some flexibility, but without falling prey to many of the perils of incrementalism.

State experimentation has been described as one of the great hallmarks of the U.S. democracy.⁷⁵ However, with respect to climate change, there is good reason to doubt the appropriateness of the current ad hoc, state and local responses to this global problem. At their most benign, current incremental reforms will have little or no effect on climate change. Yet at the worst, leakage from unregulated areas can undermine the reductions made in more policy active states. As we have illustrated with the examples of the biofuel and light bulb mandates, side effects can exacerbate climate change problems or

⁷³ See *supra* Parts II.C–D.

⁷⁴ One interim step that can always be taken—and probably should have been taken years ago for climate change—would be to adopt information collection policies that would generate data helpful to policymakers, both in selecting a comprehensive policy and later in providing a basis for evaluation of subsequently adopted substantive policies. For example, the final provision in Division A, Title II of the Consolidated Appropriations Act, 2008 calls for EPA to “require mandatory reporting of greenhouse gas emissions above appropriate thresholds in all sectors of the economy of the United States.” Consolidated Appropriations Act, 2008, Pub. L. No. 110-161, 121 Stat. 1844, 2128 (2008).

⁷⁵ See *New State Ice Co. v. Liebmann*, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting) (arguing that both the framers of the Constitution and the states intended for states to be able to adapt and experiment to coincide with “progress”).

create other public health problems. Furthermore, disjointed experimentation can entrench interests and lull the public into thinking progress is being made, thus making comprehensive policymaking more challenging to achieve. Under these circumstances, it appears better to wait to develop a comprehensive and effective climate change policy rather than to continue succumbing to pressure to adopt incremental options that will ultimately prove ineffective or otherwise problematic.