

**ENVIRONMENTAL PROTECTION:
VISIONS OF GOVERNANCE
FOR THE TWENTY-FIRST CENTURY**

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June 23, 1998

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The fundamental question that needs to be addressed by public policy in the area of environmental protection as we move into the next century is, “what is the appropriate role of government?” This question emerges along three fundamental dimensions in relation to environmental protection. These questions are closely interrelated but conceptually distinct: (1) what is the appropriate *degree* of government activity; (2) what *form* should government activity take; and (3) what *level* of government should be delegated responsibility? In this brief essay, I attempt to define the scope of these questions, suggest criteria that can be used to evaluate responses, and provide outlines of initial answers.

1. WHAT IS THE APPROPRIATE DEGREE OF GOVERNMENT ACTIVITY IN THE ENVIRONMENTAL REALM?

The fundamental theoretical argument for government activity in regard to environmental protection is that environmental pollution is a classic example of an externality, and as such tends to be severely underprovided by competitive markets. Some have taken the Coase (1960) theorem, however, as suggesting that private negotiation will internalize such externalities without government intervention. But the frequency of significant transaction costs, income effects, and multi-party externalities in the environmental realm

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means that private negotiation will not provide a socially desirable level of environmental quality. For related reasons, exclusive reliance on judicial remedies is insufficient to the task. As a result, since the time of the first Earth Day in 1970, the beginning of the modern era of environmental policy, industrialized countries throughout the world have relied mainly on a combination of legislative and administrative procedures to foster improvements in their natural environments.

If it is appropriate for government to be involved in environmental protection, how intensive should that activity be? In real-world environmental policy, this question becomes, “How stringent should our environmental goals and standards be?” For example, in the United States, should we cut back sulfur dioxide (SO₂) emissions by 10 million tons, or would a 12 million ton reduction be better? In general, how clean is clean enough? How safe is safe enough?

Most economists would argue that economic efficiency — measured as the difference between benefits and costs — ought to be one of the fundamental criteria for evaluating proposed environmental, health, and safety regulations.¹ Because society has limited resources to spend on regulation, benefit-cost analysis can help illuminate the trade-offs involved in making different kinds of social investments. In this regard, it seems irresponsible *not* to conduct such analyses, since they can inform decisions about how scarce resources can be put to the greatest social good. Benefit-cost analysis can also help answer the question of how much regulation is enough. From an efficiency standpoint, the answer to this question is simple — regulate until the incremental benefits from regulation are just offset by the incremental costs. In practice, however, the problem is much more difficult, in large part because of inherent problems in measuring marginal benefits and costs. In addition, concerns about fairness and process may be important

¹See: Arrow, Cropper, Eads, Hahn, Lave, Noll, Portney, Russell, Schmalensee, Smith, and Stavins (1996).

non-economic factors that merit consideration. Regulatory policies inevitably involve winners and losers, even when aggregate benefits exceed aggregate costs.

There is little doubt that a reallocation of expenditures on environmental, health, and safety regulations has the potential to save significant numbers of lives while using fewer resources. As can be seen in Table 1, the estimated cost per statistical life saved has varied across regulations by a factor of more than ten million! Thus, a reallocation of priorities among these same regulations could save many more lives at given cost, or, alternatively, save the same number of lives at much lower cost.

Over the years, policy makers have sent mixed signals regarding the use of benefit-cost analysis in policy evaluation. Congress has passed several statutes to protect health, safety, and the environment that effectively preclude the consideration of benefits and costs in the development of certain regulations, even though other statutes actually require the use of benefit-cost analysis.² At the same time, Presidents Carter, Reagan, Bush, and Clinton all introduced formal processes for reviewing economic implications of major environmental, health, and safety regulations. Apparently the Executive Branch, charged with designing and implementing regulations, has seen a greater need than the Congress to develop a yardstick against which the efficiency of regulatory proposals can be assessed; benefit-cost analysis has been the yardstick of choice.

Although formal benefit-cost analysis should *not* be viewed as either necessary or sufficient for designing sensible public policy, it can provide an exceptionally useful framework for consistently organizing

²Statutes that have been interpreted to restrict the ability of regulators to consider benefits and costs include: the Federal Food, Drug, and Cosmetic Act (Delaney Clause); health standards under the Occupational Safety and Health Act; safety regulations from National Highway and Transportation Safety Agency; the Clean Air Act; the Clean Water Act; the Resource Conservation and Recovery Act; the Safe Drinking Water Act; and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). On the other hand, the Consumer Product Safety Act, the Toxic Substances Control Act, and the Federal Insecticide, Fungicide, and Rodenticide Act explicitly allow regulators to consider benefits and costs.

disparate information, and in this way, it can greatly improve the process and hence the outcome of policy analysis. If properly done, benefit-cost analysis can be of great help to agencies participating in the development of regulations, and it can likewise be useful in evaluating agency decision making and in shaping statutes.

Despite such arguments, benefit-cost analysis has rarely been used by legislators or regulators to help set the stringency of environmental standards; and there is little reason to believe that the resulting environmental policies are efficient. The politics of environmental policy have favored a very different set of approaches to setting standards, such as that embraced by the Clean Air Act: set the standard to “protect the most sensitive member of the population with an adequate margin of safety.” Economists and legal scholars have spent a great deal of time arguing that such criteria are neither reasonable nor well defined, but little change has occurred.³

In the 104th Congress, a major part of the Republican’s “Contract with America” was a regulatory reform triad that included a bill that would have made meeting a benefit-cost test a *necessary condition* for a broad set of regulatory actions. That bill was narrowly defeated in the Senate, and would have faced a certain Presidential veto, in any case. However, the Small Business Regulatory Reform Act of 1996 was signed by the President, and provides an opportunity for the Congress to pass legislation that nullifies a regulation that does not pass a benefit-cost test (the nullification itself is then subject to possible Presidential veto, like any act of Congress). That legislation has yet to be tested. Also, the current Congress is considering a bill introduced by Senators Fred Thompson (R-TN) and Carl Levin (D-MI); the bill would require agencies to conduct benefit-cost and risk analysis on new regulations and periodically review

³The significant heterogeneity of costs per life saved under existing statutes, portrayed in Table 1, suggests that in the absence of a benefit-cost test aimed at achieving efficiency, much could be accomplished through greater attention to simple cost-effectiveness, that is, achieving given goals or standards at minimum total cost.

existing ones. Congressional efforts at such generic “regulatory reform” will likely continue, and there will continue to be periodic attempts to introduce benefit-cost tests into individual environmental statutes, such as those that will be up for reauthorization in the current Congress (the Clean Water Act, the Endangered Species Act, and CERCLA).

Finally, and importantly, proposals for this flavor of regulatory reform — the use of a benefit-cost test for setting environmental standards — have been finding a much more receptive audience in many states. Indeed, as of the summer of 1996, some 25 of 35 states surveyed reported significant environmental regulatory reform efforts, defined as including the establishment of benefit-cost criteria for promulgation of regulations (Graham and Loevzel 1997).

2. WHAT FORM SHOULD GOVERNMENT ACTIVITY TAKE IN THE ENVIRONMENTAL REALM?

Once the goals or standards of any given environmental policy are established (whether on political, scientific, economic, ethical, or any other grounds), policy makers are left to ask what *form* should government involvement take. In other words, what means — what policy instruments — should be used to achieve the established ends?

Economists consistently have urged the use of “market-based” instruments — principally pollution taxes and tradeable permits — rather than so-called “command-and-control” instruments, such as design standards, which require the use of particular technologies, or performance standards, which prescribe the maximum amount of pollution that individual sources can emit. At least in theory, market-based instruments are cost effective, that is, they minimize the aggregate cost of achieving a given level of environmental protection, and provide dynamic incentives for the adoption and diffusion of cheaper and better control

technologies. Despite these advantages, however, market-based instruments have been used far less frequently than command-and-control standards.⁴

Gradually, the political process has become more receptive to market-based instruments. Beginning in the 1970's, the U.S. Environmental Protection Agency (EPA) offered states the option of employing variants of tradeable permits for the control of localized, criteria air pollutants. More significantly, tradeable-permit systems were used in the 1980's to accomplish the phasedown of lead in gasoline, and to facilitate the phaseout of ozone-depleting chloroflourocarbons (CFC's); and in the 1990's to implement stricter air pollution controls in the Los Angeles metropolitan region, and — most important of all — to control acid rain under the Clean Air Act amendments of 1990 (Table 2). This last program — the trading of sulfur dioxide (SO₂) emissions allowances to reduce acid rain — is saving the country \$1 billion per year in compliance costs, while achieving the statutory goal more quickly than could have been accomplished by a conventional, command-and-control (CAC) approach.

Given the historical lack of receptiveness by the political process to market-based approaches to environmental protection, why has there been a relatively recent rise in the use of market-based approaches?⁵ As professional researchers and teachers, it would be gratifying to believe that increased understanding of market-based instruments had played a large part in fostering their increased political acceptance, but how important has this really been? In 1981, Steven Kelman surveyed Congressional staff members, and found that support and opposition to market-based environmental policy instruments was based largely on ideological grounds: Republicans who supported the concept of economic-incentive

⁴Diverse factors have caused command-and-control instruments to so dominate environmental regulation. See: Keohane, Revesz, and Stavins (1998).

⁵For a more thorough exploration of the answers to this question, see: Stavins (1998).

approaches offered as a reason the assertion that “the free market works,” or “less government intervention” is desirable, without any real awareness or understanding of the economic arguments for market-based programs. Likewise, Democratic opposition was largely based upon analogously ideological factors, with little or no apparent understanding of the real advantages or disadvantages of the various instruments. What would happen if we were to replicate Kelman’s survey today? My refutable hypothesis is that we would find increased support from Republicans, greatly increased support from Democrats, but insufficient improvements in understanding to explain these changes.⁶ So what else has mattered?

First, one factor has surely been increased pollution control costs, which have led to greater demand for cost-effective instruments. By the late 1980’s, even political liberals and environmentalists were beginning to question whether CAC regulations could produce further gains in environmental quality. During the previous twenty years, pollution abatement costs had continually increased, as stricter standards moved the private sector up the marginal cost-of-control function. By 1990, U.S. pollution control costs had reached \$125 billion annually, nearly a 300% increase in real terms from 1972 levels (U.S. Environmental Protection Agency 1990).

Second, a factor that became important in the late 1980’s was strong and vocal support from some segments of the environmental community. That crucial support can be attributed — in part — to effective “niche-seeking” by environmental groups (Keohane, Revesz, and Stavins 1998). By supporting tradeable permits for acid rain control, the Environmental Defense Fund (EDF) seized a market niche in the environmental movement, and distinguished itself from other groups.⁷ Related to this, a third factor was

⁶But there has been some increased understanding of market-based approaches among policy makers. This has partly been due to increased understanding by their staffs, a function — to some degree — of the economics training that is now common in law schools, and of the proliferation of schools of public policy (Hahn and Stavins 1991).

⁷The strategy paid off. When the memberships (and financial resources) of other environmental advocacy groups subsequently declined with the election of the environmentally-friendly Clinton-Gore Administration, EDF continued to prosper and grow (Lowry 1993).

that the SO₂ allowance trading program, the leaded gasoline phasedown, and the CFC phaseout were all designed to *reduce* emissions, not simply to *reallocate* them cost-effectively among sources. Market-based instruments are most likely to be politically acceptable when proposed to achieve environmental improvements that would not otherwise be feasible (politically or economically).

Fourth, deliberations regarding the SO₂ allowance system, the lead system, and CFC trading differed from previous attempts by economists to influence environmental policy in an important way: the separation of ends from means, i.e. the separation of consideration of goals and standards from the policy instruments used to achieve those standards. By accepting — implicitly or otherwise — the politically identified (and potentially inefficient) goal, the ten-million ton reduction of SO₂ emissions, for example, economists were able to focus successfully on the importance of adopting a cost-effective means of achieving that goal. The risk, of course, was “designing a fast train to the wrong station.”

Fifth, acid rain was an unregulated problem until the SO₂ allowance trading program of 1990; and the same can be said for leaded gasoline and CFC’s. Hence, there were no existing constituencies — in the private sector, the environmental advocacy community, or government — for the *status quo* approach, because there was no *status quo* approach. We should be more optimistic about introducing market-based instruments for "new" problems, such as global climate change, than for existing, highly regulated problems, such as abandoned hazardous waste sites.

Sixth, by the late 1980's, there had already been a perceptible shift of the political center toward a more favorable view of using markets to solve social problems. The Bush Administration, which proposed the SO₂ allowance trading program and then championed it through an initially resistant Democratic Congress, was (at least in its first two years) “moderate Republican;” and phrases such as “fiscally responsible environmental protection” and “harnessing market forces to protect the environment”

do have the sound of quintessential moderate Republican issues.⁸ But, beyond this, support for market-oriented solutions to various social problems had been increasing across the political spectrum for the previous fifteen years, as was evidenced by deliberations on deregulation of the airline, telecommunications, trucking, railroad, and banking industries. Indeed, by 1990, the concept (or at least the phrase), “market-based environmental policy,” had evolved from being politically problematic to politically attractive.

Seventh, the adoption of the SO₂ allowance trading program for acid rain control — like any major innovation in public policy — can partly be attributed to a healthy dose of chance that placed specific persons in key positions, in this case at the White House, EPA, the Congress, and environmental organizations.⁹ The result was what remains the golden era for market-based environmental strategies.

Finally, no particular form of government intervention, no individual policy instrument — whether market-based or conventional — is appropriate for all environmental problems. Which instrument is best in any given situation depends upon a variety of characteristics of the environmental problem, and the social, political, and economic context in which it is being regulated (Hockenstein, Stavins, and Whitehead 1997). There is no policy panacea. Indeed, the real challenge for bureaucrats, elected officials, and other participants in the environmental policy process comes in analyzing and then selecting the right instrument for each situation that arises.

⁸The Reagan Administration enthusiastically embraced a market-oriented ideology, but demonstrated no interest whatsoever in employing actual market-based policies in the environmental area.

⁹Within the White House, among the most active and influential enthusiasts of market-based environmental instruments were: Counsel Boyden Gray and his Deputy John Schmitz, Domestic Policy Adviser Roger Porter, Council of Economic Advisers (CEA) Member Richard Schmalensee, CEA Senior Staff Economist Robert Hahn, and Office of Management and Budget Associate Director Robert Grady. At EPA, Administrator William Reilly — a “card-carrying environmentalist” — enjoyed valuable credibility with environmental advocacy groups; and Deputy Administrator Henry Habicht was a key, early supporter of market-based instruments. In the Congress, Senators Timothy Wirth and John Heinz provided high-profile, bi-partisan support for the SO₂ allowance trading system and, more broadly, for a wide variety of market-based instruments for various environmental problems through their “Project 88” (Stavins 1988). And, finally, in the environmental community, EDF Executive Director Fred Krupp, Senior Economist Daniel Dudek, and Staff Attorney Joseph Goffman worked closely with the White House to develop the initial allowance trading proposal.

3. WHAT LEVEL OF GOVERNMENT SHOULD BE RESPONSIBLE IN THE ENVIRONMENTAL REALM?

Inseparable from the first two questions is this third aspect of the overall inquiry into the proper role of government. What *level* of government should be delegated responsibility and authority: local, state, regional, Federal, multinational, or global? As above, there is no common answer. Even from a relatively narrow economic perspective, the answer will depend upon specific characteristics of individual environmental policy issues. Unfortunately, the debates on this question have often been analytically flawed, with the result that significant mistakes have been made in identifying desirable levels of government authority.

What I have defined as the beginning of the modern era of environmental policy, the time of the first Earth Day in 1970, is also the beginning of major involvement by the Federal government in the United States in environmental protection. At that time and since, three sets of arguments have been made in favor of a strong Federal role: (1) that in the absence of national controls, states would compete economically by lowering their environmental standards in a so-called, "race to the bottom;" (2) that many environmental problems are inter-state externalities, and as such cannot be efficiently regulated by individual states; and (3) that a set of other factors, many linked with public choice arguments, also indicate the necessity of strong, national supervision. We examine these various rationales, in turn.¹⁰

3.1 The Race-to-the-Bottom Rationale

First, the race-to-the-bottom rationale, invoked explicitly and frequently in Congressional debates since 1970, maintains that — if left to their own devices — states and localities will attempt to induce (geographically mobile) firms to locate or relocate within their boundaries in order to benefit from private

¹⁰A significant part of the discussion in this part of the paper draws on Revesz (1997).

and public economic rewards by offering those firms suboptimally lax environmental standards. This argument, which continues to be compelling for many political leaders, is theoretically flawed (Revesz 1992) and empirically invalid.

In terms of theory, individual jurisdictions have incentives to set standards efficiently (Oates and Schwab 1988), despite the significant mobility of capital, partly because individuals are also mobile; they move in search of jurisdictions with favorable levels of environmental protection (Tiebout 1956). It is possible, however, that in particular instances, interstate competition might take on the structure of a prisoner's dilemma: a non-cooperative game with a dominant strategy that is socially undesirable, i.e. states might be induced to choose environmental standards that are undesirably (inefficiently) lax (Markusen, Morey, and Olewiler 1995). It is equally plausible, however, that under other conditions, strategic behavior by states would lead to standards that are excessively (inefficiently) strong (Revesz 1997). Finally, even if states did systematically adopt suboptimal (excessively lax) standards, there is no reason to assume that Federal environmental regulation would improve the situation, since the result will be that states would compete in other regulatory spheres or in terms of fiscal conditions (Levinson 1997).

Even if the "race-to-the-bottom" rationale made sense theoretically, it is empirically irrelevant. A significant literature of statistical studies has produced no evidence whatsoever that firms move their plants or establish new ones in response to differences among jurisdictions in their environmental standards (Jaffe, Peterson, Portney, and Stavins 1995). The major reason for this is that differences in environmental compliance costs across jurisdictions (even internationally, where the differences are much, much greater) are trivial compared with differences in other costs, such as for labor and conventional capital.

3.2 The Interstate Externality Rationale

A second rationale for a dominant Federal role in environmental regulation is that many environmental problems are inter-state externalities, and as such cannot be efficiently regulated by individual states. In cases where such externalities exist, there is a solid theoretical argument for Federal primacy (assuming that states cannot for some reason engage successfully in Coasian negotiations). But actual Federal regulation has done little to mitigate these interstate externalities, and may indeed have exacerbated them (Revesz 1996).

First of all, we would anticipate a strong Federal role for those environmental problems that are characterized by interstate movements. But highly localized environmental problems, including abandoned hazardous waste sites and local air pollution, are among those most strictly regulated by the Federal government (Donahue 1997). In actual implementation, the Federal role is considerably weaker under those parts of the Clean Air Act that arguably cover interstate pollutants.

The Clean Air Act is the statute intended to deal with kinds of pollution that give rise to the most serious interstate externalities. The National Ambient Air Quality Standards (NAAQS) are not targeted to address interstate air movements; and the Act's emission standards focus exclusively on emissions from individual sources, but place no constraints on numbers or locations of sources. Furthermore, as is now well known, the ambient standards gave strong incentives for sources to increase their stack heights (and for states to encourage them to do so), thereby increasing long-distance transport of air pollutants. Because of this, it is not an exaggeration to say that the Clean Air Act, as developed in the 1970's, was a principal cause of what later came to be known as acid rain (Ackerman and Hassler 1991).

On the other hand, the interstate externality argument is solid in the case of acid rain, a problem which clearly would never have been addressed by the SO₂ emitting states in the Ohio Valley and never could have been addressed by the acid rain receiving states in the Northeast. The Federal response in the

Clean Air Act amendments of 1990 was appropriate and successful. Likewise, there is a sound interstate externality argument for Federal involvement in the case of endangered species and other ecological amenities that exhibit significant non-use values held by out-of-state residents (Revesz 1997).

3.3 Public Choice and Related Rationales

The "public choice" argument is that even in the absence of mobile capital (and any race to the bottom) and any interstate externalities, state political processes systematically undervalue the benefits of environmental protection and/or overvalue the costs, compared with Federal political processes, *and* that the outcome of the Federal process is socially more desirable (Revesz 1997). One of the factors presumably at work is that environmental advocacy groups are more effective at the national level (Stewart 1977). But positive political economy provides no support for the assertion that environmental interests will be under-represented at the state or local level. Moreover, on empirical grounds, it is increasingly clear that "state politics has been transformed in ways that make it much more likely that pollution and conservation issues will have a permanent place on the political agenda, independent of federal action" (Graham 1997, p. 3).

It has also been suggested that centralization of environmental regulation brings with it significant economies of scale. Although there may be some scale economies at early stages of the regulatory process, such as determining the adverse effects of particular pollutants, it is difficult to argue that such scale economies are significant in the standard setting and subsequent stages. Furthermore, centralization also brings with it potentially significant social costs: centralized regulation is likely to be uniform, ignoring differences among jurisdictions in the benefits they derive and costs they face in improving environmental quality.

The national uniformity which Federal regulation typically brings to environmental standards can be desirable for product standards, because of significant economies of scale in production. Indeed the U.S. auto industry has frequently been supportive of more stringent national (air pollution technology) standards as a way of heading off differentiated state-level standards. But most environmental standards are process (performance) standards, where the focus is on the environmental consequences of the manner in which goods and services are produced, rather than the environmental consequences of the goods themselves. And here the scale economy argument disappears.¹¹

Perhaps at the root of many of the rationales for a national approach to environmental regulation is the notion that the Federal government should ensure that all citizens have a minimum level of environmental protection (Stewart 1977). Although it can be argued that a minimum level of health ought to be considered a basic right, environmental risk is only one small component of health risks. Given the fact that much more could be done for health in the United States through investments in immunization programs and prenatal care than through equal investments in more stringent environmental regulations, this rationale does not support a strong Federal role in environmental protection.

3.4 Which Level of Government is Appropriate?

Having said quite a bit about how *not* to think about identifying the appropriate level of government intervention, it is necessary to say something about how one can address this important question.¹² As suggested above, the existence of transboundary externalities provides a potentially compelling argument for higher levels of environmental authority. More generally, the question that frequently needs to be asked

¹¹The "poster child" of perverse uniform standards may be the requirement (until recently) under the Safe Drinking Water Act for all localities to test for an identical set of contaminants, with the result that Nebraska water systems were required to carry out expensive periodic tests for pesticides used only on pineapple production.

¹²This question of which *level* of government activity is appropriate applies, as well, to the first two questions addressed in this essay. That is, it is important to ask which level of government should establish goals and standards, and at which level of government should instruments be implemented.

is to what degree does the pollutant in question mix uniformly in its receiving "reservoir" (airshed or watershed).

For pollutants that are completely local, such as most hazardous waste sites, local air pollutants, and many water pollutants, the rebuttable presumption should be that local regulation will be most desirable. Indeed, land use and solid waste disposal have always been under exclusive local jurisdiction. Other problems are fundamentally interstate, such as acid rain (from its SO₂ and nitrogen oxide precursors) and in some cases ambient ozone (smog). Here there may be a solid argument for national regulation, as in the case of acid rain, but it may also be that innovative forms of regional cooperation can be helpful, as in the case of the Ozone Transport Assessment Group (OTAG), in which thirty-seven Eastern, Midwestern, and Southern states worked together on a solution to transregional smog.

Other environmental problems are clearly international in their dimensions, including pollution in the Colorado River moving from the United States to Mexico, acid rain moving from the United States to Canada, and air and water pollutants of all kinds in the smaller international scale of the European Union. Here bilateral or multilateral treaties are appropriate. Finally, for a small but potentially very important set of environmental problems that are uniformly mixed in the atmosphere and are truly global commons problems, only global regulation is truly satisfactory. Indeed, in the case of global climate change due to the greenhouse effect, there are compelling arguments that unilateral, bilateral, or multilateral agreements — anything less than global agreements — will not only be excessively costly, but ultimately unproductive (Stavins 1997).

As with the first two questions addressed in this essay, there is no single answer. Indeed, when single answers are proposed — either for or against Federal involvement — it is likely that the thinking behind the proposal is ideological, not analytical.

3.5 Trends in the Level of Government: Is Environmental Devolution Real?

Although the resistance from national environmental advocacy groups, the Federal bureaucracy, and other elements is significant, the trend of increasing environmental regulatory activity at the state and local level is unmistakable. It has been estimated, for example, that about 70 percent of important environmental legislation enacted by the states in the past several years has had nothing to do with Federal policy, and that no more than 20 percent of the \$10 billion the states are now spending annually on environmental and natural resource issues comes from the Federal government (Graham 1997).

The one major element of the Republicans' regulatory triad to emerge successfully from the 104th Congress was the Unfunded Mandates Reform Act of 1995, signed into law by President Clinton. Despite this Act's severe limitations,¹³ the direction of movement is clear. Also, the only major environmental statute enacted during Clinton's first term — the 1996 amendments to the Safe Drinking Water Act of 1974 — provided for reduced Federal authority and increased state and local discretion along a number of dimensions (U.S. Environmental Protection Agency 1997). Similar changes are under consideration in the Congress for three other statutes: the Clean Water Act, the Endangered Species Act, and CERCLA (the Superfund law). In reference to the first two questions addressed in this essay, it should be recalled that the locus of regulatory reform activity has moved from Washington to the states, and deliberations and actions on market-based environmental policy instruments are now common place in state and local governments.

4. CONCLUSION

¹³A major purpose of the Act is to make it more difficult for Congress to enact new regulations without providing additional appropriations, but because of statutory exemptions, more than two-thirds of major unfunded mandates will fall outside the Act's provisions.

In a paper such as this that poses questions but provides only preliminary answers, it is not an easy task — nor a wise one — to draw conclusions. Instead, I will speculate briefly on what all of this may imply, in two domains of considerable concern to institutions such as my own: research and outreach to the policy community. I address the three principal questions of this essay, but in reverse order.

First, with regard to the appropriate *level* of government authority, more research is needed, both in normative and positive terms, since our understanding of this area does not seem sufficient for the policy tasks we face. Even more can be done in the world of outreach. As is so often the case, the lag is great between what is known (by scholars and others) and what is communicated effectively to relevant, political audiences.

With regard to the *form* that government activity should take, research needs are still considerable. In the normative domain, economic research needs to focus more than it has on the design of market-based environmental policy instruments that depart from textbook models in ways that increase the likelihood of their adoption by real-world politicians, even if those instruments are thereby slightly less cost-effective. A policy instrument that appears impeccable from the vantage point of Cambridge, but proves infeasible in Washington can hardly be considered “optimal.” In terms of positive analysis, there are great needs for empirical analysis of the positive political economy of policy instrument choice, and here the need is for work that truly bridges the disciplines of economics and political science. The need for outreach work by academics on better policy instruments continues unabated, despite the fact that the political world has embraced market-based environmental instruments to a degree that was unimaginable less than a decade ago.

Finally, with regard to the appropriate *degree* of government activity, research needs surely are great in the positive realm. Whereas the normative arguments in favor of something akin to a Pareto

efficiency criterion are well developed, our understanding is limited of the causes of the positive reality of political resistance to increased reliance on benefit-cost principles in environmental, health, and safety regulation. The reason why such improved understanding would be important is that it could provide the foundation for an effective outreach effort to communicate these ideas in meaningful ways to the three critical sectors of the environmental policy community: government, private industry, and environmental advocates. If *Project 88* was successful in helping to spread the word about cost-effective, market-based policy instruments for environmental protection (Stavins 1988), then an analogous effort can, at the right time, address the much greater challenge of bringing to the policy community real understanding of the social value of efficient environmental goals and standards.

TABLE 1: RELATIVE COSTS OF SELECTED REGULATIONS

Regulation	Year Issued	Agency	Cost per life saved (Millions of 1994 Dollars)
Trihalomethane drinking water standards	1979	EPA	0.2
Children's sleepwear flammability ban	1973	CPSC	0.9
Low-altitude windshear equipment and training standards	1988	FAA	1.4
Side-impact standards for trucks, buses, and MPVs	1989	NHTSA	2.2
Ethylene dibromide drinking water standard	1991	EPA	6.3
Arsenic emissions standards for glass plants	1986	EPA	15.0
Hazardous waste listing for petroleum refining sludge	1990	EPA	30.7
Cover/move uranium mill tailings (active sites)	1983	EPA	50.1
Asbestos ban	1989	EPA	123.2
1,2 Dichloropropane drinking water standard	1991	EPA	726.8
Hazardous waste land disposal ban (1st 3rd)	1988	EPA	4,663.8
Municipal solid waste landfill standards (proposed)	1988	EPA	19,107.0
Formaldehyde occupational exposure limit	1987	OSHA	95,940.4
Hazardous waste listing for wood-preserving chemicals	1990	EPA	6,343,954.1

Agency Abbreviations. CPSC: Consumer Product Safety Commission; EPA: Environmental Protection Agency; NHTSA: National Highway Traffic Safety Administration; FAA: Federal Aviation Administration; FRA: Federal Railroad Administration; OSHA: Occupational Safety and Health Administration.

Source: U.S. Office of Management and Budget (1993)

TABLE 2: MAJOR FEDERAL TRADEABLE PERMIT SYSTEMS*

Program	Traded Commodity	Period of Operation	Environmental and Economic Effects
Emissions Trading Program	Criteria air pollutants under the Clean Air Act	1974-Present	Environmental performance unaffected; total savings of \$5-12 billion
Lead Phasedown	Rights for lead in gasoline among refineries	1982-1987	More rapid phaseout of leaded gasoline; \$250 million annual savings
Water Quality Trading	Point-nonpoint sources of nitrogen & phosphorous	1984-1986	No trading occurred, because ambient standards not binding
CFC Trading for Ozone Protection	Production rights for some CFCs, based on depletion potential	1987-Present	Environmental targets achieved ahead of schedule; effect of tp system unclear
Acid Rain Reduction	SO ₂ emission reduction credits; mainly among electric utilities	1995-Present	Environmental targets achieved ahead of schedule; annual savings of \$1 billion
RECLAIM Program	Local SO ₂ and NO _x emissions trading among stationary sources	1994-Present	Unknown as of 1997

*The RECLAIM program in southern California is a regional initiative intended to achieve Federal and state targets.

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