1. Introduction


Pollution Charges, Fees, Taxes


Deposit-Refund Systems


Trading Programs


Subsidies for Pollution Control


Liability Approaches

Information Disclosure


Voluntary Programs

In recent years, economic instruments have achieved a prominent place among the tools used by governments to manage the environment. Once mainly an academic proposition, or a revenue-raising adjunct to traditional regulatory mechanisms, market-based economic incentives are now being used as the principal instrument of control on a number of environmental issues. Nowhere is this fact more evident than in the 1990 Clean Air Act Amendments, which created many programs that are underpinned by market-based mechanisms. The Clean Water Act Amendments of 1992, the Safe Drinking Water Act, and a host of state and local initiatives also contain important new incentive-based initiatives.

1.1 Purpose of the Report

This report expands upon and updates two earlier EPA surveys on the use of economic instruments for managing the environment. A 1992 EPA report documented the growing use of economic instruments to manage the environment in the United States and also characterized the experiences of many other countries.[1] A 1997 report to EPA reviewed many additional programs in the United States and in other nations.[2] Since these reports were issued, many new instruments have been implemented and existing instruments have been subjected to evaluation by academics and government agencies. Thus, an update is not only timely but also a good opportunity for offering new insights and perspectives. This is not the first such update. Particularly noteworthy are survey articles by Stavins and Hahn and recent research by the National Academy of Public Administration.[3] While the basic conclusions of the earlier EPA reports are still valid, the number of instruments that have been reviewed for their efficacy has grown substantially. A number of subtle and not so subtle differences in perspective also may be evident to the reader.

This report attempts to go well beyond simply enumerating existing market-based mechanisms for managing the environment by examining key issues. How well have these instruments performed? How economically efficient or cost-effective are these mechanisms in achieving the goals of environmental management? What are their effects upon the environment? Why are potential gains from economic instruments seldom observed in practice, and what can be done to improve this record? What can be learned in these cases that will assist in the formulation of new mechanisms?

1.2 Scope of the Report

For the purposes of this report, the term "economic incentives" will be defined broadly as instruments that provide continuous inducements, financial or otherwise, to sources of pollution, to reduce their releases of pollutants or make their products less polluting. In essence, with incentives, sources view each unit of pollution as having a cost, whereas under more traditional regulatory approaches pollution may be free or nearly so once regulations have been satisfied.

To achieve maximum cost effectiveness, each source should control pollution to the point where the last units of pollution cost the same amount to control at each source. To achieve efficiency, the situation that maximizes the difference between benefits and costs, pollution should be controlled until the per-unit costs of controlling pollution that are faced by each source are equal to the incremental value of damage to health and the environment caused by that pollution. This latter objective is much more difficult to achieve, so much so that it is of interest primarily as an academic or theoretical exercise; it does not have great regulatory significance.

The definition of economic incentives used here excludes mechanisms that use explicit or implicit price signals to control activities that have pollution as a by-product. While sometimes known as "environmental incentives," programs that provide ride sharing, bike paths, high-occupancy vehicle lanes, parking surcharges, and the like are beyond the scope of this report. However, there is a brief discussion of congestion pricing that addresses a problem not unlike (and quite likely linked directly to) pollution. While of interest because these mechanisms may lead to a reduction in pollution, they provide neither an explicit nor an implicit price on units of pollution. Excluding these mechanisms carries no particular implication regarding EPA's perspective regarding their present or future applications.

Payments per unit of pollution are perhaps the clearest example of an incentive, as the term is used in this report. Credits and allowances to reduce pollution also provide direct price signals. As such, sources receive rights that can be sold and used by another source. Subsidies for pollution control and deposit-refund systems also create continuous financial incentives. Finally, indirect financial incentives are created through reporting requirements, liability rules, and voluntary programs. All of these mechanisms provide financial incentives for sources to reduce their emissions and to make their products more environmentally friendly.

The principal contrast between incentive mechanisms and traditional regulatory approaches is that the latter do not provide incentives to reduce releases below permitted levels, or to make their products less harmful to the environment once regulatory requirements are satisfied. Under traditional regulatory approaches, sources are tempted to view releases within permitted amounts as having no cost and products that release less pollution than allowed by requirements s as having no incremental value. Sources operating within the limits of existing regulations have little reason to act until new regulations are issued.

In fact, if firms reduce pollution below permitted amounts or produce products with superior environmental performance, they may trigger actions by regulators to impose tougher requirements based on a source's past performance. Thus, under traditional forms of regulation there may be perverse incentives *not* to innovate and *not* to improve the technology to control pollution. Nonetheless, some incentives to exceed regulatory requirements do exist. Releasing less than permitted amounts of pollution provides a margin of safety to sources in the event of equipment malfunctioning; it often leads to fewer inspections; and it may trigger a tightening of regulations that would adversely affect competitors. Vendors of equipment that controls pollution also may have an incentive to design equipment and processes that exceed regulatory requirements. If they design technologies that exceed these requirements, EPA might adopt stricter pollution control requirements, thus creating a market for the vendors' products. Although this report attempts to make a careful distinction between traditional and market-based approaches, these distinctions are often blurred in practice. A range of pollution control measures does exist. They span the spectrum from such highly prescriptive traditional regulatory measures as technology requirements to such purely market-oriented measures as deposit-refund systems

or pay-per-bag methods for municipal waste disposal. Between these extremes exists a broad range of instruments, with no clear dividing line between traditional regulatory approaches and methods based on economic incentives. Many approaches to environmental management embody some features of incentive mechanisms along with a heavy dose of direct regulatory action. Most of the best known examples of economic incentive approaches, such as the acid rain trading program and the gasoline lead credit trading program, also have some features that are found in traditional regulatory approaches such as enforcement for noncompliance.

While many incentive programs are reviewed herein, including all that could be identified at the federal level, this report makes no pretense of being exhaustive. The literature on economic incentives is immense. Many levels of government have adopted such programs or are considering their use. Rather than being comprehensive, an attempt has been made to identify those mechanisms that are most likely to have significance in the long term. In doing so, many important initiatives have undoubtedly been omitted because of a lack of information or the need to create limits on the scope of this report. For example, economic mechanisms for allocating water are noted only briefly, despite the potential effect of this mechanism on the environment, because pollution control is not the primary objective of water allocation. Likewise, the brief discussion on highway pricing and congestion charges merely serves to introduce these incentives, since the effects of these fees on the environment—although they may be potentially significant—have yet to be documented.

1.3 Organization of the Report

This report is organized into eight additional chapters that are briefly summarized below.

Chapter 2 examines current and past U.S. government policies that incorporate incentive mechanisms, with an emphasis on policies initiated by the Clinton administration.

Chapter 3 provides an overview of the various types of incentive mechanisms in terms of their cost effectiveness and environmental effects, both in theory and in practice.

Chapter 4 discusses pollution-based fee, charge, and tax systems in place in the United States, and fees imposed on the quantity and quality of emissions, or both, that are released into the environment.

Chapter 5 considers deposit-refund systems to encourage recycling or the proper disposal of the product.

Chapter 6 covers trading systems, including credits for pollution reductions that have been achieved (open market programs) as well as emissions cap-and-trade (allowance) programs.

Chapter 7 discusses subsidy systems, including grants, low-interest loans, favorable tax treatment, and preferential procurement policies for products believed to be environmentally friendly. The chapter also considers the potential benefits that could be achieved by eliminating subsidies that harm the environment. Chapter 8 addresses the use of liability as a mechanism for compensating victims when sources release pollution that causes harm to human health and the environment and also as a mechanism for encouraging sources to comply with existing environmental regulations.

Chapter 9 discusses in some detail the potential effects that economic incentives may have on the information reporting requirements of two laws. They are the Emergency Planning and

Community Right-To-Know Act (EPCRA), which established the Toxics Release Inventory (TRI) reporting requirements, and California's Safe Drinking Water and Toxic Enforcement Act, commonly referred to as Proposition 65. Other forms of information reporting are also reviewed in this chapter, including environmental impact assessment reporting, product labeling, environmental performance awards, Securities and Exchange environmental reporting requirements, and lead paint and radon disclosure requirements.

Chapter 10 looks at programs under which EPA and the states ask companies to voluntarily participate in activities to reduce pollution and protect the environment.