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HARNESSING THE MARKETPLACE

We have to do more with less

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If there was ever a time when the United States—or any other nation for that matter—could afford to consider environmental protection in isolation from costs, those days have ended. According to EPA figures, the nation now spends well over $100 billion annually to comply with federal environmental laws and regulations.

Heightened concern over the economic impact of these regulations has fostered increased caution about the regulatory burdens placed upon businesses and individuals. More than a decade of high budget deficits, sluggish productivity growth, and intensified foreign competition has spurred serious interest in alternative environmental approaches that can lower compliance costs and regulatory burdens. Citizens and policy makers have not lost sight of the benefits of environmental protection. However, they are giving greater attention to cost-effective environmental policies.

In this context, political leaders are now giving more consideration to a promising set of new environmental policies that recognize market forces not only as part of the problem, but as potentially part of the solution. Such "market-based" or "economic-incentive" policy mechanisms can, in many cases, enable environmental goals to be achieved effectively and at lower aggregate cost to society. For EPA and other federal, state, and local regulatory agencies, an important task is to do "more with less," wherever possible. Devising ways to deal with both ongoing and new environmental problems by harnessing, rather than obstructing, market forces is consistent with this goal.

The purpose of this article is to provide an overview of the major types of cost-effective, economic-incentive policy instruments that can be used to harness market forces on behalf of environmental protection. But first let's take a look at conventional environmental regulation, since any policy must be considered in the light of feasible alternatives. How does the traditional command-and-control approach work?

Conventional regulations tend to force all firms to shoulder identical shares of the pollution-control burden, regardless of the relative costs to individual companies. In effect, these regulations typically set uniform standards for firms, the most prevalent being technology-based and performance-based standards.

Technology-based standards, as the name suggests, specify the method, and sometimes the equipment, that firms must use to comply with a regulation. For example, every firm in a particular industry might be required to use the "best available technology" to control water pollution. As a more extreme example, all electric utilities might be required to employ a specific technology, such as electrostatic precipitators, to remove particulates.

The right technology in one situation may be wrong in another.

A performance standard, on the other hand, sets a uniform control target for firms while allowing them some latitude in how they meet it. Such a standard might set a limit on the allowable units of a pollutant that can be released per time period, but no limit on the means by which this goal is achieved.

Holding all firms to the same target can be expensive and in some circumstances counterproductive. Uniform standards can effectively limit emissions of pollutants, but they typically exact relatively high costs to society in the process by forcing some firms to resort to unduly expensive means of controlling pollution. The reasons are simple: The costs of controlling emissions may vary greatly between firms, and even within the same firm, and the right technology in one situation may be wrong in another. Indeed, the cost of controlling a given pollutant may vary by a factor of 100

or more, depending on the age and location of the plants involved and the control technologies available.

Possibly an even more serious drawback: Conventional regulations tend to freeze the development of technologies that could provide greater levels of control. When the focus is on conforming to standards, little or no financial incentive exists for firms to exceed their control targets. In fact, a firm that successfully tries out a new technology may be "rewarded" by being subsequently held to a higher standard of performance, with little opportunity to benefit financially from its investment. As a result, dollars that might have been invested in technology development are diverted to legal battles over the definition of acceptable technologies and standards of performance.

On the other hand, some environmental problems are highly localized and attributable to pollution from individual sources. In such cases, a command-and-control approach, such as a source-specific emission limit, may be the preferred policy.

Command-and-control regulations target the individual polluter. Let's now consider market-based policies, which characteristically aim at what is often the real target of concern: the overall amount of pollution for a given area. What we care about most, after all, is not how much pollution the local factory emits, but the quality of the air we breathe.

Incentive-based approaches seem virtually tailor-made for aggregate pollution problems over a large area (for example, acid rain). Under a market-based approach, the government establishes financial incentives so that firms in an entire industry or region are driven to take the necessary steps to reduce the aggregate level of pollution to a desired level. Then, as with any regulatory system, the government monitors and enforces compliance.

In policy terms, market-based instruments achieve the same *aggregate* level of control as might a command-and-control approach, but they permit the burden of pollution control to be shared more efficiently among firms. In economic terms, they provide market incentives for the greatest reductions in pollution by those firms that can do so most cheaply. The result is cost-effective because fewer total economic resources are used to achieve the same level of pollution control—or, alternatively, more pollution control is obtained for the same level of resources.

Theoretically, the government could achieve a similarly cost-effective solution by setting different standards for individual firms, so that the costs of additional increments of pollution control would be distributed "equitably." However, this would require detailed information about the control costs each firm faces—information that the government lacks and could obtain only at great cost, if at all. Market-based policies provide a way out of this impasse because by their very nature they lead to the cost-effective allocation of pollution-control costs among firms.

By forcing firms to factor environmental costs into their decision making, market-based policies create powerful incentives for firms to find cleaner production technologies. Such policy instruments can also help elucidate the environmental debate for the general public by focusing attention on environmental goals rather than on technicalities, which become primarily the worry of the firms involved.

But market-based systems do not represent a *laissez-faire* approach to solving pollution problems. A market-based approach recognizes that environmental problems can be traced to market failures—cases where the decision-making processes of firms and consumers do not reflect the consequences of those decisions for society. Incentive-based policies reject the notion that such failures justify "scrapping" market forces and dictating the behavior of firms or consumers. Instead, they provide businesses and consumers with freedom of choice in determining the best ways to reduce pollution.

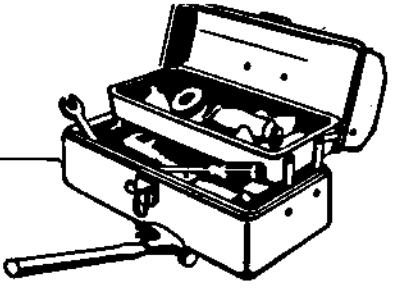
Market-based mechanisms come in a variety of forms: pollution charges; tradeable permits; deposit-refund systems; removal of government barriers to market activity; and elimination of government subsidies. Each of these warrants serious consideration.

Pollution Charges

Producers of pollution can be charged a fee or a tax on the *amount* of pollution they generate (not simply on their pollution-generating activities). This makes it worth their while to reduce pollution to the point where their expenditures for additional increments of pollution control are equal to the pollution tax rate. As a result, firms will attain different degrees of control, depending on whether their control costs are high or low. An effective pollution charge system minimizes the aggregate costs of pollution control *and* gives firms ongoing incentives to develop and adopt newer and better pollution-control technologies.

Pollution charges potentially offer an additional advantage over conventional environmental-policy mechanisms: They can generate substantial revenues for government. Applied together with proportionate reductions in other taxes, they can be used to introduce revenue-neutral policy changes—revenue-neutral in that the total revenues paid to government remain the same. The important point here is that government can reduce taxes that discourage *desirable* activities, such as labor and the generation of capital, and rely more heavily on taxes that discourage *undesirable* behavior, such as environmental pollution.

Critics say below-cost timber sales and other government subsidies promote economically inefficient and environmentally unsound resource use.



In economic terms, this policy option involves a gradual movement from "distortionary" to "corrective" taxes. Thus, pollution charges offer the possibility of a double dividend: first, environmental protection at minimum cost, and second, increased efficiency in the tax structure.

The downside of pollution charges is that in some cases, an effective system can impose a significant monitoring burden on government. Further, it is difficult to estimate in advance how large a charge will be required to obtain a desired level of pollution reduction. It may also be difficult, in a political context, to establish charges large enough to achieve given environmental objectives.

Air and water pollution charges have been adopted in France, the Netherlands, Sweden, Norway, Denmark, Finland, Italy, and West Germany. However, these countries' charge schemes have been designed primarily as revenue-raising devices rather than as environmental policy instruments. More recent European Community initiatives with energy charges are closer to true "green taxes." Potential applications in the United States include a carbon dioxide (carbon or BTU) charge to help curb greenhouse gas emissions; "environmental costing" at electrical utilities, whereby environmental impacts are factored into choices among various power-generation sources; and unit charge ("pay-as-you-throw") systems for pickup and disposal of municipal solid waste.

Tradeable Permit Systems

Unlike a charge system, a system of tradeable permits allows the government to specify an overall level of pollution that will be tolerated. This total quantity of allowable emissions or discharges is parceled out, or allotted, in the form of permits among polluters. Firms that keep their emissions levels below the allotted level may sell or lease their surplus allotments to other firms or use them to offset excess emissions in other parts of their own facilities. Such a system tends to minimize the total societal cost of achieving a given level of pollution control. Like pollution charges, permit systems can be used to improve environmental quality, not just to maintain the status quo.

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If the number of regulated sources of emissions is great, the administrative (transaction) costs of tradeable permit systems can be very high. On the other hand, if very few sources are involved, certain firms may heavily dominate the permit market, and the result may be noncompetitive behavior and consequent inefficiencies. Finally, regulators must decide how to allocate permits among sources. Should they be given away as an endowment, or should they be sold through an auction? If they are distributed free of charge, what criteria should be used in the allocation?

Tradeable permits have been used primarily in the United States under EPA's emissions trading programs, in the nationwide phasedown of lead in automotive fuel, and in chlorofluorocarbon (CFC) reduction initiatives. Most recently, of course, Congress has enacted a sulfur dioxide tradeable allowance system for acid-rain control, expected to save the economy up to $1 billion per year.

Other potential applications for tradeable permits include point- and nonpoint-source water-pollution control; control of global climate change through international trading greenhouse gas permits; and recycling credits (which combine recycling targets with tradeable permits).

Deposit-Refund Systems

Nine states, several Canadian provinces, and a number of European nations have enacted bottle bills to reduce littering with beverage containers. In effect, purchasers of potentially polluting products pay a surcharge, which is refunded when the product is returned to an approved center for recycling or proper disposal. Deposit-refund systems eliminate or reduce the incentive for illegal "midnight dumping," which admittedly exists under a pollution charge system.

Deposit-refund systems could be used for containerized hazardous waste and for some other forms of solid waste. Lead-acid batteries, used motor-vehicle oil, vehicle tires, and industrial solvents are potential candidates. Rhode Island and Maine have enacted deposit-refund systems for automobile batteries, and Maine has a system for commercial-size pesticide containers.[1] Denmark has such a plan for mercury and cadmium batteries, and Norway and Sweden have implemented deposit-refund systems for car bodies.

Removal of Government Barriers to Market Activity

In some cases, environmental protection could be improved simply by removing existing government-mandated barriers to market activity. Measures that facilitate the voluntary exchange of water rights, for example, can promote more efficient allocation and use of scarce water supplies while curbing the need for expensive and environmentally disruptive water supply projects.

A major market-oriented water exchange has recently been initiated in Southern California based on this

For Further Reading

The following publications provide more thorough overviews of the potential use of market-based mechanisms for environmental protection:

Anderson, Robert C., Lisa A. Hofmann, and Michael Rusin. *The Use of Economic Incentive Mechanisms in Environmental Management*. Washington, DC: American Petroleum Institute, June 1990. Available by contacting the American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005.

Moore, John L., et al. *Using Incentives for Environmental Protection: An Overview*. Washington, DC: Congressional Research Service, June 1989. Available to government employees from the Library of Congress' Congressional Research Service at (202) 707-5700. Members of the general public must make their requests through their U.S. Senator or Representative.

Stavins, Robert N., ed. *Project 88—Harnessing Market Forces to Protect Our Environment: Initiatives for the New President*. A Public Policy Study sponsored by Senator Timothy E. Wirth, Colorado, and Senator John Heinz, Pennsylvania. Washington, DC, December 1988. Available from either Senator Wirth's office, 380 Russell Senate Office Building, Washington, DC 20510, (202) 224-5852; or Robert N. Stavins, Assistant Professor of Public Policy, John F. Kennedy School of Government, Harvard University, 79 John F. Kennedy Street, Cambridge, MA 02138, (617) 495-1820.

Stavins, Robert N., ed. *Project 88—Round II, Incentives for Action: Designing Market-Based Environmental Strategies*. A Public Policy Study sponsored by Senator Timothy E. Wirth, Colorado, and Senator John Heinz, Pennsylvania. Washington, DC, May 1991. Available from (see above).

U.S. Environmental Protection Agency. *Economic Incentives: Options for Environmental Protection*. Office of Policy, Planning, and Evaluation, Economic Incentives Task Force, 21P-2001. Washington, DC, March 1991. Available from EPA's Public Information Center, 401 M Street, SW, Washington, DC 20460, (202) 260-7751.

U.S. Environmental Protection Agency. *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*. Science Advisory Board, SAB-EC-90-021. Washington, DC, September 1990. Available from EPA's Public Information Center (see above).

approach. In 1988, the Metropolitan Water District of Southern California, serving much of the Los Angeles-San Diego region, reached agreement with the Imperial Irrigation District on a $233 million water conservation and transfer arrangement, based largely upon a 1983 proposal by the Environmental Defense Fund. Similarly, properly designed comprehensive least-cost bidding at electrical utilities can promote economically rational energy generation and consumption by encouraging electric utilities to consider both conventional, supply-side augmentation of generating capacity and demand-side reductions in energy use through conservation.

Elimination of Government Subsidies

Many government subsidies promote economically inefficient and environmentally unsound development. A major example is the U.S. Forest Service's "below-cost timber sales," which recover less than the cost of making timber available for harvesting by private lumber companies. The result: inefficient timber cutting on government lands, which has led to substantial losses of habitat and damages to watersheds.

Gradual removal of these subsidies would foster environmental protection and, additionally, increase net federal revenues. Other examples of programs that may be both economically inefficient and environmentally disruptive include some U.S. Bureau of Reclamation water supply projects and certain U.S. Army Corps of Engineers flood-control projects. The Corps projects have the effect of providing unintended incentives for private landowners to convert their forested wetlands to dryland agriculture, bringing a host of environmental concerns, including degraded water quality.

Choices We Face

In many cases, market-based approaches will allow a given level of environmental protection to be achieved at lower total cost than would be possible with conventional policy approaches. By imposing a cost on pollution-causing activities, incentive-based systems allow individual firms to decide how they will achieve the required level of environmental protection. In a competitive market economy, market forces tend to drive these decisions toward least-cost solutions.

Incentive-based policies can also stimulate the private sector to develop new pollution-control technologies and expertise. Because investments in pollution control can improve firms' profits under incentive-based systems, firms will be encouraged to adopt superior pollution-control technologies. This in turn creates incentives for research and development of cheaper and better pollution-abatement techniques.

Market-oriented policies, however, will certainly *not* fit every problem. Moreover, practical problems may make it impossible to implement incentive-based environmental policies successfully, even if they are appropriate on theoretical grounds. Such implementation problems can render even the best policy idea quite useless. To build appropriate market-based programs, it will be necessary, in some cases, to adapt present approaches—in other cases, to abandon them.

Of course, no single policy approach is likely to be appropriate for all environmental problems. The policy agenda ought to be shaped by its objectives—presumably including the reduction of environmental risk to acceptable levels. The choice of the most effective mechanisms for achieving this and other legitimate objectives will need to draw upon the broadest possible array of potential instruments. Market-based mechanisms, along with conventional command-and-control policies, education programs, and a host of other instruments, belong in the policy maker's toolkit. The real challenge is to choose the right tool for each. □