ENFORCEMENT OF ECONOMIC INSTRUMENTS IN THE UNITED STATES

RASNIC, JOHN B.

Director, Stationary Source Compliance Division, United States Environmental Protection Agency, 401 M Street, SW (630-6W), Washington, DC 20460 USA

SUMMARY

The United States is moving aggressively toward more market based or economic incentive programs (EIP) for limiting pollution. Many believe that in the long term, market based programs have a better chance at success in pollution prevention and encouraging clean technologies than the more traditional approach of command and control. The economic approach tends to tap the resourcefulness of the entire community by bringing out their desire to obtain a product or service at the least overall costs. To accomplish their goal of internalizing all costs, economic programs must include those costs associated with environmental protection required in delivering a product or service in order to be the most successful. For most of these economic instruments to work effectively, they must be backed by clear regulations, enforceable permits to establish emission rights for trading, an effective compliance promotion effort and an aggressive enforcement program. This paper describes several types of economic instruments, their enforcement challenges and the current activities at US EPA to implement them.

1 INTRODUCTION

A variety of programs fall under the general heading of economic incentive programs (EIPs). Further, within each general type of program also are several different basic program designs. I would like to describe common types of EIPs that have been implemented, designed, or discussed in the literature for stationary and mobile sources. The program types discussed below do not include all of the possible types of EIPs. Innovative approaches incorporating new ideas in existing programs, different combinations of existing program elements, or wholly new incentive systems provide additional opportunities for agencies to find ways to meet environmental goals at lower total cost.

1.1 Emissions trading markets

One prominent class of EIPs is based upon the creation of a market in which trading of source-specific emissions requirements may occur. Such programs may include traditional rate-based emissions limits (generally referred to as emissions averaging) or overall limits on a source's total mass emissions per unit of time (generally referred to as an emissions cap). The emissions limits, which may be placed on individual emitting units or on facilities as a whole, may decline over time. The common feature of such programs is that sources have an ongoing incentive to reduce pollution and increase flexibility in meeting their regulatory requirements. A source may meet its own requirements either by directly preventing or controlling emissions or by trading or averaging with another source. Trading or averaging may occur within the same facility, within the same firm, or between different firms. Sources with lower cost abatement alternatives may provide the necessary emissions reductions to sources facing more expensive alternatives. These programs can lower the overall cost of meeting a given total level of abatement. All sources eligible to trade in an emissions market are faced with continuing incentives to find better ways of reducing emissions at the lowest possible cost, even if they are already meeting their own emissions requirements.

Stationary, area, and mobile sources could be allowed to participate in a common emissions trading market. Programs involving emissions trading markets are particularly effective at reducing

overall costs when individual affected sources face significantly different emissions control costs. A wider range in control costs among affected sources creates greater opportunities for cost-reducing trades. Thus, for example, areas which face relatively high stationary source control costs relative to mobile source control costs benefit most by including both stationary and mobile sources in a single emissions trading market.

Programs involving emissions trading markets may be designed as either a marketable emissions allowance program or as a marketable emissions reductions credit program. Programs based on marketable allowances establish an emission allocation or quota for each source, but give sources an opportunity to adjust their allocations through trading. Each source's actual emissions at some defined point(s) in time must be less than its adjusted allocation. Allowance programs may assign each affected source a certain number of allowances based on a percentage of their historical emissions or some other specified criteria, such as a reduced level of emissions necessary to satisfy a specific environmental goal. To achieve net emissions reductions, the program design could include declining limits over time. Emissions limits could also specify both a mass per unit time limit and an effective time period. For instance, a source's limit may be 800 pounds per month for 1998, 780 pounds per month in 1999, etc. Sources can be given considerable flexibility to decide how to assure their emissions will not exceed their allowances in each period, subject to meeting all other regulatory requirements. If they choose to, sources may buy or sell portions of their allowances for each period. If all sources emit only as much as permitted by the number of allowances they hold (adjusted by trades), the total emissions from all affected sources will not exceed the total emissions allocated for that period.

In contrast, emission reduction credit (ERC) programs feature trading of emissions reductions, measured against a pre-established emissions baseline, rather than trading of emissions allowances. Each source's initial emissions baseline is established either by the EIP rules or through promulgation of traditional regulations. Sources can generate ERCs by implementing enforceable measures that reduce emissions below the source's emissions baseline. Conversely, sources may exceed their emissions baseline by obtaining sufficient ERCs from other sources. Thus, a major distinction between these two types of trading programs is that ERC trading involves the calculation of a change in emissions as a result of a specific emission reduction measure, whereas allowance trading involves only the calculation of actual emissions at a given point in time.

The definition of the commodity to be traded and the design of the administrative procedures the buyer and seller must follow to complete a trade are obvious elements that must be carefully selected to help ensure a successful trading market that achieves the desired environmental goal at the lowest cost. An emissions market is defined as efficient if it achieves the environmental goal at the lowest possible total cost. Any feature of a program that unnecessarily increases the total cost without helping achieve the environmental goals causes market inefficiency. Thus, the design of an emission trading program should be evaluated not only in terms of the likelihood that the program design will ensure that the environmental goals of the program will be met, but also in terms of the costs that the design imposes upon market transactions and the impact of those costs on market efficiency.

Transactions costs are the investment in time and resources to acquire information about the price and availability of allowances or ERCs, to negotiate a trade, and to assure the trade is properly recorded and legally enforceable. All trading markets impose some level of transaction costs. The level of transaction costs in an emissions trading market are affected by various aspects of the design of the market, such as uncertainties in the value of the allowance or credit being traded, the legitimacy of the allowance or credit being offered for sale, and the long-term integrity of the market itself. Emissions trading programs in which every transaction is different, such as programs requiring significant consideration of the differences in the chemical properties or geographic location of the emissions, can result in higher transaction costs than programs with a standardized trading commodity and well-defined rules for acceptable trades. Transaction costs are also affected by the relative ease with which information can be obtained about the availability and price of allowances or credits.

While the market considerations discussed above are clearly important in designing an efficient market to minimize the transaction costs of such a program, other considerations, such as regulatory certainty, enforcement issues, and public acceptance, also clearly need to be factored into the design of an emissions trading program.

1.2 Fee programs

A fee on each unit of emissions is a strategy that can provide a direct incentive for sources to reduce emissions. Not all emission fee programs are designed to motivate sources to lower emissions. Fee programs using small fees are designed primarily to generate revenue, often to cover some of the administrative costs of a regulatory program. In order to motivate a change in emissions, the fees must be high enough that sources will actively seek to reduce emissions. Ideally fees should be set so as to result in emissions being reduced to the socially optimal level considering the costs of control and the benefits of the emissions reductions.

There can be significant variations in emission fee programs. For example, potential emissions could be targeted by placing a fee on an input (e.g., a fee on the quantity and BTU content of fuel used in an industrial boiler) rather than on actual emissions. Sources paying a fee on potential emissions could be eligible for a fee waiver or rebate by demonstrating that potential emissions are not actually emitted, such as through a carbon absorber system on a coating operation.

Some fee program variations are designed to mitigate the potentially large amount of revenue that a fee program could generate. Although more complex than a simple fee program, programs that reduce or eliminate the total revenues may be more readily adopted than a simple emission fee. Some programs lower the amount of total revenues generated by waiving the fee on some emissions. These programs reduce the total amount of revenue generated, while providing an incentive to decrease emissions. Alternatively, a program may impose higher per-unit fees on a portion of the emissions stream, providing a more powerful but targeted incentive at the same revenue levels. For example, fees could be collected on all emissions in excess of some fixed level. The level could be set as a percentage of a baseline (e.g., fees on emissions above some percentage of historical emissions), or as the lowest emissions possible (e.g., fees on emissions in excess of the lowest demonstrated emissions from the source category).

Other fee programs are “revenue neutral,” meaning that the pollution control agency does not receive any net revenues. One way to design a revenue-neutral program is to have both a fee provision and a rebate provision. Rebates must be carefully designed to avoid lessening the incentive provided by the emission fee. For example, a rebate based on comparing a source’s actual emissions and the average emissions for the source category can be designed to be revenue neutral and not diminish the incentive.

Other types of fee programs collect a fee in relation to particular activities or types of products to encourage the use of alternatives. While these fees are not necessarily directly linked to the total amount of emissions from the activity or product, the relative simplicity of a usage fee may make such programs an effective way to lower emissions. An area source example is a construction permit fee for wood stoves. Such a permit fee is directly related to the potential to emit inherent in a wood stove, and not to the actual emissions from each wood stove in use. Fees on raw materials to a manufacturing process can encourage production reformulation (e.g., fees on solvent sold to makers of architectural coatings) or changes in work practices (e.g., fees on specialty solvents and degreasing compounds used in manufacturing).

Road pricing mechanisms are fee programs that are available to curtail low occupancy vehicle use, fund transportation system improvements and control measures, spatially and temporally shift driving patterns, and attempt to effect land usage changes. Primarily examples include increased peak period roadway, bridge, or tunnel tolls (this could also be accomplished with automated vehicle identification systems as well), and toll discounts for pooling arrangements and zero-emitting/ low-emitting vehicles.

1.3 Tax code provisions

Modifications to the existing tax code can provide an effective economic incentive. Possible tax code revisions to encourage emissions reductions cover a broad span of programs, such as accelerated depreciation of capital equipment used for emissions reductions, corporate income tax deductions or credits for emission abatement costs, property tax waivers based on decreasing emissions, and exempting low-emitting products from sales tax. Mobile source tax code incentive strategies include waiving or lowering any of the following for zero- or low-emitting vehicles: vehicle registration fees, vehicle property tax, sales tax, taxicab license fees, and parking taxes.

1.4 Subsidies

An agency may create incentives for reducing emissions by offering direct subsidies, grants or low interest loans to encourage the purchase of lower-emitting capital equipment, or a switch to less polluting operating practices. Examples of such programs include clean vehicle conversions, starting shuttle bus or van pool programs, and mass transit fare subsidies. Subsidy programs often suffer from a variety of "free rider" problems. For instance, subsidies for people or firms who were going to switch to the cleaner alternative anyway lower the effectiveness of the subsidy program, or drive up the cost of achieving a targeted level of emissions reduction.

2 ENFORCEMENT CHALLENGES

Economic programs also bring unique enforcement problems because most still require some government or third party oversight in order to ensure fairness and to avoid cheating. I would like to share with you some of our experiences in this area and discuss enforcement implications.

2.1 Experience in the U.S. Air Program

In the United States, five program areas have received the most attention in using economic incentive principles as a primary focus for environmental regulation:

2.1.1 Phase out in the use of lead in gasoline

The EPA initiated a series of successively more stringent lead limits in gasoline during the late 1970s due to the increase in use of new cars with catalytic converters and the gathering storm over health effects of high lead levels in blood.

Initially EPA regulations demanded equal reductions from all refineries but eventually speeded the transition to unleaded gasoline by offering trading and banking options through which facilities could pay other producers for reduction credits to offset their excesses. Modern facilities and environmentally progressive companies were able to substantially reduce lead levels in their own products and sell credits to their competitors for profit which avoided shutdown situations at several older refineries but maintained an overall aggressive pace for the entire industry in the phase out of the use of lead as an octane booster.

2.1.2 Phase down in the manufacture of chlorofluorocarbons (CFCs)

The EPA promulgated regulations implementing the requirements of the Montreal Protocol through a system of tradeable allowances. In the allowance system, companies are restricted in their production and consumption of each controlled substance. They must have both production and consumption allowances in order to manufacture controlled substances but need only consumption allowances to import them. In turn, a company may receive allowances for exporting. These

allowances are chemical-specific and may be traded or sold, subject to approval by the Agency. Allowances may also be converted from one chemical to another within the same group by adjusting the number of allowances according to the relative ozone-depletion potentials of the chemicals.

The Agency granted production and consumption allowances to companies based on the amount either produced or imported during the baseline year. For group I CFCs and halons, the baseline year was 1986. For chemicals in groups III, IV and V (the remaining CFCs, carbon tetrachloride and methyl chloroform), the baseline year was 1989. For groups VI and VII (methyl bromide and hydrobromofluorocarbons), the baseline year was 1991.

In any given year, a company is allowed to produce and consume no more than a specified percentage of its baseline year production and consumption allowances for each controlled substance, plus or minus any allowances obtained or traded during the control period. The percentage is reduced over time so that the United States meets its phaseout obligations under the Montreal Protocol. Under the current phase-out schedule, Class I substances, except for methyl bromide, will no longer be produced after January 1, 1996. Methyl bromide production will cease on January 1, 2001.

2.1.3 National emission standards for acid rain precursors

The overall goal of the Acid Rain Program is to achieve significant environmental benefits through reductions in emissions of sulfur dioxide (SO_2) by 10 million tons and nitrogen oxides (NO_x) by 2 million tons. To achieve this goal at the lowest cost to society the program employs both traditional and innovative market-based approaches for controlling air pollution.

Phase I begins in 1995 and affects 110 mostly coal burning electric utility plants and phase II begins in the year 2000 and tightens annual emissions limits on these large units and sets restrictions on units greater than 25 megawatt output.

At the heart of this economic incentives program is an allowance trading system that harnesses the forces of the free market to reduce pollution. Under this system affected utility units are allocated allowances annually based on their historic fuel consumption and a specific emissions rate. Each allowance permits a unit to emit 1 ton of SO_2 during or after a specified year. Once a ton of SO_2 is emitted one allowance is retired and can no longer be used.

Allowances may be bought, sold, or banked. Any person may acquire allowances and participate in the trading system. However, in the traditional mode of controlling pollution, regardless of the number of allowances assigned to a source, it may not emit at levels that would violate federal or State ambient air quality standards to protect public health.

2.1.4 National emission standards for architectural and industrial maintenance (AIM) coatings

EPA has been conducting a regulatory negotiation for the past year in an effort to craft rules that will control volatile organic compound (VOC) emission from the architectural, industrial and maintenance coatings industry which involve a variety of paints and coatings. The rule under consideration will affect roughly 65 percent of the coatings industry, which accounts for two percent of the total VOC emissions nationwide. Agreements have been reached to reduce VOC emissions from current levels by 25 percent in 1996 and 45 percent by 2003.

A table of standards for these coatings which limits the amount of VOC in grams per liter in the coatings will be applicable to all coatings manufactured or imported for use in the U.S.. The VOC content will then be reduced over time to obtain the desired emissions goal. In addition, manufacturers will have the option to comply with a corporate average which will permit companies the flexibility to develop least cost strategies to supply a wide range of applications.

2.1.5 RECLAIM program for California

Reclaim, the Regional Clean Air Incentive Market is a market incentives air pollution reduction program for nitrogen oxides (NO_x) and sulfur oxides (SO_x) in the South Coast Air Quality Management District of California. The supporters of this program believe that the approach towards achieving clean air in Southern California provides greater certainty in meeting health standards while allowing industry to choose the most cost-effective solution to reduce their emissions.

This program affects approximately 390 facilities of NO_x representing 64 percent of the emissions from stationary sources and 41 facilities of SO_x representing 83 percent of the emissions of stationary sources. A baseline for each facility will be developed using a formula of previous emissions levels of which reductions will be required for each facility each year until the desired goal is reached. This process results in emission reduction credits which can then be traded on the open market to allow for the most cost effective emissions reductions to occur. This program is in the final rule adoption process of California.

2.1.6 Rapid amortization of pollution control equipment

Rapid amortization of the costs for pollution control equipment is a provision in the tax code of the United States (US) which allows businesses to enjoy the economic benefits of pollution control expenditures earlier than would occur under normal tax provisions for capital expenditures.

Expenses incurred by a business for capital expenditures can not be entirely expensed in the year for which the expenditure occurs but must be spread out over the time period representing the life expectancy of the equipment. The Internal Revenue Service (IRS) of the US publishes tables for taxpayers use in determining the period allowed under its rules. Most pollution control equipment is assigned a period of ten (10) to fifteen (15) years as the period to be used in amortizing these expenditures. For instance a piece of equipment costing $500,000.00 and assigned a 10 year period would be able to deduct from their income $50,000.00 a year as a business expense.

However, under the rapid amortization provision the IRS has established a 7.5 year period for treating certified pollution control capital expenditures. The business is required to obtain a certification from a governmental pollution control agency that the purchased equipment is being used for pollution control purposes. The business then submits the certification with their tax return showing the modified amortization period to the IRS. In this case, then using the $500,000.00 example above the business would use the value of $66,666.66 as a business expense instead of the $50,000.00 expense under the normal amortization period.

2.2 Compliance and enforcement issues

Although these programs differ significantly in their scope and coverage, they raise similar compliance and enforcement issues.

Several programs are initiated by establishing a base and an allocation for all primary affected companies and then a decline in allocation is assigned over time until the emissions goal is achieved. These may also have an emissions fee associated with each allocated emissions unit. Each company is required to establish sampling and analysis methods and recordkeeping and reporting procedures for determining compliance. Most programs are further complicated for compliance and enforcement in that companies are permitted to trade, sell, and average their allocations between units, within companies or with other companies.

Several demands were placed on the US EPA in monitoring and enforcing these approaches to emission reductions. From a technical standpoint sampling and analytical methods with quality control procedures needed to be developed, established and agreed on from the outset to ensure accuracy and consistency between companies and for government inspectors.

From an accounting standpoint several points of information and data sets needed to be established and agreed on in order to assure that all the necessary information was gathered on a

routine basis and would be available for auditing to assure that the requirement was being accomplished on schedule and that no cheating was occurring which would economically disadvantage complying competitors.

2.3 Guidelines for state programs

The US EPA has promulgated rules and procedures for use in preparing economic incentive programs. Under monitoring, recordkeeping and reporting requirements we talk about what is appropriate.

The rules were based on the premise that EIPs depend more strongly than traditional control programs on monitoring, recordkeeping and reporting (MRR) to ensure compliance and to allow for adequate enforcement because they are inherently more flexible and less prescriptive than traditional technology or performance standards. The rules recognized that while a wide range of MRR approaches are available that can be used to show compliance for different types of sources, no one approach is necessarily the most appropriate, or even technically feasible, for all types of sources that may be included in an EIP. Thus, the rules explicitly allow for alternative monitoring methods.

An EIP must contain test methods and, where necessary, emission quantification methodologies, appropriate to the emission limits established in the EIP. EIP sources must be subject to clearly specified MRR requirements appropriate to the test methods and any applicable quantification methodologies, consistent with permitting and enhanced monitoring program rules, where applicable. In general, agencies should refer and adhere to the enhanced monitoring protocol requirements set out in EPA's Enhanced Monitoring Program Rule in designing the monitoring methods to implement any EIP. Agencies shall provide justification and supporting analysis if it uses alternative approaches to designing monitoring methods for source categories not subject to the Enhanced Monitoring Program Rule. Monitoring methods may include, but are not limited to:

- The continuous monitoring of mass emissions, emission rates, or process or control parameters, ambient conditions, activity levels and throughput or production rates.
- In situ or portable measurement devices to verify control system operating conditions.
- Periodic measurement of mass emissions or emission rates using reference test methods and specified averaging times for emissions caps or emission rate limits.
- Operation and maintenance procedures and/or other work practices designed to prevent, identify, or remedy noncomplying conditions.
- Manual or automated recordkeeping of material usage, inventories, throughput, production, or levels of required activities.
- Mass balance calculations which are a function of inventory, usage, or disposal records.
- Any combination of these methods and shall require that responsible parties at each facility in the EIP program certify reported information.

Similarly appropriate enforcement mechanisms are discussed in the Agency's EIP rules and procedures. Under enforcement we talk about the enforcement consequences.

An EIP must include adequate enforcement consequences for noncompliance with any source requirements, including MRR requirements. Both Federal and State enforcement penalties must be included, such that the level of deterrence embodied in traditional regulatory programs is preserved.

Traditionally regulatory programs provide for enforcement against noncompliance with emissions limits at both the Federal and State/local levels. The statutory maximum Federal penalties under the Act are $25,000 per day, per source in violation. To preserve the existing level of deterrence under the Act, an EIP that imposes multiday and/or multisource emission limits must define violations of those limits in such a way that the violations will translate into sufficient numbers of source-days of violation. Further, the program must include provisions such that State/local penalties create a

deterrent effect comparable to that of traditional regulatory programs. One possible approach would be for the EIP to authorize predetermined penalties based on the amount of an exceedance of such a cap, provided the predetermined amounts are sufficiently large. For instance the Acid Rain program has established $2,000 per ton of excess sulfur dioxide.

The EIPs that impose multi-source emissions limits must require facilities to develop enforceable plans for remedying noncompliance in those cases where facilities have exceeded emissions limits for the specified averaging period. Such plans must identify appropriate and enforceable control measures or other procedures or strategies sufficient to achieve and maintain compliance with applicable emissions limits.

3 CONCLUSION

Compliance with MRR requirements is critical to the integrity and success of EIPs. Thus, an EIP must include enforcement provisions that establish a regulatory structure which clearly and effectively deters inadequate or improper MRR, providing for both State/local and Federal penalties. Such provisions should preserve the Federal civil penalties and criminal sanctions (for knowing violations) authorized in the Act for violations of MRR requirements. Further, the enforcement provisions must include methods for determining required data when MRR violations result in missing, inadequate, or erroneous monitoring and recordkeeping data. These methods must ensure that sources have a sufficiently strong incentive to properly perform monitoring and recordkeeping in the first place.

The major trade off in economic incentive programs is the greater flexibility that the program offers for sources versus the need for better monitoring, record keeping and reporting requirements. Many believe that the onus shifts to the Agency to be able to audit a program to uncover violations as opposed to the traditional testing for violations approach. Compliance and enforcement authorities must be aware that the structure and thoroughness of their approach will have to be able to uncover this type of “paper” violation which will represent actual emission excess.

Economic incentive programs are not necessarily simple or easy to implement and may require very complex monitoring and enforcement mechanisms but once in place and market decisions are made which include all costs of products or services real environmental results can be seen.