The Efficiency Benefits of "Green Taxes" A Tribute to Senator John Heinz*

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INTRODUCTION

> [Interviewer]: Quite apart from emission standards and effluent taxes, shouldn't corporate officials take action to stop pollution out of a sense of social responsibility?
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> [Milton] Friedman: I wouldn't buy stock in a company that hired that kind of leadership. A corporate executive's responsibility is to make as much money for the stockholders as possible, as long as he operates within the rules of the game. When an executive decides to take action for reasons of social responsibility, he is taking money from someone else—from the stockholders, in the form of lower dividends; from the employees, in the form of lower wages; or from the consumer, in the form of higher prices. The responsibility of a corporate executive is to fulfill the terms of his contract.[1]

Contrary to Friedman's advice, Richard Clarke, the CEO of Pacific Gas & Electric Company, has been directing management to "[m]ake environmental considerations and concerns part of any de-

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* Senator John Heinz was killed on April 4, 1991. This article is a tribute to the veteran of environmental policy making who, "with a . . . unique environmental and private sector perspective, . . . knew well the limits of traditional command and control, predominantly regulatory attempts to protect the environment." During his lifetime, Senator Heinz courageously fought to "unleash the powers of the marketplace in service of [his] environmental goals." Senator Timothy E. Wirth, *Foreward* to PROJECT 88—ROUND II, INCENTIVES IN ACTION: DESIGNING MARKET-BASED ENVIRONMENTAL STRATEGIES at ix (1991)[hereinafter, PROJECT 88].

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1. *Playboy Interview: Milton Friedman*, PLAYBOY, Feb. 1973, at 51, 59.

cisions [they] make, right from the beginning." "Don't think of it," Clarke demands, "as something extra you throw in the pot."[2] These divergent views between economist and businessperson may be reconciled by the explanation that market conditions have changed such that it has become shrewd management policy to include environmental concerns in the decision process. This article explores the conditions that must change to drive market actors to alter their behavior according to Clarke's policy, the notion of "environmental costing."

Before the Clean Air Act was amended in 1990, the decision-making process of an electric utility plant often failed to consider sulfur dioxide emissions when deciding on a generation level.[3] Emissions of sulfur dioxide, a precursor of acid rain, into the atmosphere harm plant and animal life and also cause extensive damage to various materials by way of corrosion.[4]

A power plant employs inputs of labor, coal, and other commodi-

2. *See* David Kirkpatrick, *Environmentalism: The New Crusade*, FORTUNE, Feb. 12, 1990, at 44, 50. Note the difference between a regulated public utility and a competitive, profit-maximizing firm. In contrast to public utilities, which are usually monopolies whose management decisions are affected only by government regulations, competitive corporations are controlled by the profit motive and market forces.

3. The Clean Air Act, 42 U.S.C. §§ 7401-7671q (1988 & Supp. II 1990) was radically altered by the 1990 amendments. These amendments, and especially the provisions of subchapter IV (§ 7651), entitled *Acid Deposition Control*, put a new emphasis on curbing emissions of sulfur. "The Clean Air Act Amendments of 1990 will severely impact utilities in 21 States . . . ." 136 CONG. REC. E3432 (daily ed. Oct. 24, 1990) (extension of remarks of Rep. Bruce). For a brief overview of the Clean Air Act, see Michael Oppenheimer, *Reducing Acid Rain in Eastern North America: The Scientific Basis for an Acid Rain Control Policy*, 19 U. MICH. J.L. REF. 989, 993 n.16 (1986).

4. "Acid deposition in Eastern North America is caused almost entirely by industrial emissions, with electric power plants as the major source. Sulfur originating in sulfur dioxide emissions deposited in the environment is the major source of watershed acidification, as well as a source of damage to crops, materials, forests and human health." Oppenheimer, *supra* note 3, at 1009. "Sulfur dioxide emissions in the [eastern United States] amounted to 22.5 million tons in 1980 of which sixteen million tons, or seventy-one percent, came from electric power plants, mostly coal-fired." *Id.* at 989. ("Sulfur . . . oxides, pollutants released by coal-burning electric-power plants . . . are spewed into the atmosphere. There they are changed chemically . . . and they fall back to Earth as acidified rain or snow. This destroys plant and animal life in streams, damages forests, and even erodes buildings."). EARTH WORKS GROUP, 50 SIMPLE THINGS YOU CAN DO TO SAVE THE EARTH 13 (1989), (citing CLEANING UP THE OUTDOORS); KRISTEN HJALTE ET AL., ENVIRONMENTAL POLICY AND WELFARE ECONOMICS 60 (Curt Wells trans., 1977); *see also* Oppenheimer, *supra* note 3, at 990-92 (acidification causes numerous harms including (1) the leaching of toxic metals into surface waters; (2) the destruction of fish populations and other aquatic biotica; (3) the leaching of nutrients from soils; (4) harm to forests; (5) reduction in some crop yields; (6) accelerated corrosion of structural materials; and (7) the probable aggravation of human respiratory and cardiovascular problems).

ties purchased at market prices. Yet, in producing electricity, the plant also "uses up" clean air in the sense that its emissions of sulfur dioxide and other air pollutants spoil this social good. Because a power company does not have to pay for the input of clean air, it fails to restrict its use of the unpriced commodity.[5] This results in an over-consumption of clean air relative to the socially optimal level.[6]

Pollution from sulfur dioxide serves as an example of a negative "externality"—a class that includes social harms such as industrial accidents, occupational diseases, and industrial pollution. Although pollution comes in many forms, this article will be restricted to the use of sulfur dioxide air pollution as a practical illustration to complement the analysis of abstract economic theories.

Externalities are a form of market failure.[7] Because air is "free," it is overused; and thus society suffers from more air pollution than it would if an appropriate price were placed on the consumption of air. In the example of a polluting power plant, overconsumption is the result of an imbalance between the plant's marginal private cost of the clean air (zero) and the marginal social cost. The marginal social cost is the true opportunity cost to society of the pollution.

As a separate but related problem, air is a "public good" in the sense that it can be used simultaneously and its consumption cannot be excluded. Where the power plant enjoys the benefits of this public good at no extra cost to itself, it will consume away, emitting sulfur dioxide and other air pollutants with abandon. This results in an economic problem; the private costs of the power plant are not aligned with the social costs of the air pollution, demonstrating the nature of an externality.

> The polluting plant does not bear the cost it imposes on the environment and others when it uses the common air or water as a sink for disposal of its residuals. But government can put a price on these externalities through a tax on pollution. Such a tax would give pol-

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5. ALAN S. BLINDER, HARD HEADS, SOFT HEARTS 140 (1987).

6. Put very briefly and very superficially, many economists argue that the source of the environmental problem is the fact that the price system simply is not applied to many of society's resources. Its fresh air, its clean rivers, its good neighborhoods are resources that can be used up in the productive process just as coal, electricity, and steel are consumed. But while a price related to cost of production is charged for fuel and raw materials, the air and our other environmental resources can be used up without payment for the privilege.

William J. Baumol, *Environmental Protection at Minimum Cost*, 30 AM. J. ECON. & SOC. 337, 340 (1971).

7. *See* A. MYRICK FREEMAN III ET AL., THE ECONOMICS OF ENVIRONMENTAL POLICY (1973).

luters strong incentives to clean up at least cost and invest in less polluting processes and products. Because the costs imposed by polluters would, in most cases, be passed on to consumers in the form of higher prices, market price signals would lead consumers to switch to products that are produced by less polluting processes.[8]

PIGOUVIAN TAXES

Early in the twentieth century, when economists began to focus on the difference between private and social costs and their relation to social welfare, a new brand of economics was born. Borrowing from the Marshallian tax-bounty scheme, A.C. Pigou applied his own analysis of the producers' surplus in *Economics of Welfare*.[9] Pigou recognized that when the divergences between private and social costs are pervasive throughout the economy, market prices cannot be used as measures of consumer satisfaction. His proposal for this structural market failure was to institute a tax and subsidy scheme that would bring the private and social product into balance.[10] Today, Pigou's proposed welfare taxes are classified under a general category of "pollution taxes."[11]

Pigou's famous example of a railway that damages neighboring fields has become a favorite of scholars in law and economics. Pigou's general prescription of taxing the railroad on its external diseconomies follows from the doctrine known as the "polluter pays principle." Under a Pigouvian tax scheme, the government imposes a tax on the railroad to force it to "internalize" the social costs it had previously imposed on the farmers whose fields were damaged by the railway's spark emissions. Ideally, this tax would force the railroad's private costs into balance with its social costs, resulting in optimal resource allocation. Accordingly, the railroad would decrease its spark emissions to the point where the cost of tax abatement marginally exceeded the tax charge.

The sulfur dioxide-emitting power plant presents an analogous situation to that of the spark-emitting railway. Taxing sulfur emis-

8. Richard B. Stewart, *Economics, Environment, and the Limits of Legal Control*, 9 HARV. ENVTL. L. REV. 1, 10 (1985).

9. MARK BLAUG, ECONOMIC THEORY IN RETROSPECT 388-89 (4th ed. 1985).

10. *See* William J. Baumol, *On Taxation and the Control of Externalities*, 62 AM. ECON. REV. 307 (1972). This article contains a theoretical and technical discussion of applying the Pigouvian prescription as an instrument of tax policy in today's economy. After addressing criticisms of the Pigouvian tax scheme, Baumol reaches the conclusion that pinpointing the generators of externalities for tax and subsidy treatment will be sufficient to bring about an optimal allocation of resources.

11. GEORGE S. TOLLEY ET AL., 1 ENVIRONMENTAL POLICY 188 (1981).

sions would put a price tag on clean air in the same manner the market puts prices on other inputs. Such a tax would, under the general notion of environmental costing, have the effect of forcing the polluting power plant to appreciate the amount of clean air it consumes. Consequently, the utility would choose either to avoid the tax by imposing less of a cost on society or to repay society for the amount of damage it causes by paying the emissions tax.[12]

COASE'S RESPONSE

The idea of setting the market straight through Pigouvian taxes sounds a panacea for all of society's pollution problems. However, free-market economists who dominate the field of law and economics are opposed to such an interventionist directive.[13] In 1960, R.H.

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12. Society has been giving away, free, too many of its precious resources far too long. It is not as scandalous as it sounds to decide that everything has its price. The real scandal lies in setting that price at zero or at some token level that invites us all to destroy and to despoil. Unless we recognize the legitimate role of taxation in this area, we may end up with our sense of morality intact but our environment in ruins.

Baumol, *supra* note 6, at 343.

13. *See* RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 353-56 (3d ed. 1986) (Posner observes that the tax approach to pollution is far from being a universal cure. He levels three principal criticisms against pollution taxes. First, they are likely to be counterproductive in situations in which the victim of the pollution is the least-cost avoider. Second, he makes the point that "there are billions of emissions of pollutants every year, and it is totally infeasible to estimate the social cost of each one for the purpose of setting the correct tax rates." This is a problem of getting enough information to devise an efficient tax schedule. Third, Posner assumes that in most cases, pollution will be "cost-justified" such that a pollution tax will have the principal effect of increasing the tax bills of polluting enterprises rather than reducing pollution. Moreover, he maintains that these increased tax bills will be in the form of excise taxes (because they are roughly proportional to output) which are regressive. Therefore, "[t]o assure proportionality or progressivity of the tax system, comprehensive pollution taxes would require exemptions, rebates, or compensating changes elsewhere in the tax system."

These criticisms, however, are not fatal. The problem with Posner's first argument is that it ignores both the reality of most situations in which a pollution tax is likely to be applied, and the teachings of Coase, which will be discussed below. Posner suggests that the victims may be the least cost avoiders of pollution, using the examples of installing air conditioning or living farther from the source of pollution. These examples are indicative of the two weaknesses of Posner's first criticism. Where the number of victims is large, the aggregate cost of air conditioners or moving will most probably outweigh the cost of pollution abatement. If the number of victims is small, then, applying the Coase Theorem, *see infra* text accompanying notes 14-17, the factory and the victims will negotiate an agreement establishing an efficient amount of pollution, making a tax unnecessary.

The weakness in Posner's second criticism is that the information requirements of a pollution tax, although substantial, are not as great as those required by alternative methods of restricting pollution. Posner admits that

the tax approach has one great advantage over the other regulatory approaches: It

Coase severely criticized the practice of welfare economics and its tax and subsidy prescription for divergences in private and social product. In his famous article, "The Problem of Social Cost," Coase challenged the Pigouvian tax system and claimed that, given certain conditions, the market mechanism would lead to optimal resource allocation on its own, correcting itself where externalities exist.[14]

Coase and his Chicago school following first emphasize the feedback effects of instituting a tax and subsidy to correct market imperfections. Often, they assert, the administrative costs of instituting a tax and subsidy scheme absorb more resources than are lost from the market failure that these remedies are supposed to correct. Further, they maintain that the intervention itself causes market imperfections of its own. Therefore, the Coase school claims, this solution may be worse than the harm it sets out to remedy.

Coase's second point is that pollution is a reciprocal concept and that the industrialist is not the sole cause of the pollution problem:

> The question is commonly thought of as one in which A inflicts harm on B and what has to be decided is: how should we restrain A? But this is wrong. We are dealing with a problem of a reciprocal nature.

> does not require the agency to measure the costs of compliance with the pollution control criteria embodied in the tax rates . . . . [T]he agency need only estimate the benefits of reducing pollution. . . . To put this differently, emission standards require cost-benefit analysis; pollution taxes require only benefit analysis.

Posner, *supra* at 356-57.

Finally, the criticism that pollution taxes will have regressive effects is also subject to rebuttal. First, this criticism is premised on the dubious assumption that "much pollution is cost-justified." Whether or not pollution is justified depends not only on the cost of abatement, but on the benefit derived from a cleaner environment. While this raises problems of valuation, it nevertheless stands that, in a society that ties great importance to the preservation of the integrity of its environment, much pollution will not be justified. *See* Baumol, *supra* note 10, at 316 ("a very substantial portion of the cost of pollution is psychic; and even if we knew how to evaluate the psychic cost to some individual we seem to have little hope of dealing with effects so widely diffused through the population."); *see also* J. Andrew Hoerner, *Climate Said To Be Warm for Passage of Carbon Tax*, 47 TAX NOTES 1415, 1417 (1990) (Roger Dower, the director of World Resources Institute's climate, energy and pollution division, stated that "You can't just look at the economic costs of higher energy prices. You also have to look at the economic benefits from reduced environmental degradation." Such benefits include reductions in global warming, health costs, lost work time, higher property values, and better recreational facilities.).

Beyond this faulty premise, it is noteworthy that Posner's further objection to the regressivity of pollution excise taxes is not unique to taxes. Any effective pollution abatement will ultimately raise costs to consumers as they internalize the costs that had previously been unaccounted for as external social costs.).

14. Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. ECON. 1 (1960). Ronald Coase received the Nobel Prize in Economics in 1991.

> To avoid the harm to B would inflict harm on A. The real question that has to be decided is: should A be allowed to harm B or should B be allowed to harm A? The problem is to avoid the more serious harm.[15]

One of Coase's illustrations shares similarities with the example of the power plant and the externality of sulfur dioxide emissions. The case of *Cooke v. Forbes*[16] involved an externality dispute where the fumes emitted from a manufacturer of sulphate of ammonia discolored the cocoa-nut fibre matting of a neighboring producer. The maker of the matting sought an injunction against the emission of the fumes but the court refused to grant the remedy. To Coase this situation was one in which, given the condition that property rights were clearly defined, the parties were at liberty to negotiate and contract with one another to arrive at an optimal solution.

The "Coase Theorem" is the proposition that when property rights are clearly assigned and transaction costs are zero (*i.e.*, parties can freely negotiate without significant costs of informing one another, enforcing the agreement, excluding free-riders, dealing with hold-outs, and so forth), market forces will motivate the parties to enter into voluntary agreements that shift the cost of the "pollution" in such a way as to maximize the joint welfare of the contracting parties. When transaction costs are negligible, it does not matter which party has the right to pollute or to enjoin the pollution because both parties will eventually contract with one another so that they optimize the allocation of pollution.

In the sulfur-dioxide-emitting power plant example, property rights might be assigned to the neighboring community that could then enjoin the plant from spewing forth its pollution. Transaction costs could be low if the entire community were represented by a fully informed council empowered to make binding agreements and open to free discussion. With an equally accommodating representative of the power plant, it would follow that resources would be optimally allocated. Depending on the costs of cutting emissions (e.g., through scrubbers, alternative fuels, technology improvements, or relocating the plant) and the dollar value that the community places on pollution-free air, the power plant would pay the community to allow it to emit sulfur dioxide up to the point where the marginal benefit of the power plant equals the marginal cost (the price demanded by the community) of that quantity of

15. *Id.* at 1.

16. L. R. 5 Eq. 166 (1867).

emissions.[17]

Conservative legal economists use the Coase Theorem to argue against the liberal application of pollution taxes. Their non-interventionist arguments claim that where transaction costs are low, the market should be allowed to correct itself through private negotiations and courts should not interfere with such efficient allocations.[18] Furthermore, where transaction costs are high, due to government inefficiencies, state intervention may only exacerbate the situation rather than correct the market failure.[19]

Despite the Chicago school's proclamation of the superior nature of a market-based approach, the popular trend is to consider the market as only one of several possible tools that can be combined to solve pollution externality problems. Just as a pollution tax that fails to consider market forces would be highly inadequate, a market solution that does not take transaction costs into consideration would also be ineffective. Neither Pigou nor Coase suggest their

17. If this picture appears to be a little too idealistic, the reason is because it *is* too idealistic. The existence of zero transaction costs is almost unheard of and Coase himself warns of using this benchmark of efficiency as anything other than a hypothetical ideal. Ronald H. Coase, *Notes on the Problem of Social Cost, in* THE FIRM, THE MARKET AND THE LAW 14-15 (1988). Despite this warning, right-wing scholars of law and economics continue to argue against market intervention with the claim that the Coase Theorem justifies a market-based approach. For discussion of this use and abuse of Coase's teachings see: Pierre Schlag, *The Problem of Transaction Costs*, 62 S. CAL. L. REV. 1661 (1989); Pierre Schlag, *An Appreciative Comment on Coase's* The Problem of Social Cost: *A View from the Left*, 1986 WIS. L. REV. 919 (1986); Adam Chase, The Coase Theorem and Efficiency Analysis: What's Hiding Behind This Ignorant Veil? (1990) (unpublished paper on file with *UCLA Journal of Environmental Law & Policy*).

18. *See* Michael White & Donald Wittman, *Comparison of Taxes, Regulation, and Liability Rules Under Imperfect Information*, 12 J. LEGAL STUD. 413, 424-25 (1983) (concluding that the expected deadweight costs of an appropriately defined negligence liability approach to pollution regulation is less than or equal to the expected deadweight costs obtained under both price (an effluent tax) and quantity (regulatory controls) approaches. The liability approach has the advantage, the authors contend, of fewer instances of pollution being litigated in court than "must be regulated by the pollution authority under quantity controls."); *see also* POSNER, *supra* note 13, at 353 n.1 (Posner supports such a liability approach because it considers the actions of the victim of pollution, like the theory of contributory negligence in a strict liability case); *contra* Baumol, *supra* note 10 (the liability idea is discussed and dismissed given a tax setting in which both the polluting party and the affected party would be subject to taxation).

19. *See* HJALTE et al., *supra* note 4, at 88 (noting the fact that a command economy has the means to solve pollution problems, but questioning the ability of a bureaucracy to implement an optimal environmental policy. "The information required for such a task would be so extensive that it is probable that environmental considerations would be lost in the bureaucratic maze."). The authors support a combination of a market economy and a centralized decision maker as the most effective means of protecting the environment.

methods be used in isolation. "The voluntary solution to the problem of externality has limited relevance for a number of reasons. In particular, high transactions costs preclude such a solution, and it is hard to conceive of an externality problem at all without high costs of transacting."[20] The solution to a specific pollution externality must depend on the facts of the situation and policy makers must ask, "Are transaction costs high?" and "Will the government be able to solve this efficiently?" Often the answer to these questions leads to a combination of market and government solutions.[21]

DIRECT COMMAND AND CONTROL REGULATION VERSUS AN INDIRECT ECONOMIC INCENTIVE SOLUTION

Assuming that the idealized frame of reference used by proponents of the Coase Theorem is unrealistic—that is, transaction costs are significant—then an interventionist policy must be pursued to combat pollution externalities because the market will not correct itself. The question of what kind of government intervention is best, direct regulation through restrictions on pollution or an indirect market-based solution,[22] such as tax or permit trading schemes, concerns many economists,[23] politicians,[24] and environment-

20. JULIAN LOWE & DAVID LEWIS, THE ECONOMICS OF ENVIRONMENTAL MANAGEMENT 176 (1980). *See also* Daniel T. Dick, *The Voluntary Approach to Externality Problems: A Survey of the Critics*, 2 J. ENVTL. & ECON. MGMT. 185 (1976).

21. *See* Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 COLUM. J. ENVTL. L. 171 (1988) (debate between "market enthusiasts" and "the defenders of democracy" involves a false dichotomy with regard to reforming environmental law). The authors argue for a creative use of market incentives which will improve the administrative efficiency of democracy while saving billions of dollars each year.

22. The terms "market-based," "economic incentives," "market incentives," "fiscal incentives," "tax-based," "fiscal measures," "price-incentives," etc., are used somewhat interchangeably in this article. They embrace a variety of taxes, fees, charges, credits, tradable permits, and other financial measures implemented by the government through legislation.

23. Among economists, the overwhelming consensus is that "[A] tax on pollution is a better way to protect the environment than the direct controls that society now imposes." BLINDER, *supra* note 5, at 137. *See also* J.R. Kearl, et al., *A Confusion of Economists?*, 69 AM. ECON. REV. 28, 30 (May 1979).

24. Although most politicians have favored direct regulation over a tax solution, the late Senator John Heinz of Pennsylvania supported the latter. *See* John Heinz, *Environment/Taxes: Tax Incentives for Pollution Control*, 8 J. CORP. TAX. 83 (1981). Heinz noted the positive effects of environmental laws but criticized the reams of regulations that they have spawned. "Unfortunately, they have also created an army of technocrats and lawyers who exist only to write, interpret, and litigate them . . . ." *Id.* The Senator came down on the side of tax incentives:

> Unlike regulatory approaches, this system takes account of the profit motive, encouraging firms not only to comply with environmental regulations but also to find the

alists.[25] Strong arguments exist for and against both.[26] This section will briefly present some of the more common controversies currently debated in the field. As one might expect, the solution ultimately depends on the surrounding circumstances of the particular pollution problem.[27] In some cases direct government control will be best, while in other situations a more passive role of imposing taxes or granting subsidies will be optimal.[28]

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least costly, most efficient means of so doing. This approach also recognizes that online personnel might have more knowledge of how industrial processes operate . . . than do the regulators and legislators in Washington. Critics of the free-market, effluent fee approach have contended that it is somehow "immoral," constituting a "license to pollute," and that companies would rather pay the fee than find ways to reduce environmental degradation—a judgment that says as much about the critics as it does about American business.

Id. at 84.

See 136 CONG. REC. E3432 (daily ed. Oct. 24, 1990) (statement of Rep. Bruce discussing H.R. 5904); *see also infra* text accompanying notes 73-83.

25. Once a cadre of hard-nosed liberal litigators with the unofficial motto "Sue the bastards," Environmental Defense Fund has broken ranks with fellow legal eagles Natural Resources Defense Council and Sierra Club Legal Defense Fund by casting its lot with "free market" environmentalism. The idea—which has been kicking around since the seventies—is to curb pollution by harnessing market forces rather than harnessing business with micro-regulation. Besides being included in Bush's Clean Air Bill, free-market environmentalism has won EDF an audience with Margaret Thatcher and praise from many large corporations (whose dollars, incidentally, EDF does not accept).

OUTSIDE MAGAZINE, Sept. 1990, at 73. "When introducing his Clean Air proposals at the White House on June 12, 1989, President Bush said: 'Let me commend . . . groups like the Environmental Defense Fund for bringing creative solutions to long-standing problems, for not only breaking the mold, but helping to build a new one. . . .' " PROJECT 88, *supra* note *, at 1 n.3. The Environmental Defense Fund may have broken the mold, but, to varying degrees, other environmental groups have followed the lead: "[T]he Wilderness Society, the National Audubon Society, the National Wildlife Federation, the Sierra Club, the Natural Resources Defense Council, and the Conservation Law Foundation have all come to support *selective* use of economic-incentive mechanisms." *Id.* at 4 n.18.

26. The choice of government intervention should probably include a nuisance or common law alternative, but, for the purposes of this article, it will be artificially restricted to the two mentioned above. *See* TERRY L. ANDERSON & DONALD R. LEAL, FREE MARKET ENVIRONMENTALISM, 147-49, 164-67 (Anderson and Leal adopt a Coasean approach in their attempt to solve water pollution and global warming problems through well-defined property rights and the assignment of those rights.).

27. JOHN A. BUTLIN, THE ECONOMICS OF ENVIRONMENTAL POLICY 24-25 (1981) (Butlin points out six factors that must be weighed in choosing the solution: (1) the scientific analysis of the pollution and its effects; (2) the evaluation of the social nuisance caused by the given degree of pollution of the given kind; (3) the assessment of future damage to the environment; (4) the level of transaction costs that must be incurred; (5) the amount of social damage that would occur if the pollution were not prohibited in the entirety; and (6) the weighting of emphasis according to the noxiousness of the various pollutants).

28. WILLIAM J. BAUMOL & WALLACE E. OATES, ECONOMICS, ENVIRONMENTAL POLICY, AND THE QUALITY OF LIFE 357 (1979) (an argument is made for a mixture of

Efficiency

The Efficiency of Economic Incentives

Literature focusing on the efficiency of direct regulation of pollution as opposed to that of indirect market incentives appears to be of one mind: *pro* tax and permit trading, anti direct regulation. A tax on pollution, such as an emissions charge placed on a sulfur dioxide-emitting power plant, may clean up the environment at lower cost than mandatory quantitative controls.[29] This happens because the market accommodates individual differences among polluters.[30]

For instance, the goal of obtaining a twenty percent reduction in sulfur dioxide emissions could be achieved through either of two means. First, the government could mandate that all sources of sulfur dioxide reduce their emissions rates by a designated level in order to achieve the overall twenty percent reduction. Current environmental regulations operate in this manner, except that they mandate implementing pollution control technology as well as output.

The second option is to charge a fee on discharges calibrated to reduce emissions by the desired amount. This option, however, achieves the same end at a lower cost to society, making it a more efficient option.[31] The assignment of fees can be allocated so that firms that can reduce emissions more easily and cheaply will be given financial incentives to achieve the bulk of the desired reductions. This occurs because those firms that find the reductions more onerous and costly will be forced to purchase tradable permits, or will incur higher pollution taxes, resulting in a competitive disadvantage.[32]

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market incentives and direct regulation combined with a third aspect of moral suasion to supplement the other two policy approaches). *See also* PROJECT 88, *supra* note *, at 9.

29. Economic-incentive systems lead firms to undertake pollution-control efforts that allocate the control burden appropriately. By making it costly for firms to increase their pollution, the government encourages them to clean up in a cost-effective manner: the invisible hand of the market is brought to bear on behalf of the environment.

PROJECT 88, *supra* note *, at 5. *See* SANFORD E. GAINES & RICHARD A. WESTIN, TAXATION FOR ENVIRONMENTAL PROTECTION 4-7 (1991), *reviewed in* 23 ENVTL. L. (forthcoming April 1993).

30. BLINDER, *supra* note 5, at 141; Baumol, *supra* note 6, at 341-43.

31. Baumol, *supra* note 10, at 318-19.

32. BLINDER, *supra* note 5 at 141; GAINES & WESTIN, *supra* note 29 at 5; STEPHEN BREYER, REGULATION AND ITS REFORM 270 (1982). Note that this argument loses some of its strength in a public utilities framework where regulated monopolies are not driven by competitive market forces.

Proponents of effluent taxes and similar market mechanisms for reducing pollution focus on the versatility of price signals that spread out the charges placed on industry. Price signals work to decentralize mediation between the willingness of producers to produce and the financial abilities of consumers to consume.[33] Price regulates supply and demand, working both as an incentive to industry to develop better technology and make other pollution-reducing adjustments, and as a rationing device to consumers. When the tax imposed on polluters equals the marginal social costs of their emissions, optimal efficiency is obtained.[34]

In sum, under this tax system, industry must account for the pollution that previously was an external cost to society. As a result, polluting industries will pass on to their customers the costs incurred in cutting emissions or purchasing emission credits. Consumers therefore pay higher prices for goods produced by polluting industries. Goods produced by manufacturers that do not pollute will then be relatively less expensive than those produced by polluting manufacturers. Ultimately, unless new technology is developed or alternative fuels and techniques are used, consumers will decide whether to keep pollution-intensive industries alive. Other efficiency arguments in favor of price incentives and related fiscal devices highlight the fact that not only do these mechanisms promise to be effective in reducing levels of emissions, but they can also yield sizeable savings of scarce resources[35] as well as produce a bountiful pool of revenues.[36] Revenues are a concomitant aspect of emissions charges. Unlike most taxes which create deadweight inefficiencies, charges on externalities are unique in that they reduce rather than exacerbate market distortions.[37] Furthermore, a net benefit results

33. Daniel J. Dudek & John Palmisano, *Emissions Trading: Why is the Thoroughbred Hobbled?*, 13 COLUM. J. ENVTL. L. 217, 222 (1988).

34. BUTLIN, *supra* note 27, at 142.

35. BAUMOL & OATES, *supra* note 28, at 348; The House Ways and Means Committee has recently considered excise taxes on timber harvests. Richard A. Westin, *Environmental Taxes: Some Options*, 48 TAX NOTES 355 (1990).

36. ALBERT L. NICHOLS, TARGETING ECONOMIC INCENTIVES FOR ENVIRONMENTAL PROTECTION 35 (1984). A carbon tax introduced by Rep. Fortney Stark, D-Calif., would raise roughly $6 billion in the first year, rising steadily to $30 billion annually in the fifth year. Hoerner, *supra* note 13, at 1415; Dan Rostenkowski, D-Ill., has announced a deficit reduction plan that includes $22 billion raised through unspecified pollution taxes. J. Andrew Hoerner, *Breath and Taxes: Air Pollution Taxes in the Works*, 46 TAX NOTES 1356 (1990).

37. *See* PROJECT 88, *supra* note *, at 24-25 (in the discussion of carbon charges as a measure to combat global climate change the authors observe that "[t]he carbon charge is a 'corrective' tax, one that helps improve the functioning of the market, in contrast with most other taxes, which tend to distort the functioning of the market."); David

where the revenues from pollution-reduction schemes are substituted for other taxes.[38] From an environmentalist perspective, these revenues would be optimally spent by the government on clean-up projects for past pollution that went untaxed.

Ideally, the revenues collected from taxing polluters would be used to compensate the victims of the pollution. However, this ideal ignores the problem of identity. For instance, no one knows which particular power plants cause defoliation in Eastern Canada. Nor can one identify the specific fisherpeople in New England who suffer from decreased incomes as a result of acid rain. Because of these targeting problems it is probably more effective to pool pollution taxes and earmark the revenues for environmental purposes or to apply the pooled funds as general government revenues.

Finally, consistency serves as an additional virtue of pollution taxes. The automatic and self-enforcing nature of taxes shelters them from the waxing and waning pressures associated with environmental and financial concerns that affect the vigor with which regulatory agencies attack pollution. This permanent influence will significantly affect the behavior of the economy.[39] For instance, industrial planners can rely on the presence of pollution taxes instead of trying to anticipate transient public outcry.

Inefficiencies of Direct Control

The other side of the pro market-based incentive argument is an anti-direct regulation argument. This argument focuses on the inefficiencies of government command and control mandates. However, before delving into the criticisms of the regulatory approach, note that the bias towards the economic-incentive approach can be partially explained by the fact that it is primarily a hypothetical economic model. Therefore, it does not suffer from the faults of the status quo of quantity mandates which are currently applied by the government's environmental agencies.

Direct control occurs through either a technology-based standard or a performance standard. In a technology-based standard, the government establishes a standard on the basis of a particular tech-

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Terkla, *The Efficiency Value of Effluent Tax Revenue*, 11 J. ENVTL. & ECON. MGMT. 107 (1984).

38. NICHOLS, *supra* note 36, at 35. Note, however, the potential for divergence in the goals of pollution reduction and revenue raising. Policymakers might face the dilemma of trading off techniques that are more effective for bringing in a steady flow of tax dollars for those that are more effective in controlling pollution.

39. Baumol, *supra* note 6, at 342.

nology or, where monitoring problems are severe, explicitly requires the use of specified technology. In a performance-standard system, the government merely sets a specified level of allowable emissions and gives producers the flexibility to decide how to attain the standard.[40]

Much of the critique of the command and control method of reducing pollution is similar to that used to argue the efficiencies of tax and tradable credit methods. Where market-based approaches accommodate differences among sources in the cost of achieving control, the present system makes environmental protection unduly expensive by ignoring these differences.[41] "Because of uniformity in regulatory requirements, facilities in a particular industry with relatively high abatement costs are often forced to achieve as much clean-up as those with relatively low abatement costs."[42]

The major fault of a direct intervention regulatory scheme stems from the inefficiencies associated with administering the complex body of environmental regulations.[43] The legal-regulatory system requires an extensive, time-consuming process of litigation and review that allows polluters to delay compliance.[44] These procedures postpone returns on investment in developing new technologies and create risk by adding uncertainty as to whether regulatory clearance for new products or processes will be granted.[45] As a result, the system fails to motivate adequately innovation in the development of environmentally superior processes, controls, and products.[46] Regulatory inefficiency may cause environmental benefits to be delivered at excessive costs as well as having adverse effects on investment, productivity and economic growth.[47]

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40. PROJECT 88, *supra* note *, at 5; *Oppenheimer, supra* note 3, at 993, n.16, 994, n.17.

41. Stewart, *supra* note 8, at 7; *see* GAINES & WESTIN, *supra* note 29, at 4 ("[D]irect regulation has serious limitations. It is an inflexible system that generally achieves its results only at the cost of significant economic inefficiencies, inequitable competitive effects, and the inhibition of technological developments.").

42. Stewart, *supra* note 8, at 7.

43. White & Wittman, *supra* note 18, at 414. The authors lay out a detailed and graphically complex economic analysis of the administrative costs of quantity controls on pollution. They then compare them to the corresponding deadweight costs of an effluent tax, concluding that the costs of the former are higher than those of the latter where the slope of the marginal cost curve for pollution abatement is steeper than the marginal benefit curve. *Id.* at 424.

44. Stewart, *supra* note 8, at 8.

45. *Id.*

46. GAINES & WESTIN, *supra* note 29, at 4.

47. Stewart, *supra* note 8, at 6. "[C]onventional policy approaches can be effective in achieving environmental goals, but they tend to impose relatively high costs on soci-

As one-sided as the efficiency argument may appear, some inefficiency arguments against the use of market-based incentives exist. First, their use should be restricted to situations where metering of pollution is technically and economically practical.[48] The costs of imposing these taxes may otherwise be as high, if not higher than those of administering a direct regulation of pollution. Second, a related inefficiency argument arises from the possibility of a divergence in the optimal charge rate and the marginal damage. The decisions of how much to charge and how to spend the revenues are delicate ones, and the price-incentive system may be inefficient when these economic decisions go astray.[49]

Incentives

The basic incentive argument behind pollution taxes is that they provide for flexibility, whereas direct regulations rigidly prohibit emissions in excess of a designated amount. A scheme that taxes every unit emitted gives producers sharp financial incentives to reduce emissions up to the point at which (marginal) abatement costs are on par with the pollution tax rate. Thus, the polluter strives to reduce pollution to the most efficient level, not just to some statutorily-determined level mandated by the government. This kind of an economic incentive extends to efforts to devise or purchase innova-

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ety. . . ." PROJECT 88, *supra* note *, at 5. The authors of Project 88 assert that economic-incentive approaches will, in many cases, allow a given level of environmental protection to be achieved at lower total cost than would be possible with conventional policy approaches. The study refers to an estimate that the market-based approach to acid rain reduction could lead to a savings of $1 billion per year over a dictated technological solution. *Id.* at 8-9.

48. BAUMOL & OATES, *supra* note 28, at 348. The practicality requirement of metering also exists with performance standards, which helps to explain why there are so many "engineering" standards in our current regulations.

Deputy Assistant Treasury Secretary for Tax Policy, Michael Graetz, has opposed proposed pollution taxes because they have not met his three criteria. Graetz asserts that national standards are more appropriate than regional ones, that enough information is available "to set the tax at a level that will achieve . . . environmental goals without placing an excessive burden on industry," and that "the tax be . . . administrable and collectible." J. Andrew Hoerner, *Tax Villains! Ways and Means Holds Hearing on Pollution Taxes*, 46 TAX NOTES 1235 (1990).

Environmental taxes and marketable permits are not economically practicable in situations where scientific uncertainty may cause the government to unexpectedly change requirements. Pollution control entails long-term capital investment such that market solutions will work well only when stability can be assured. GAINES & WESTIN, *supra* note 29, at 6.

49. The decisionmaking process involves a complex set of social, economic, political, and environmental considerations that reach beyond the bounds of this article. More particularly, the potential regressive effects of market-based incentives is a crucial element which will, for the most part, go unaddressed.

tive ways to reduce emissions. This differs from current regulations which may dictate technology rather than drive its development.[50]

The incentive argument relates closely to the above efficiency argument. Faced with a tax per unit of pollutant, those polluters that find it cheap to reduce pollution will reduce emissions by a greater amount relative to those that find it expensive.[51] This consequently reduces aggregate pollution to a given level at lower overall cost than would forcing each polluter through regulations to reduce the pollution by a unitary amount.[52] Note, however, that incentives must be adjusted so that pollution control objectives can be achieved without putting too much strain on producers or causing market distortions.[53]

This delicate relationship between incentive and equity concerns raises the issue of which technique to use, subsidies—amounts paid to polluters to get them to curtail their pollution—or charges. Which technique to use depends on the purpose. For straight reduction of overall pollution, it is better to tax that which is most noxious rather than to subsidize that which is less repulsive.[54] An

50. BLINDER, *supra* note 5, at 144-45.

51. *See* Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules and Alienability: One View from the Cathedral*, 85 HARV. L. REV. 1089 (1972) (discussing the notion of the cheapest- or least-cost avoider); GAINES & WESTIN, *supra* note 29, at 5; PROJECT 88, *supra* note *, at 5 ("The costs of controlling emissions vary greatly from one source to another. For certain pollutants, the cost per unit controlled may vary by a factor of 100 or more, depending upon the age and location of plants and the technologies at their disposal.").

52. BUTLIN, *supra* note 27, at 25; Richard B. Stewart, *Controlling Environmental Risks Through Economic Incentives*, 13 COLUM. J. ENVTL. L. 153, 158-60 (1988) (Stewart discusses a number of advantages that the economic incentive system has over command and control regulation: (1) decentralized flexibility; (2) cost savings; (3) reduced administrative burden and information requirements; (4) flexibility in the control technologies employed; (5) no penalties imposed on new products; (6) increased incentives to devise new products or production technologies to reduce still further the amount of pollution; (7) enhanced democratic accountability of environmental policy decisions; and (8) the capacity to provide an important and appropriate new source of government revenue.).

53. Senator Kent Conrad, D-N.D., has taken a leading position in opposition to the carbon tax. He labeled the tax "an unbelievably bad idea." His criticism of the carbon tax is that it would "punish energy-producing states, send consumer energy costs skyrocketing, cause American industries to move jobs and operations overseas, and impose higher taxes on U.S. consumers with precious little benefit." *Industry Increasingly Concerned by Possibility of a "Carbon Tax"*, INDEPENDENT POWER REPORT, at New Projects 12 (June 15, 1990); *Independents Could Be Hit Hard by Certain Kinds of Energy Taxes*, INDEPENDENT POWER REPORT, at Rates & Regulations 16 (Aug. 10, 1990); *c.f.* Daily Rep. for Executives (BNA), Oct. 29, 1990, at H-1 (citing a bill, analyzed to have a positive impact on the coal industry by providing a 20% environmental tax credit to companies using minerals to clean coal).

54. BUTLIN, *supra* note 27, at 25.

ideal approach taxes both the more and less noxious pollution, while giving incentives by taxing the more objectionable form of pollution at a higher rate.

The case for granting subsidies is hard to make and usually their use is restricted to situations of extreme hardship or political expediency.[55] Subsidies to aid and assist industry in cases where pollution reduction could be achieved only at major costs (e.g., where entire product lines must be switched or where working capital must be completely replaced) are justifiable where the effect is merely to ease the costs of major transitions that might otherwise force the industry to shut down and cause further social externalities.[56]

The arguments against subsidies as incentives center around the belief that subsidies give the wrong incentives. Subsidies have the effect of serving to reward polluters, or at least relieve them of the financial burden of cleaning up the mess that they created. Because subsidies can actually encourage polluters to expand their damaging activities, they must be used sparingly.[57]

Specific environmental tax incentives exist in the Internal Revenue Code currently and efforts are being made to expand this approach.[58] Senator Heinz once sought to increase the limited tax

55. BAUMOL & OATES, *supra* note 28, at 348. This type of subsidy, however, is different from the type of subsidy discussed above. This subsidy is unlike the first type which is an alternative to a pollution tax. Rather, it is more of a transfer payment paid to those that are dislocated by the pollution abatement. *See* GAINES & WESTIN, *supra* note 29, at 10 ("Fiscal measures can be used to modify behavior through either the 'stick' of taxing undesirable activities more heavily or the 'carrot' of tax savings for desirable activities. Legislators are understandably more comfortable granting tax subsidies than imposing tax increases. Such subsidies may conflict, however, with the 'polluter pays' principle."). Examples of appropriate subsidies include situations in which the burden falls heavily on the poor, or when the source of pollution makes a strong claim for public assistance to help cover the costs of abatement.

56. Harold B. Malmgren, *Environmental Management and the International Economy*, *in* MANAGING THE ENVIRONMENT 58 (Allen V. Kneese et al., eds., 1971); *see* Daily Rep. for Executives (BNA), Oct. 29, 1990, at H-1. Rep. Terry Bruce, D-Ill, introduced a bill (H.R. 5904) that provides for, *inter alia*, a 20% tax credit for pollution control devices and a short amortization period for such devices. According to Bruce, these provisions will mitigate the burdens imposed by the Clear Air Act, especially for utilities and coal producing states. The benefits of the bill are the creation of more construction jobs, the saving of coal and mining operations, and the continued use of millions of tons of coal that would be abandoned as a result of the Clear Air Act. *Id.* *See also* 136 CONG. REC. E3432 (daily ed. Oct. 24, 1990).

57. BAUMOL & OATES, *supra* note 28, at 348.

58. H.R. 5904, introduced October 23, 1990, would allow for a 20% environmental tax credit for pollution control devices; tax exempt pollution control bonds; 60-month amortization for pollution control devices; 20% credit for minerals used in cleaning coal; and exemption from taxation for the revenue a utility receives from selling allow-

incentives provided under section 103 (dealing with tax-exempt industrial development bonds) and section 169[59] (dealing with five-year amortization) to recognize the necessity of investing in pollution control and waste disposal facilities to fulfill the mandates of environmental laws. Heinz, a pragmatic environmentalist legislator, concluded that, "combined with general tax measures to spur capital formation and economic revitalization . . . revisions to Sections 103 and 169 can help resolve many of the current conflicts between environmental protection and economic growth."[60]

Enforcement

Perhaps the greatest criticism of a pollution tax is that, as a system of emissions charges, it would be too burdensome to enforce. If the level of sulfur dioxide emissions produced by the polluting power plant were not measurable, the critics argue, then it would be impossible to tax the utility according to its consumption of clean air. In such a case, the efficiency gains from internalizing externalities would be lost. This criticism has two major flaws. First, if emissions are not measurable, a charge may not be placed on the output of sulfur dioxide. However, that does not preclude a tax on the input of sulfur-containing fuels or a credit for the amount of sulfur captured by scrubbers. A per-unit tax could be levied on the sulfur content of coal such that the same economic efficiency and incentive arguments discussed above would hold true to the price-induced pollution control measures.[61] Second, although the measurement problem may prevent charges on emissions, it would also obstruct efforts to enforce command and control standards. The inability to enforce anti-pollution regulations explains the current situation

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ance credits as established in the Clean Air Act amendments. 136 CONG. REC. E3432 (daily ed. Oct. 24, 1990); Heinz, *supra* note 24, at 85; *see* Donald T. Rocen & David C. Green, *New Tax on Ozone-Depleting Chemicals Has Far-Reaching Consequences*, 72 J. TAX. 282 (1990) (the authors offer a practical, Internal Revenue Code-oriented discussion of the tax on chlorofluorocarbons enacted pursuant to the Montreal Protocol).

59. Section 169 of the Internal Revenue Code allows certified pollution control facilities to be amortized over a period of sixty months. The elective provision is designed to induce private industry to commit funds for anti-pollution facilities. Richard A. Westin & Sanford E. Gaines, *The Relationship of Federal Income Taxes to Toxic Wastes: A Selective Study*, 16 B.C. ENVTL. AFF. L. REV. 753, 768 (1989); *see* Paul R. McDaniel & Alan S. Kaplinsky, *The Use of the Federal Income Tax System to Combat Air and Water Pollution: A Case Study in Tax Expenditures*, 12 B.C. INDUS. & COM. L. REV. 351 (1971).

60. Heinz, *supra* note 24, at 88. For a comprehensive discussion of existing environmental tax incentives, see GAINES & WESTIN, *supra* note 29, at 186-224.

61. *See* Amy C. Christian, *Designing a Carbon Tax: The Introduction of the Carbon-Burned Tax (CBT)*, 10 UCLA J. ENVTL. L. & POL'Y 221 (1992).

with the Environmental Protection Agency (EPA) and its poor record of policing its direct quantity control standards.[62]

Assuming that a satisfactory level of measurability can be achieved, the enforceability of emission charges is strengthened by the fact that they are instituted through the mechanism of "the relentless and anonymous tax collector who basically reads your meter like the gas or electric company. No fuss, no muss, no bother—and no need for big bureaucracy."[63] Polluters can escape the pollution charge only by exploiting the obvious loophole that is deliberately left open: reducing emissions. In contrast to the enforcement nightmare that plagues our current environmental efforts, the facility of price incentives outshines that of the command and control system.

It is said to be an "obvious fact that fees can work effectively only where the monitoring of levels of emissions is practicable."[64] This helps to explain why the success of pollution taxes depends on finding a readily applicable standard of measurement. Fortunately, technology has developed at a rapid pace in this field, partially driven by the growing concern for public health and safety and by particular environmental catastrophes that have had severe impacts on human lives.[65]

Now that satellites are equipped with powerful cameras, spectroscopes, multi-channel remote sensing devices, and other advanced technological scanners such as detectors for spying and sighting deposits of valuable minerals or chemicals, it is possible to detect and monitor the emissions of designated gases.[66] In situations where a

62. BLINDER, *supra* note 5, at 142.

63. *Id.* at 143. Blinder alludes to the paltry record of the bureaucratic enforcement of direct environmental regulations. As an example, the state of Connecticut identified 1469 violations of its air-pollution statutes between 1971 and 1974. Only sixteen of these cases were referred to the attorney general for prosecution and, after a year had passed only three injunctions were obtained, but not a single fine was imposed. The EPA's record of enforcement is equally unimpressive. The total of air-pollution fines collected by EPA during the years of 1977-1980 amounted to merely $27 million, less than 1/100th of 1 percent of what firms spent during those years to comply with environmental regulations. Blinder concludes, "It seems a fair guess that America's labyrinthian environmental regulations are enforced about as rigorously as the 55 mile per hour speed limit." *Id.* at 143-44; *see also* Baumol, *supra* note 6, at 342.

64. BAUMOL & OATES, *supra* note 28, at 348.

65. *E.g.*, Love Canal, Three-Mile Island, Bhophal, Chernobyl, Exxon Valdez, asbestos, Ciba-Geigy . . .

66. *See* R.C. Carpenter, *The Analysis of Some Evidential Materials by Inductively Coupled Plasma-Optical Emission Spectrometry*, 27 FORENSIC SCI. INT'L 157 (1985); *see also* ANDERSON & LEAL, *supra* note 26, at 165-66 (exploring various possible technologies for detecting environmental damages. Examples of those technologies include tracers (odorants, coloring agents, and isotopes), lasimetrics (a technology that maps

few major polluters amount to the bulk of the pollution problem, detecting emissions through elaborate, lengthy and expensive monitoring techniques is worth the cost. The efficiency gains that specific pollution charges have over uniform command and control regulations justify the expenses incurred.[67]

As mentioned above, alternative approaches exist for providing enforcement agents with valuable shortcuts for instituting pollution taxes. In the case of sulfur dioxide, for instance, it may be unnecessary to measure what is actually being spewed from a power plant's smoke stacks; a determination of the sulfur content of the fuel prior to combustion may be an adequate measure of the ultimate effluent. The tax would simply be placed on the sale of fuels based on their sulfur content.[68] This method of taxing on inputs would need to be adjusted to encourage the use of scrubbers. Estimates on the amount of sulfur that designated types of scrubbers are able to eliminate could provide an additional enforcement shortcut. Alternatively, another tax option is a charge based on energy produced—a Btu tax—which provides an indirect method of taxing the use of fossil fuels.[69]

A further option would be to levy a tax that would affect pollution sources throughout the production process. Premised upon the concept of a value-added tax, this alternative tax scheme would impose a tax on each entity that burned sulfur-containing inputs based upon the volume of sulfur-containing fuel purchased less the volume of fuel sold. This method of taxing the amount of sulfur burned offers the flexibility of taxing multiple entities along the production chain while adjusting for the fact that purchasers of sulfur-containing fuels might not consume all of the fuel, choosing instead to sell it without emitting any pollution.[70] These alternatives may provide the best means of taxing small or mobile sources of pollution leaving emissions taxes for larger sources of pollution.

Although the anti-market-based incentives argument, premised on the lack of enforceability as a result of the deficiency in existing monitoring capacities, may be valid, it does not promote the use of direct regulatory enforcement. Emissions detection and metering

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atmospheric chemical concentrations), and a combination of chemical injections into source materials and batteries of monitoring stations.).

67. BAUMOL & OATES, *supra* note 28, at 350.

68. *Id.* at 349.

69. PROJECT 88, *supra* note *, at 23. *But see* Christian, *supra* note 61, at 231-32 (pointing out deficiencies in the Btu tax).

70. Christian, *supra* note 61, at 240-43 (Christian provides a thorough model for a "Carbon-Burned Tax," under which each taxpayer is taxed on the fuel it burns).

capacities need to be upgraded regardless of whether the United States sticks with the current technology-based regulatory standards of its command and control system or chooses economic incentives to achieve its environmental goals. Monitoring the regulated pollution control equipment plays an integral role in effectively enforcing technology-based standards. Under a pollution charge system at least the government will have a revenue source to pay for the development and necessary upgrading of emissions monitoring equipment.[71]

William Baumol, a prominent scholar in the area of environmental economics, provides a fitting summary for this section's discussion of the efficiencies and effectiveness of a pollution tax as opposed to those of direct regulation:

> In sum, the tax reorientation approach offers a variety of attractive features. It is equitable—it charges only those who engage in the activities that threaten the environment and bases the charges on the extent of the taxpayer's contribution to the environmental problems; it is automatic and self-enforcing; it minimizes the need for enforcement machinery and the temptations for corruption; it is effective and makes full use of the productive efficiency of the free enterprise system: its effects are long lived, and it promises to achieve its goals at minimum overall cost to the economy.[72]

Politics

In light of the efficiency gains that market-based incentives have over the current direct regulatory approach, one wonders why the United States has not already altered its environmental policy. Politics supply one explanation for the preservation of the current environmental command and control system. The nature of the political structure—with its federal, state, and local agencies and their bureaucratic devices, its political action committees, corruption, lobbying pressures, back-scratching, and regional interests—creates resistance to dramatic change.[73] The United States' short-

71. Stewart, *supra* note 8, at 11.

72. Baumol, *supra* note 6, at 343.

73. "In spite of the heightened awareness of environmental issues and Congress's detailed legislation in the past twenty years on a vast range of environmental issues, the legislative process for writing tax law still has no systematic environmental input." Westin & Gaines, *supra* note 59, at 758. Westin and Gaines observe that the *ad hoc* nature of the relationship between federal tax legislation and environmental concerns suggests the need to subject the environment to tax legislation and to mandatory thoughtful evaluation and comments. *See* GAINES & WESTIN, *supra* note 29, at 183.

term orientation and political structure makes for a strong status quo bias.

Bureaucracies have a stake in preserving the system that sustains their existence. Congresspersons and their staffs, corporate lobbyists, and federal and state regulators have all worked hard to shape the present regulatory system and have vested interests in seeing that nothing dramatically alters the system.[74] The objections that these bureaucratic institutions raise against a pollution tax mechanism include, among others,[75] the various criticisms dealt with above (e.g., enforcement difficulties such as the metering and monitoring problems of emissions charges) in addition to the argument that the current system works while the tax alternative has not yet been tested. "If it ain't broke," the argument goes, "don't fix it." But this conservative excuse for avoiding change lacks merit because the present system *is* broken; it suffers from gross inefficiencies while being over-adversarial, litigious, extremely expensive and poorly enforced.[76] Yet the bureaucratic inertia steadies the current system's fixed foundation and it remains.

Another primary source of resistance to the move to a market

74. BLINDER, *supra* note 5, at 150. The political tug-of-war in the Senate over the vote on revisions to the 1970 Clean Air Act is an excellent example of the weaknesses caused by political, institutional, and regional allegiances. The fierce battle between Majority leader George Mitchell of Maine and Appropriations Committee Chairman Robert Byrd of West Virginia (home of high-sulfur coal) over the strength of sulfur dioxide emission restrictions is particularly noteworthy. Byrd resorted to old-style political arm-twisting in order to protect his home-state's interest in the fuel burned by Midwestern utility plants that cause acid rain in Mitchell's home state. One senator stated that the "clear implication" of Byrd's lobbying efforts was that he would remember which senators voted against him when their states came up for projects that must pass the Appropriations Committee. Byrd sought an amendment to the Clean Air Act granting unemployment and retirement benefits to coal miners who lose their jobs as a result of the Act's acid rain provisions. Jack Nelson & Michael Ross, L.A. TIMES, Mar. 26, 1990, at A13; *see supra* text accompanying notes 44-46.

75. Opponents of pollution taxes have recently focused on two primary criticisms. First, Edward Mitchell of the Edison Electric Institute stated that a pollution tax would raise the cost of electricity with an impact which is "regressive, and will disproportionately penalize low- and fixed-income residential customers." This argument of unequal burdens is also made with regard to regional effects. *See* POSNER, *supra* note 13. The second point of contention is that a pollution tax would reduce the competitive position of the U.S. vis-à-vis its international trading partners. Hoerner, *supra* note 36, at 1357; J. Andrew Hoerner, *Future Bright but Hazy for Pollution Taxes*, 47 TAX NOTES 12 (1990). *Contra* PROJECT 88, *supra* note *, at 8 ("In a competitive market economy, market forces will then tend to drive these decisions toward least-cost solutions. The resulting savings in production costs and consequent increases in productivity are especially valuable at a time of substantial concern regarding the United States' international competitiveness.").

76. BLINDER, *supra* note 5, at 150.

system of pollution charges comes from industry. Industry has a significant impact on politics.[77] Although inconsistent with the usual free-enterprise, non-interventionist rhetoric that business voices, industry prefers to have the government dictate direct controls over the freedom of a pollution tax and its accompanying market pressures. Industry prefers to manage and control the market through stabilizing arrangements with government regulatory agents than face the expense of internalizing its external costs. Firms can rely on the current regulatory system which protects existing industries from competition by imposing higher entry costs in the forms of regulatory expenses on new plants and products. "While a switch to economic-based incentives would provide long-run advantages, it creates short-term destabilization, uncertainty, and other costs that managers prefer to avoid."[78]

Economist Alan Blinder explains that part of the industrial aversion to a change to a pollution tax system is "the reason Houdini felt so at home in a strait-jacket: he knew he could always escape."[79] Large dominant corporations use their political and economic muscle in Congress and in state legislatures to obtain weak laws. They manipulate the existing system of regulation to work in their favor by turning it against smaller competitors or new market entrants. If nothing else, big business ensures that compliance is easy or, should it choose to violate the regulations, the fines light.[80]

Another reason for industrial resistance to pollution fees is that, although pollution control expenditures would be less under an incentive-based system than they would under the regulatory system—because the market allocates compliance burdens in a cost-minimizing fashion—total outlays (control expenditures plus fee payments to the government) may be greater.[81] This fear encourages resistance.[82] While emissions taxes reduce the total social cost of externalities, the distribution of the burden promises to allocate a

77. GAINES & WESTIN, *supra* note 29 at 183.

78. Stewart, *supra* note 8, at 21.

79. BLINDER, *supra* note 5, at 150.

80. *Id.*; GAINES & WESTIN, *supra* note 29, at 4.

81. For a discussion of the equitable differences between economic incentive approaches and command and control approaches, see James M. Buchanan & Gordon Tulluck, *Polluters' Profits and Political Response: Direct Controls Versus Taxes*, 65 AM. ECON. REV. 139 (1975); Donald N. Dewees, *Instrument Choice in Environmental Policy*, 21 ECON. INQUIRY 53 (1983); David Harrison, Jr. & Paul R. Portney, *Who Loses from Reform of Environmental Regulation?*, *in* REFORM OF ENVIRONMENTAL REGULATION 119 (Wesley Magat ed., 1982); Robert W. Hahn, *The Political Economy of Environmental Regulation: Towards a Unifying Framework*, 65 PUB. CHOICE 21 (1990).

82. Stewart, *supra* note 8, at 12.

greater portion of the bill to industry than does the current regulatory system. At present, polluters are allowed to spew forth a specified volume of emissions free of charge. Under an emissions tax, however, they would have to pay for every unit emitted. The difference in the two systems could be significant, which helps explain industrial antipathy to a fee system. However, this cost differential could be mitigated through a "tax exemption" provision similar to the earned income allowance that exempts individuals from personal income taxes for incomes below designated amounts. This would allow emissions below a certain volume to be free from the tax.

A final political matter raised by the pollution tax concept stems from the fundamental problem of, "Who should decide for whom what the standards and control measures are to be?"[83] This involves four main sub-issues. First, the selection and imposition of a pollution tax becomes highly political when some industries and regions are affected more severely than others. Second, setting the fee scale will cause a heated contest. Third, deciding how to spend the proceeds of the emissions taxes will also raise political tensions.[84] Finally, because political action committees and lobby groups will use their influence to protect their interests, no guarantees exist that the eventual tax base and fee schedules will not look like the present tattered Internal Revenue Code.

Environmental Ethics

Environmentalists add a final category, related to that of politics, to the list of concerns surrounding the use of economic incentives. For many conservationists, the dispute is not settled through the cost-benefit, efficiency analyses that preoccupy economists. Rather, certain environmentalists see it as a question of morality. To them, the protection of the environment should not be reduced to a dollars-and-cents calculus. As David Doniger, a lawyer for the Natural Resources Defense Council put it: "We take the view that there are rights involved here, rights to be protected from threats to your health, regardless of the cost involved."[85] It does not seem justifiable to put a price on clean air, or to assign some pecuniary figure to the value of a mountain. Just as society finds it difficult to put

83. Malmgren, *supra* note 56, at 63.

84. For further discussion of these issues, see *supra* notes 53, 74-75 and accompanying text.

85. Robert E. Taylor, *Group's Influence on U.S. Environmental Laws, Policies Earn It a Reputation as a Shadow EPA*, WALL ST. J., Jan. 13, 1986, at 50.

human rights on the auctioning block, environmental activists oppose treating our natural resources as marketable commodities to be sold like loaves of bread and jars of peanut butter. However, by maintaining this moral position, environmentalists have played a significant part in promoting and supporting the present command and control system.

Economists have often been forced to justify placing measurable values on sensitive subjects. Where a community must decide whether or not it should build a public works project that would cost billions of dollars and employ hundreds of workers, one of the costs figured into the cost-benefit analysis is that of the lives that are expected to be lost in construction casualties. Similar to the moral and social dilemma of putting a dollar figure on the price of a human life, problems arise when courts address matters of negligence damages in tort cases.[86] Critics of these economic assessments miss the point when they focus on the methods used and not the purpose for using them.[87]

A common moral objection to the use of emissions charges is that they grant a "license to pollute." As Senator Edmund Muskie stated, "We cannot give anyone the option of polluting for a fee."[88] This popular, yet unsound sentiment grows out of the general distrust of markets. It is true that a market imperfection—an externality—caused the pollution problem, but placing a tax on pollution would fix, not exacerbate the market failure. The pollution results from the market functioning incorrectly and the tax remedies the failure. Economic incentives require industry to pay for the use of common resources, to practice "environmental costing," rather than obtaining this valuable privilege for free.

Environmentalists will still have a say in the setting of goals under a system of economic incentives. They will battle with industrialists in setting the fee schedule for taxing emissions. Industry may in fact continue to pollute under a market-based system, but at least it will have to compensate society for the environmental damage it imposes. Furthermore, the revenues generated under this sys-

86. *E.g.*, the litigation regarding Ford Motor Company's decision not to recall defectively designed Pintos because the anticipated cost of settling with victims would be less than recalling the cars.

87. "Some critics, however, oppose economic incentives on the grounds that they depreciate basic values by allowing human health and environmental integrity to be traded off for dollars. This criticism confuses ends and means and also ignores the inescapable need to choose among competing values in defining our goals." Stewart, *supra* note 52, at 163; *c.f. supra* note 25.

88. *Quoted in* BLINDER, *supra* note 5, at 136.

tem, tax dollars that might be used to clean up industry's mess, offer another positive attribute for environmentalists.

The persistence of the current command and control regulatory system can be partially attributed to the environmentalist sentiment that legal standards stigmatize polluters as criminals. Therefore, the standards are considered more effective than market mechanisms which merely give economic incentives to reduce, not halt emissions of noxious wastes. The reality of the pollution problem, however, is that corporations, not people, pollute. Institutions do not suffer from the psychological pressures of stigmatization.[89] Unless corporate violators of environmental regulations are prosecuted and their convictions publicized in an effort to destroy the goodwill of the entity, a corporation will be unaffected by the stigmatization as a criminal. Corporations frequently violate the law without suffering such public image consequences.

The market incentive approach is more realistic in that it appreciates the fact that corporations exist for one purpose—to make profits. Sticking corporations with an emissions charge hits them where it counts. It is the most efficient and effective method of getting industry to clean up its act. Environmentalists should acknowledge this fact by joining forces with the economists who are behind the switch to a market incentive system.[90]

The combination of industrial resistance and environmentalist opposition provides an answer to the question of why market-based incentives have not been instituted. The explanation has two sides. First, the movement lacks the push that could eventually come from the environmental lobby. Once the efficiency gains of the tax system overcome the conservationist aversion to economic incentives as opposed to regulation, environmentalists could provide tremendous support for instituting a price-incentive scheme.[91] Second, industries resist the potential threat of increased costs and competition. The merger of these two negative forces helps to explain the lack of progress.

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89. *See* PLAYBOY, *supra* note 1, at 59. What this stigmatization standpoint lacks is an understanding of how individual attitudes translate into corporate behavior. Perhaps corporate executives should be imprisoned when their corporations pollute.

90. Note that the Environmental Defense Fund has been practicing "free-market" environmentalism and that other environmental groups are catching on. *See supra* note 25.

91. For example, Sierra Club's Michael McCloskey advocated a tax of 45 cents per pound of sulfur oxides emitted ($900/ton), as outlined in the Sierra Club report, *Blueprint for the Environment: A Plan for Federal Action*, (T. Allen Corap ed., 1989). Hoerner, *supra* note 36, at 1357.

EMISSIONS TAXES

Instituting a pollution tax system raises two key concerns. One is the selection of an appropriate base upon which to levy the charge. The other is the determination of the actual magnitude of the fee. Theoretically, economic calculus settles these issues, but in reality[92] they are not as simple as they might appear to be in an academic vacuum. As discussed above, politics have a tremendous impact on both of these considerations. Unfortunately, this is not a case of pure economics in which the externality can be internalized by setting taxes according to the difference in marginal social cost and marginal private cost and then by applying the tax to all pollution.[93]

The proper base for the assessment of charges is the actual level of emitted pollutants. If possible, the ideal would be to confront each polluting entity with its own fee schedule that would be custom fit to each of the pollutants it emitted.[94] The fee would differ from pollutant to pollutant depending on the relative damage it causes. For each pollutant, the tax would provide an appropriate incentive for the individual firm to cut its emission discharge.[95] Problems that shatter this ideal system include the potentially enormous number of firms and variety of pollutants. More important, the method of determining the polluter's tax bill is subject to compromise.

Optimally the tax bill would equal the number of units of waste emitted multiplied by the unit fee for each pollutant.[96] In practice,

92. Although air and water pollution taxes have been adopted in France, the Netherlands, Sweden, Norway, Denmark, Finland, Italy, and Germany, these charge schemes have been designed primarily as revenue-raising devices, rather than as serious incentive-based environmental policy mechanisms. PROJECT 88, *supra* note *, at 6.

93. *See* JULIAN LOWE & DAVID LEWIS, THE ECONOMICS OF ENVIRONMENTAL MANAGEMENT 148-53, 164-74 (1980) (this book offers a detailed analysis of the economics, graphs and calculus included, but should not be taken up by those who are queasy about complex algebraic formulas and the like); Peter Passell, *Private Incentives As Pollution Curb*, N.Y. TIMES, Oct. 19, 1988, at D2; *The Greening of the Invisible Hand*, ECONOMIST, Dec. 24, 1988, at 107; Frances Cairncross, *Costing the Earth*, ECONOMIST, Sept. 2, 1989, at 1; Gretchen Morgenson & Gale Eisenstadt, *Market-Driven Environmentalism*, FORBES, Mar. 5, 1990, at 94.

94. *See* Part & Zeckhauser, Incentive-Based Decentralization: Expected Externality Payments Induce Efficient Behavior Groups (1981) (unpublished paper, on file at Harvard University).

95. BAUMOL & OATES, *supra* note 28, at 354. The problem is one of measuring harm as opposed to effluent level. The ideal measure would account for the increased damage caused when several effluents are mixed together.

96. *Id.* at 156. *Contra* Susan Rose-Ackerman, *Effluent Charges: A Critique*, 6 CAN. J. ECON. 512-18 (1973) (Rose-Ackerman argues that a charge set equal to marginal damage will impose excessive costs on firms if marginal damages are increasing. This is

however, this would not be the method used because the metering problems of assessing effluent taxes would preclude such precision. The more realistic approach is to issue a table of "pollution coefficients" that estimate average levels of waste emissions per unit of output for each industry. Such a loose system, however, has the fault that it no longer retains direct economic incentives to reduce discharges.[97]

Determining the level of the fees presents another major obstacle to the design of a successful effluent tax program. As mentioned above, the ideal would be to set the tax equal to the divergence of marginal social and private cost so that the externality was internalized.[98] This amount can only be estimated and the figure is difficult to derive. First, scientists need to recommend emission reduction levels and to describe the environmental impacts of these reductions.[99] Next, economists will be called upon to calculate the costs of the emission reductions and to place a monetary figure on the social value of preserving the environment. Then politicians must decide on an emission reduction goal and, through a process of trial and error, estimate the tax level necessary to reduce emissions by the desired amount.[100] After that, decisionmakers must observe industrial behavior and readjust the tax according to the observed reaction. This process will continue until the desired level of pollution reduction is attained.[101]

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because firms are charged at the same rate for all emissions, although only the last unit of emissions does as much damage as the charge would indicate.).

97. BAUMOL & OATES, *supra* note 28, at 354-55.

98. The object is to find the charge rate that minimizes social cost (defined as control costs plus residual damages less tax-displacement damages). For a mathematical explication of this optimal equation, see NICHOLS, *supra* note 36, at 35-36.

99. *See* Oppenheimer, *supra* note 3, at 1000-01.

100. "Substantial uncertainty is associated with all of the available methods of valuing environmental damages. Great advances have been made, however, over the past two decades in the major approaches to estimating the economic damages of pollution: preference-revealing survey; Hotelling-Clawson-Knetsch methods; hedonic pricing studies; and experimental markets." PROJECT 88, *supra* note *, at 37.

101. BLINDER, *supra* note 5, at 156-57. Baumol and Oates suggest short cuts in this expensive and time-consuming process. First, the target amount of reduction could depend on threshold levels above which the threat to human health is significant and below which it becomes minimal. The use of engineering studies of the costs of pollution abatement will assist in setting the tax level because the authority can assess the likelihood of compliance ahead of time. BAUMOL & OATES, *supra* note 28, at 356-57.

However, introducing the factors of uncertainty and change make the estimation of the benefits of reduced emissions even more tenuous in nature. "Our understanding of the links between emissions and damages is primitive; for most pollutants, available rise 'estimates' could more accurately be characterized as 'educated guesses.'" NICHOLS, *supra* note 36, at 43. The techniques for assigning monetary values to reductions in risk are neither well developed nor widely accepted. Estimates of control costs are also

Theoretically ideal, emissions taxes offer the advantages of efficiency and enforceability as instruments of environmental policy. One must be wary, however, of the system growing either overly severe or excessively lenient—it can do no better than the targets set by the political process.[102] Optimism about the pollution tax scheme was represented in a bill introduced by the late Senator (then Congressman) Heinz in the U.S. Congress.[103] The bill would have amended the Internal Revenue Code to levy a tax on the discharges of taxable pollution. The bill set the procedure for determining the tax rate which would have been set by Congress and reviewed at intervals.[104]

Allen Kneese, an expert in the field of environmental economics, makes several recommendations for a government seeking to institute a pollution tax program.[105] First, the government should immediately develop as complete a list as practical of possible deleterious substances found in emissions. The list should then be trimmed down by eliminating those substances which are to be totally banned on the grounds that their overall negative effects outweigh any cost-saving benefits associated with the discharge. For the remaining harmful substances on the list, the government should set an emissions tax at a level that provides substantial incentive for control. Firms should have the burden of proof to show why they should be immune from such a tax for equity reasons. Furthermore, the burden should be higher for producers of new products or processes, forcing them to identify and report on any potential ecological harm they might cause. The proceeds of the effluent charges should be used to encourage the establishment of regional environmental pollution management agencies. Finally, the government should sponsor research on control and monitoring methods.

Kneese's recommendations serve as helpful starters. Other possibilities include a grandfather clause exempting current polluters from pollution charges on emission falling below an allowable level of pollution. To complement this approach, the tax rate could rise over time according to a schedule set to encourage pollution reduction through advances in control technologies. Another option, a

highly uncertain because reliable data are difficult and expensive to obtain. *See* Baumol, *supra* note 10, at 316-20.

102. BAUMOL & OATES, *supra* note 28, at 357.

103. H.R. 635, 93d Cong., 1st Sess. (1973)

104. ALLEN V. KNEESE, ECONOMICS AND THE ENVIRONMENT 161 (1977).

105. Malmgren, *supra* note 56, at 48-51.

pollution ceiling, provides that any amount below a designated mark would be tax free. Any emissions above the specified level would be taxed at progressive rates that increased according to the amount of pollution emitted.[106]

EMISSIONS TRADING

Unlike a charge system, a system of tradable permits allows the government to specify an overall tolerable level of pollution. This total quantity is allotted in the form of permits among polluters (firms). Firms that keep their emissions below the specified level may sell or lease their surplus allotments to other firms, or use them to offset excess emissions in other parts of their facilities.[107]

The birth of emissions trading came about by accident. In the 1970s, when it became apparent that many of the nation's regions would be unable to meet the air quality standards prescribed by the Clean Air Act, EPA avoided imposing heavy economic penalties by creating its "emissions-offsets program" of 1976. Companies were allowed to create new sources of pollution in areas with substandard air quality as long as they reduced their pollution elsewhere.[108] The next step in the development of emissions trading came with the invention of the "bubble" concept in 1979.

EPA's "bubble policy" treats a plant's emissions in the aggregate (one single bubble), rather than using a smokestack-by-smokestack approach. This provides firms with the motivation to reduce overall pollution in the most cost-effective manner.[109] The bubble strategy can be applied to both existing emissions from various sources or to additional new sources where old sources are hit with compensating reductions so no net increase in emissions results from the plant as a whole.[110] The bubble strategy has been extended to different applications that enable existing sources to reallocate pollution rights in one common market in order fully to achieve the incentive and cost-

106. William Howard of the National Wildlife Federation suggested that a regulatory standard be used to establish a ceiling for the maximum tolerable level of emissions and a tax imposed to bring about further reductions below the ceiling. Hoerner, *supra* note 36, at 1357.

107. PROJECT 88, *supra* note *, at 6.

108. BLINDER, *supra* note 5, at 154.

109. Heinz, *supra* note 24, at 85; Robert W. Hahn & Roger E. Noll, *Designing a Market for Tradable Permits, in* REFORM OF ENVIRONMENTAL REGULATION 119 (W. Magat ed., 1982). *Contra* Jack L. Landau, *Economic Dream or Environmental Nightmare? The Legality of the "Bubble Concept" in Air and Water Pollution Control*, 8 B.C. ENVTL. AFF. L. REV. 741 (1980).

110. *See* FREDERICK R. ANDERSON ET AL., ENVIRONMENTAL PROTECTION: LAW AND POLICY 255-69 (1984).

minimizing benefits of the marketable permit scheme.[111]

The growth of intra-firm emissions trading through the bubble concept has increased recently due to the Supreme Court decision sustaining their use over challenges from environmental groups.[112] Their application has had positive results.[113] For example, in 1981, a DuPont plant in New Jersey was ordered to reduce its emissions from 119 sources by eighty-five percent. Operating under the State's bubble provision, company engineers proposed instead to reduce emissions from seven large stacks by ninety-nine percent. Consequently, pollution reduction exceeded the state's requirement by 2,300 tons per year and DuPont saved $12 million in capital costs and $3 million per year in operating costs.[114]

TRADING TAX CREDITS—A COMBINATION

Combining the efficiency of a pollution tax with that of emissions trading may work to increase the benefits of both programs. Where the tax system allowed for some minimum amount of pollution that would go untaxed (like the Internal Revenue Code's earned-income allowance), some potentially eligible firms would fail to drop below that level because of the lack of economic incentive. Alternatively, some firms, for technological reasons, would be unable to reduce their emissions and would, therefore, have to pay the full amount of tax assessed against them. A system of tax credits in combination with an emission trading scheme could work to solve both of these problems.

Emission Reduction Credits[115] (ERCs) would make up the cur-

111. Stewart, *supra* note 8, at 14.

112. Chevron, U.S.A. Inc. v. NRDC, 467 U.S. 837 (1984), *reh'g denied*, 468 U.S. 1227 (1984).

113. In a report on 200 trades there was an estimated savings of $700 million in compliance costs while the same reduction in emissions was maintained. Regulatory Reform Staff, U.S. EPA, Emissions Trading Report (May 10, 1984); U.S. GAO, A Market Approach to Air Pollution Control Could Reduce Compliance Costs Without Jeopardizing Clean Air Goals (Report PAD-82-15) (1982); Although firms have not made extensive use of the EPA Emissions Trading Program and its component parts (including bubbles, offsets, netting, and banking), companies such as Armco, DuPont, USX, and 3M have traded emissions credits to the toll of over $4 billion in savings in control costs without an adverse affect on air quality. PROJECT 88, *supra* note *, at 7 (citing Dudek & Palmisano, *supra* note 33); *see also* RICHARD LIROFF, REFORMING AIR POLLUTION REGULATIONS: THE TOIL AND TROUBLE OF EPA'S BUBBLE (1986).

114. Michael H. Levin, *Statutes and Stopping Points: Building a Better Bubble at EPA*, REG., Mar.-Apr. 1985, at 33.

115. Dudek & Palmisano, *supra* note 33, at 221. This article provides an in-depth analysis of the system of emissions trading within the present government command and control regulatory scheme. The mechanisms used in these types of emissions

rency used by deficit firms (demand) to transact with surplus firms (supply) for the purpose of trading these favorable tax attributes. In the proposed tax system that taxed more objectionable forms of pollution at higher rates than less noxious pollutants, the credits would be weighted accordingly. The firm in a higher bracket of emissions taxes that happens to find it relatively easy to reduce emissions below the tax floor will be motivated to do so in return for valuable ERCs. The firms that find it excessively expensive to reduce their emissions would either pay the full tax or, alternatively, turn to the ERC market and purchase credits to reduce their tax.

Mixing the pollution tax system with emission trading produces the added gain of inter-firm efficiency. The emissions tax itself will provide incentives within the firm to reduce pollution to the optimal level. Yet, where the firm uniformly lacks the ability to reduce emissions, it will have no other choice than to pay the full tax. Adding the opportunity of ERC trading gives further incentives to those firms that can dramatically reduce their emissions because they can sell their ERCs to firms that need them. The effect is an extension of the bubble concept from the level of the single firm to the industry level of a single market. Note, however, that apart from making the ERC market a possibility, inefficiency may arise from using a non-taxable threshold.

Problems arise when the market for ERCs is thin, where it is difficult to identify potential trading partners, or in the case of a monopolized or highly concentrated market for credits.[116] Furthermore, setting a ceiling at which to impose taxes faces the same technical criticisms as command and control mandates.

CONCLUSION: THE BENEFITS OF ECONOMIC INCENTIVES AS SEEN THROUGH THE EXAMPLE OF SULFUR DIOXIDE EMISSIONS

The power plant that causes acid rain through emissions of sulfur dioxide illustrates the feasibility of free-market incentives. Integrating the concrete example of sulfur dioxide emissions into the abstract analysis above helps to illustrate the weaknesses of the current system of direct administrative controls and the strengths of a market incentives program. Currently, the most common approach to the sulfur dioxide problem comes from direct command

trades, however, are easily converted into a tax-based program of pollution control because both rely on voluntary market transactions.

116. PROJECT 88, *supra* note *, at 94.

and control regulation.[117] Government agencies have set standards for the sulfur content allowed in fuels and required polluters to reduce the amount of sulfur emitted by using scrubbers or employing alternative energy sources.[118]

This area of regulation has an especially abysmal record because, under the 1977 amendments to the Clean Air Act, the government managed to weaken rather than strengthen sulfur dioxide pollution controls. In the case of the polluting electrical power plant, the plant must reduce emissions under present environmental regulations. It could attain this reduction either by burning low-sulfur coal, which comes mainly from the West, or by installing scrubbers to clean up the dirty gases produced by high-sulfur Eastern and Midwestern coal.[119]

As an equity consideration, environmental regulations impose higher standards on new sources of pollution than on old ones.[120] For new power plants, the scrubber serves as the "best available technology" prescribed by EPA. Unfortunately scrubbers lack reliability and add significant costs. New plants must install stack-gas scrubbers regardless of the coal they burn while old plants can simply choose to switch to low-sulfur fuels.[121]

These environmental regulations lead to undesirable effects. First, the double-standard impedes modernization. Moreover, because they face higher costs, new power plants must charge higher rates. In effect, the cheaper rates give consumers the incentive to switch to older, dirtier power plants while giving the utilities incentives to keep the old plants running rather than switching to modern, cleaner and more efficient plants. Further, because the new plants incur the additional costs of installing scrubbers, they are less likely to incur the expense of switching to low-sulfur coal. Problems arise when the scrubbers break down, leaving the unscrubbed emissions worse than if the new plant had switched to the low-sulfur fuel. Consequently, the sulfur dioxide pollution may be worse than it would have been without the politically-determined regulation.[122]

Another weakness of using the command and control approach to reduce sulfur dioxide pollution is the high administration costs of

117. HJALTE et al., *supra* note 4, at 60.
118. *Id.* at 61-62.
119. BLINDER, *supra* note 5, at 145-46.
120. *See* POSNER, *supra* note 13, at 358.
121. BLINDER, *supra* note 5, at 146.
122. *Id.*

instituting the program. To set appropriate standards, environmental agencies would have to complete social efficiency studies for each and every source of sulfur dioxide emissions in order to avoid setting overly lenient emission standards for those sources that could cheaply reduce sulfur dioxide output and vice versa.[123] Thus the criticisms of politics and inefficiencies discussed above are well directed in the area of sulfur dioxide regulation.

In contrast, "[f]ees seem particularly promising as a means to control sulphur discharges into the atmosphere."[124] Furthermore, economic-incentive policies are "well suited for the management of uniformly-mixed air pollution problems, such as acid rain . . . ."[125] The automatic price mechanisms and profit maximization principles that work in a free-market economy achieve the minimal cost solution and result in efficiency gains. While the switch from the current regulatory program to a market-based incentive system might cause some troubles, the transition would provide EPA with a valuable window of opportunity in which it could maintain some control through regulations and simultaneously use a trial and error method to set the emission tax at its optimal level.[126]

The incentives that a sulfur emissions tax would provide would be a clear improvement over the bureaucratic mandate of our present system. Extending market efficiency incentives creates gains by deregulating utilities so that market forces can drive power plants to reduce their sulfur emissions against the threat of being overcome by cleaner competitors. Although the current system makes equity allowances for old power plants, giving them special treatment and advantages over new plants, a sulfur tax in conjunction with emissions trading would provide similar equitable advantages without an efficiency loss.

A minimum allowable pollution level could be set, at which all further emissions would be subject to charge. This amount might be the sulfur emissions level of an old plant burning low-sulfur coal. The availability of ERCs would provide incentives for a new plant to reduce its emissions far below the floor by using a scrubber and burning low-sulfur fuel. As a result, older electric plants could still stay in business if they purchased the ERCs from newer, more ecological plants. This encourages the new plants to reduce their sulfur pollution to its lowest cost-effective level while decreasing the net

123. HJALTE et al., *supra* note 4, at 63.
124. BAUMOL & OATES, *supra* note 28, at 351.
125. PROJECT 88, *supra* note *, at 19.
126. HJALTE et al., *supra* note 4, at 64.

amount of sulfur pollution that society must tolerate. This concept could be extended by granting marketable ERCs to cleaner forms of power production. Hydroelectric, natural gas, and perhaps even nuclear plants would be given credits for ecological energy generation, allowing them to increase profits by selling their credits to dirtier, coal-fired utilities.

Arguments that focus on the detection problems of a pollution tax have little impact when it comes to sulfur dioxide due to the shortcut of taxing the fuel itself. Enforcement could be maintained through an excise tax on the sale of fuels based on their sulfur content, alleviating the need for actual metering at the point of discharge. This charge would provide an additional incentive to process high-sulfur fuels to reduce their sulfur content. Recently, Japan introduced a sulfur tax of this variety. Japan based this tax on estimated emissions of sulfur dioxides, where the estimate depends on both the sulfur content of the fuel burned and on the extent of stack-gas desulfurization accomplished.[127]

The United States has been interested in a sulfur tax since 1972, when President Nixon proposed the Pure Air Tax Act that would have taxed sulfur emissions on the basis of the region's air quality in the preceding year. The Act proposed a tax of fifteen cents per pound where primary air quality standards had been violated, ten cents per pound where secondary air standards were violated, and zero where all standards were met. However, the bill encountered stiff opposition in Congress due to regional differences and the political conflicts surrounding the various competitive advantages that the tax differentials might have created.[128]

Having passed over the hurdles of efficiency, incentives, and enforcement, the sulfur emissions tax also clears the final barriers of ethics and politics. High-principled environmentalists may pose a threat to an emissions tax on sulfur dioxide pollution. However, extremist opposition to market incentives is waning now that environmental organizations acknowledge the net benefits that these types of programs have on the environment.[129] Proponents of this eco-

127. BAUMOL & OATES, *supra* note 28, at 351; France became the first nation to institute a tax on air pollution, with the passage of Decree No. 90-983. Under the decree, installations can be taxed up to 200 francs (about $40) per ton for sulfur and nitrous emissions. *France Becomes First Nation to Tax Air Pollution*, 13 Int'l Envtl. Rep. (BNA) 228 (June 13, 1990); Sweden is also planning on implementing a tax on sulfur dioxides. Hoerner, *supra* note 13, at 1418; *see also* Westin & Gaines, *supra* note 59, at 753.

128. BAUMOL & OATES, *supra* note 28, at 351-52, 360.

129. *See supra* note 25.

nomic incentive, market-based method of reducing sulfur emissions have been gaining strong allies from environmentalists and conservationists.

Because of its potential for raising revenues, a sulfur dioxide tax attracts politicians. On the federal level, regional differences may preclude the use of a pollution tax. However, these regional problems might be solved by instituting the taxes on the state level. This way, if the region suffers from a higher tax, it also benefits from greater revenues. Depending on the rate and base of the tax, the area may be able to compensate for any business loss that results from the higher tax. Furthermore, the use of ERCs will reduce the incentive for firms to undertake the costs of relocation. A separate solution would be an interstate system of marketable ERCs. This would reallocate the burden of the tax over a greater area by allowing power plants in highly taxed regions to trade with those in low tax regions.

This sulfur dioxide emissions example makes it clear that economic incentives have substantial benefits over the current command and control regulations confronting the utility industry. The time has arrived for creative, efficient, and effective environmental solutions, and emissions charges and tradable permits are the answer.