The Market for Bads

EPA's Experience with Emissions Trading

Robert W. Hahn and Gordon L. Hester

IN THE 18 YEARS since its establishment, the Environmental Protection Agency has developed a large and growing body of regulations to cope with myriad environmental problems, from ozone pollution and smog to toxic waste disposal. The EPA's approach to environmental management has been rigid as well as strict, allowing companies almost no flexibility in meeting environmental targets. Unfortunately, like all highly centralized approaches to problem solving, this "command-and-control" approach fails to take advantage of important information. Firms, not regulators, have the detailed knowledge about pollution control costs that is crucial to finding the least costly ways of cleaning up the environment.

Regardless of one's view of the value of environmental improvements, it is clear that the EPA's rigid regulatory strategy has wasted a substantial portion of the nation's investment in air quality. The cost of air pollution control during the 1980s has averaged about $18 billion annually, and economic studies indicate that more cost-effective pollution control strategies could easily have achieved the same degree of environmental quality for billions less.

Recently the EPA has undertaken several modest reforms which allow firms greater flexibility in meeting environmental standards. By far the most ambitious of these is the emissions trading policy, which includes the well-known "bubble program" and three lesser-known programs. The basic idea of emissions trading is that firms, given the opportunity, can often devise less costly ways to control their emissions than regulators can. The emissions trading policy is an attempt to take advantage of this fact by creating a market in *de facto* rights to pollute. Trading of these rights can increase efficiency by concentrating air pollution control efforts on those emissions sources which are cheapest to control. In theory, this market for "bads" should have many of the same efficiency properties as ordinary markets for goods and services.

This article provides a systematic review of the performance of emissions trading policy. Our analysis shows that emissions trading has resulted in substantial economic gains—in the form of reduced compliance costs for firms—with almost no effect on the environment. These gains have fallen far short of their potential,

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however. The mixed performance of the emissions trading program can be traced to a struggle over property rights between industry groups and environmentalists. Regulators have been arbitrating this struggle, but with their own interest in maintaining flexibility and control in the regulatory process.

The Making of a Market

In the theorist's world, regulatory reform is accomplished by the wholesale replacement of one approach with another. In the real world, this is a rare occurrence. Emissions trading, like most reforms, has been designed to fit into an existing regulatory structure—in this case the cumbersome command-and-control system developed under the Clean Air Act. Two features of this system have proved especially significant for emissions trading. First, the EPA classifies emissions sources according to three factors: size ("major" and "minor"); location ("attainment areas" where air quality goals have been met, and "nonattainment areas" where they have not been met); and age (sources which were "existing" when permits were first issued, and "new" sources). Regulatory burdens differ significantly across classes: emissions sources that are major, new, and located in nonattainment areas are subject to the most stringent pollution control requirements. The inefficiencies embedded in these differential control requirements create many of the cost-saving opportunities for emissions trading.

Second, the division of responsibilities between the federal government and the states has particular significance for emissions trading. Under the Clean Air Act, the EPA sets regulatory standards and the states implement them. This has led to some striking gaps between federal ambitions and state capabilities. Emissions trading necessarily requires reliable information about firms' emissions to provide the basis for allocating emissions rights and keeping track of trades. Unfortunately this information is not readily available, and few states have been up to the task of accurately assembling the required data. As a result, many firms do not take advantage of opportunities to reduce emissions control costs because of uncertainties about their emissions rights.

The basic unit of currency for emissions trading is the emission reduction credit. Credits

Bubbleology

Emissions trading encompasses four programs—*netting, offsets, bubbles,* and *banking.*

Netting, which began in 1974, allows a firm creating a new emissions source within a plant to reduce emissions from another source in the plant so that net emissions do not increase significantly. The firm can thus avoid the stringent emissions limits which would otherwise apply to the new source. A firm using netting is only allowed to obtain the necessary emissions reduction credits from its own sources. This is called *internal trading* because the transaction involves just one firm.

Offsets have been used by new emissions sources since 1976 in areas where air quality goals have not been met. The offset rule specifies that new sources may be located in these "nonattainment areas," but only if they "offset" their new emissions by reducing emissions from existing sources by even larger amounts. The offsets can be obtained through internal trading, just as with netting. However, they can also be obtained from another firm's sources, which is called *external trading.* The offset rule was developed by the EPA as an alternative to banning construction of new sources altogether in nonattainment areas.

Bubbles were first allowed in 1979. A bubble allows a firm to sum the emissions limits for individual sources of a pollutant within a plant, and to adjust the levels of control applied to different sources as long as this aggregate limit is not exceeded. Bubbles enable firms to use their knowledge of pollution control costs to achieve efficiency gains without exceeding the overall emissions limits imposed by regulators. While the trading concept for bubbles is similar to that for netting and offsets, bubbles apply to existing sources. In theory, a bubble can be used for more than one plant or firm, so that external trading could be involved. In practice, bubbles are nearly always used for single plants, so only internal trading occurs. Initially every bubble had to be approved at the federal level. In 1981 the EPA approved a "generic rule" for New Jersey which allowed the state to give final approval for bubbles. Since then several other states have adopted similar rules.

Banking, the fourth emissions trading program, was developed in 1979 in conjunction with the bubble policy. Banking allows firms to save emissions reduction credits for future use in emissions trading. The development of banking rules and the administration of banking programs have been left to the states, subject to EPA guidelines.

are created when pollution sources reduce their emissions below the levels allowed by their permits. These reductions can be achieved in a variety of ways—burning cleaner fuel, installing new control equipment, or even shutting down a source altogether. Once created, credits can be used elsewhere in a firm or sold to another firm. Firms that buy credits effectively buy the right to produce more emissions than their permits would otherwise allow. If one source can create credits for less than it would cost another source to reduce its emissions, then the two sources can both benefit by arranging a trade.

Program Performance

The table summarizes the performance of the EPA's emissions trading programs as measured by cost savings, environmental impact, and numbers of trades. All figures are cumulative estimates through 1985. Cost savings have been estimated as the difference between the emissions control costs that would have been necessary under the command-and-control system and those actually incurred under emissions trading. These estimates are not adjusted for inflation.

At the federal level 42 bubbles have been approved since 1979, resulting in a savings of about $300 million. Most bubbles have resulted in little or no reduction in actual emissions; thus they have had an insignificant effect on environmental quality. Whether additional reductions in emissions would have been required if firms had not been able to use bubbles, as environmentalists argue, cannot be known; our estimates do not account for any supposedly forgone emissions reductions.

While the bubbles approved by the EPA have received the most attention, more than twice as many bubbles have been approved at the state level. These bubbles are estimated to have saved $135 million and, like EPA-approved bubbles, to have had little environmental impact, either positive or negative.

The information compiled by the EPA about netting, offsets, and banking is much less detailed, so greater uncertainty must be attached to our estimates of performance. We estimate that approximately 2,000 offset transactions have occurred since 1976. Cost savings have not been estimated since the advantage of using offsets lies in the firm's ability to locate in nonattainment areas—an economic benefit difficult to quantify. Offsets should lead to an improvement in environmental quality but, given deficiencies in the information compiled by states, this may not be the case. We estimate the net effect of offsets on the environment to be neutral.

Netting, the oldest emissions trading program, has been used an estimated 8,000 times over the past 12 years, for a total cost savings of about $4 billion. Although individual netting transactions can result in small increases in emissions, we estimate that the aggregate damage to the environment is small.

Banking is the least frequently used emissions trading program and has resulted in insignificant cost savings. Its environmental impact is positive, but also insignificant.

On balance, the emissions trading policy has been a mixture of successes and disappointments. The program has clearly afforded many firms increased flexibility in meeting emissions limits, and this flexibility has resulted in significant cost savings—in the billions of dollars nationwide. However, these savings have been realized almost entirely from internal trading, and fall far short of the savings that could be realized if there were more external trading. Environmental impacts are more difficult to estimate, but the best available information indicates that the program has resulted in insignificant changes in overall emissions levels.

Politics and Property Rights

Emissions trading has brought market forces to bear on environmental problems in a small but significant way. Yet it clearly has not led to the creation of the active markets in emissions rights that economists had envisioned. The limited, incremental nature of the policy is a direct result of the conflicting political pressures applied by powerful interest groups.

The politics of emissions trading can best be understood in terms of a struggle over the nature and distribution of property rights. The struggle concerns not only measurable outputs, such as costs and environmental quality, but also underlying values. Environmentalists, industry, and regulators are the three key groups in this struggle.

The most obvious motivation of environmentalists is their concern for environmental quality. They have consistently disparaged emissions trading, arguing that environmental quality

EMISSIONS TRADING ACTIVITY
(Cumulative Estimates through 1985)

	Bubbles		Offsets	Netting	Banking
	Federal	State			
Number of Trades	42	90	1,000	8,000	100
Cost Savings (millions)	$300	$135	N/A	$4,000	Very Small
Air Quality Impact	Neutral	Neutral	Neutral	Slightly Negative	Very Slightly Positive

has been sacrificed for economic efficiency. They characterize the emissions trading program as little more than a loophole for industry to evade regulations.

There is another, deeper motivation for environmentalists' opposition to emissions trading. A basic premise underlying the program is that the explicit trading of rights to pollute is a legitimate activity. This is not a premise which many environmentalists accept. For some it is an issue of morality—clean air is an inalienable right which is not for sale at any price. For others it is an important issue of symbolism—allowing firms to trade emissions rights leaves the polluters with important decisions about tradeoffs between economics and environmental quality. Such a policy can shape national attitudes toward environmental regulation in a way that undermines the interests of environmentalists.

For these reasons environmentalists have been almost unanimous in their opposition to emissions trading. Though environmental groups have large national constituencies, they lack resources, especially the professional staff, needed for extensive participation in the local regulatory process. They make the best use of their resources by working at the national level, pressing for new regulations at the EPA and litigating cases of national significance. This strategy brings environmental groups both visibility and tangible results, and suits their needs better than a decentralized regime.

Regulated industries have had a mixed response to emissions trading. It is generally assumed that firms wish to reduce expenditures on environmental controls. Using the flexibility provided by emissions trading is one way to accomplish this. But firms also have a strong preference for certainty in environmental regulation. If property rights are poorly defined under emissions trading and regulators are perceived as capricious, firms may forego the potential reduction in emissions control costs to avoid the additional uncertainty that is created by participating in the program.

Most individual firms, except very large national corporations, do not have the resources to play a significant role in policy development at the federal level. Rather they work better at the state level with regulators they have contact with in permit proceedings. Generally, firms can afford to go to court only to defend their immediate interests, not for the sake of influencing broader policy.

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Industry trade groups and very large corporations play prominent roles in policy making at the EPA. Like environmental groups, they participate in the development of new regulations through both formal and informal channels. They also use the courts to affect policy, although this strategy is generally less attractive to them than to environmentalists. Since environmentalists prefer the *status quo* to the implementation of emissions trading, the delays that result from a court case work to their advantage, even if they ultimately lose the case. On the other hand, there are almost no advocates of emissions trading for whom it makes sense to pursue protracted litigation in federal courts.

The countervailing pressures of industry and environmentalists come to bear on a third key interest group—regulators. Regulators try to make progress toward environmental goals in a manner that placates the legislators who fund their agencies. They also attempt to minimize conflict with interest groups, especially those

that have significant influence with legislators. To keep themselves well-positioned to respond to future pressures, regulators try to maintain control over the regulatory process and to preserve their own flexibility.

Federal and state regulators differ significantly in their ability to control the regulatory process under the Clean Air Act. The EPA, though subject to intense interest group pressure, has considerable legal discretion in setting policy. Its ability to control the details of how states implement policy, however, is inherently limited. The states have relatively little discretion in policy making, but they have a considerable amount in policy implementation. Implementation generally takes place through the permit process, which is frequently subject to little scrutiny.

Distributing Property Rights

Emissions trading was designed to increase industry's flexibility in meeting environmental standards without jeopardizing progress toward environmental goals. The EPA attempted to define a set of property rights and to minimize restrictions on the use of those rights. At the same time, the EPA had to be sensitive to the concerns of environmentalists about the trading of rights to pollute. The conflicting interests of environmentalists and industry have led the EPA to deemphasize the explicit nature of the property rights. For example, instead of giving these rights appropriate labels such as "tradable emissions permits" or " marketable emissions rights," the EPA refers to them as "emission reduction credits," "offsets," and the like.

The issue of defining property rights goes deeper than just developing acceptable names, however. There has been a continuing struggle over the quantity of rights to which firms are entitled. The core of the problem hinges on determining the appropriate baseline to use for allocating emissions rights. Measuring actual emissions is technically difficult, legally contentious, and politically sensitive. Ambiguities about baselines have contributed to uncertainty about the allocation of property rights and the likelihood that regulators will approve proposed trades.

The uncertainty over the distribution of property rights has been exacerbated by the unpredictable way regulators define and monitor the programs. Consider the treatment of banked rights. The amount of rights which a firm is entitled to bank is given close scrutiny, and state rules often subject banked rights to either partial confiscation or restrictions on use. This contrasts with the treatment of rights which are being "used" rather than banked—emissions limits in permits are rarely reduced by regulators in mid-stream. Apparently all rights are *not* created equal, and rights which are traded are more likely to lose value. This pattern is consistent with the demonstrated preference of regulators to retain discretion in the regulatory process, rather than to grant it to firms in the form of property rights. It can also be seen as a response by regulators to environmentalists' concerns about the appropriateness of trading rights.

The absence of well-defined emissions rights helps to explain why trading has been predominantly internal. Obtaining emissions credits from another firm involves significant uncertainty and search costs. These uncertainties are greatly exacerbated if the amount of emissions rights each firm is entitled to, and the potential uses of these rights, are not well specified. If emissions rights were better defined, more external trading would take place. Also external trading would become more attractive to firms if there were fewer restrictions on the use of banked rights.

The absence of active external markets significantly reduces the potential gains from emissions trading. Firms can exploit differences in marginal emissions control costs of their own sources, but not differences in control costs between firms. This means that total emissions control costs remain billions of dollars above efficient levels.

Deflated Bubbles

In late 1986 the EPA published its long-awaited "Final Policy Statement" on emissions trading. While the statement purported to address the entire scope of emissions trading programs, it focused quite narrowly on bubbles and was primarily intended to resolve issues about their use.

The major changes in emissions trading policy include: clarifying the definition of emissions credits and further limiting their creation; subjecting state bubble programs to greater federal oversight; tightening trading rules for nonattainment areas to ensure that every bubble will

result in a significant environmental improvement; clarifying rules for bubbles in attainment areas; and expediting the review of bubble applications pending at the EPA.

These changes will reduce uncertainty, which is desirable, but are unlikely to increase trading activity substantially. The new policy puts another substantial burden on firms using bubbles in nonattainment areas—exactly those areas where firms are most likely to want to use them. This burden takes the form of a requirement that firms using bubbles must reduce from sources included in the bubble total emissions by 20 percent. No such requirement is imposed on firms that do not use bubbles. Thus the cost of participating in the bubble program has been raised significantly in just those areas where the use of bubbles would have resulted in the most substantial efficiency gains.

The new policy, especially as it applies to nonattainment areas, constitutes a fundamental change in the EPA's approach to emissions trading. Rather than providing industry with greater flexibility in meeting existing emissions standards, the new policy attempts to use emissions trading as a means of extracting significant additional reductions in emissions. It should not be surprising if few firms find it advantageous to use bubbles under the new policy.

The EPA's new approach concentrates on preventing the approval of "bad" bubbles and discounts the benefits—economic and environmental—that will result from the increased use of trading. Indeed the new policy places too much emphasis on making emissions trading a foolproof program. This is truly ironic given that the EPA has been singularly unsuccessful in establishing a foolproof command-and-control regulatory system.

Needed Reforms

A balanced reform would reduce the uncertainties involved in trading and encourage more external trading. It would include a minimum of three broad elements. First, a major effort should be made to improve information about baseline emissions, especially in nonattainment areas. This would enable state regulators to improve the effectiveness of conventional regulation and it would remove much uncertainty. Second, states should be encouraged to develop rules for approving bubbles. Experience with netting and offsets, as well as state-approved bubbles, shows that emissions trading works best when implemented at the state level. Third, stronger steps should be taken to encourage the use of emissions credit banks. (There should be fewer restrictions on the use of banked credits, for example.) The development of active state banking programs could significantly reduce the search and transactions costs that are now inhibiting external trading.

The Future of Environmental Markets

The performance of emissions trading confirms economists' predictions that market-based approaches to pollution control can be highly cost-effective. At the same time, however, it reveals the political obstacles that stand in the way of these approaches. The largest obstacle appears to be the difficulty of creating well-defined, secure property rights, which are essential to the smooth functioning of any market.

We believe the obstacles to market-based reforms can be overcome. Indeed the EPA's program allowing refiners to trade rights to add lead to gasoline provides an interesting contrast to the emissions trading program. Unlike emissions trading, the lead trading program appears to have resulted in a smoothly functioning market for lead rights over the limited lifetime of the program.

If market-based approaches are to make further progress in environmental regulation, reform advocates will need a better understanding of the information requirements and the political constraints that determine the success or failure of markets for "bads." In the long run the merits of the limited experiments that have been tried to date should open the door to broader reforms, larger markets, and more cost-effective environmental protection. □

Selected Readings

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