

ficiently stringent emission limits were applied to the firms and the set goals were not achieved.

How can we create better incentives for new technology? I think one thing we could do at the outset is, to the maximum extent possible, tell each firm what their legal obligations will be. Second, we have to regulate in a way that the political powers that be will seriously enforce the regulations. Because when we overregulate, the firms can count upon somebody stepping in, changing the regulations, and relieving them of their obligations. But that leads to the problem of knowing at what level to set the obligations so that they will be politically enforceable. The problem then, is predicting the current state of technology. The people who know that are, of course, the industry and they are not about to say that they should really cut their emissions back eighty percent if it is cheaper to cut back forty percent.

There are a few strategies that deserve more attention. One is not to set emission limits but rather to impose emission taxes. This strategy emerges out of the realization that neither emissions levels nor future technology need be predicted. By setting emission taxes, an ongoing incentive to improve technology is established.

Professor Alvin K. Klevorick:

Alan Miller's paper is interesting and fits very well with the title and theme of this Conference—learning from our past mistakes in order to produce an improved air pollution control law for the 1990s. Miller diagnoses the problems with our recent formulation and implementation of environmental policy, and he prescribes a cure for those ills in the form of a different policy direction for the future.

The paper contains interesting observations and provocative suggestions. I concur with a number of Miller's criticisms of current policy, but I differ with him on other aspects of the diagnosis. Consequently, I am not as confident as he is about the desirability of following his alternative approach. Moreover, I believe that his proposal has some difficulties of its own.

Miller begins by observing that environmental problems have been increasingly debated in economic terms.⁴ Although he accepts the proposition that cost estimates are essential to sound policy analysis, he believes that the economic framework has led to an emphasis on the costs of control or cleanup because these

4. *Id.* at 69-70.

costs are easier to measure than the costs of harm to health and to the environment.⁵ Miller, therefore, raises a caution flag about the potential danger of ignoring soft variables or having them implicitly dwarfed by a focus on more concrete, easier to measure costs.

The caution is appropriate, of course, but the emphasis on control and cleanup costs is not inherent in an economic analysis of environmental problems. Such a framework calls explicitly for a weighing of costs and benefits. It requires accounting for the costs of harm to health and the environment as well as for the costs of cleanup and control. Indeed, in some studies that eschew the economic framework one observes a bias precisely opposite to that Miller describes: the very difficulty of measuring the costs of environmental harms—and hence the benefits of environmental control—leads to an exaggeration of their magnitude relative to that of the hard control and cleanup cost figures.

The reality, however, is that both sets of costs are difficult to measure; this is especially so when, as in the situation on which Miller focuses, effective cleanup and control entails the development and diffusion of new technology. It is important to recognize the inaccuracy of our estimates of costs and benefits, but that uncertainty is inherent in the kind of problem we are addressing. A sound economic framework, a decision-theoretic policy-formation structure will recognize the variance around our point estimates of costs and benefits. The policy analyst will display alternative scenarios employing different sets of estimates and endeavor to ascertain the sensitivity of outcomes under different policy instruments to alternative assumptions about the several costs involved.

The problem is not the economic framework and the role it gives to cost assessment, but the adoption of cost estimation as a tool of advocacy. In an earlier draft of the paper that appears in the *Annual Survey of American Law*, Miller identified this phenomenon with clarity when he observed that the costs of lawyers and lobbyists is much less than the cost of pollution control. Moreover, as environmentalists and industry become more sophisticated, the value of further refinements in methods to 'prove' that the costs and benefits are higher/lower will continue to increase.⁶ The problem derives from the biases that enter into cost estimates when they are deployed to serve the purpose of an advo-

5. *Id.* at 70-71.

6. *Id.* at 71-72.

cate as opposed to an analyst. There will be a systematic overestimation of the costs of change by those who will have to make changes; inertia and bounded rationality will lead them to underappreciate what new technology might achieve and to overestimate the costs of cleanup and control. But, at the same time, those who will not have to bear the costs of change will systematically underestimate those costs and overestimate the benefits of control. They will have, perhaps, an overly sanguine view of the miracles technology may have in store. Add to the brew the appropriate degree of hyperbole on each side, and one has a recipe for an unsatisfactory analysis and an unsuccessful policy.

Miller seems to believe that policy has been successful in the recent past when we have departed from haggling over estimates of costs and benefits and set technology-forcing standards for industry to meet.⁷ His principal examples are the reduction in chlorofluorocarbons ("CFC's") and the achievement of the automobile fuel efficiency levels embodied in the Corporate Average Fuel Economy ("CAFE") standards. In each of these two cases, as Miller analyzes them, the standard-setting, technology-forcing approach was effective in encouraging engineering innovations.⁸

Before considering Miller's analysis, it is very important to observe that any standard implies a particular assessment of damage costs and control costs. Even if the specification of a standard—whether a target from which shortfalls are tolerated or a firm requirement from which departures are penalized—does not embrace the locution of costs and benefits, the standard-setting reflects a weighing of those quantities. Costs and their assessment are as important in providing incentives for the development and use of new technologies as they are in setting static standards or penalties.

Miller's appraisal of the virtues of technology-forcing standards in the CFC and CAFE cases seems overly rosy to me. He regards as "obvious" the role CFC standards played in making the phasing out of CFC's much cheaper and much easier than it had been perceived to be only a few years earlier.⁹ He contends that, without regulation, there was little incentive for chemical companies and their customers to search for substitutes. Expectations of regulation created a large market opportunity for the application of entrepreneurial spirit to develop and introduce

7. *Id.* at 73-75.

8. *Id.*

9. *Id.* at 73-74.

substitutes.¹⁰ But the regulation need not have taken the form of standards. Taxes on the emission of CFC's, subsidies for reducing those emissions, or grants for research all could have functioned as well. Moreover, had the standard been incorrectly set, substantial damage could have resulted from the misallocation of resources—whether too many or too few—to attaining that inappropriate level of emissions.

In discussing the achievement of desired fuel efficiency levels, Miller concludes that “the combination of CAFE standards and higher oil prices led to a doubling of fleet fuel economy between 1974 and 1989.”¹¹ The conjunction “and” is terribly important because it is difficult to disentangle the effect of the standards themselves from the effect of the rise in oil prices in bringing about the fuel efficiency gain. To the extent that the oil price increase played a significant role, one must also ask whether a straightforward tax on gasoline consumption might not have achieved the CAFE standard's end even more effectively. For one must consider the possible side effects of any regulatory mechanism, and the CAFE standard is no exception.

Thus, in separate articles John Kwoka and Andrew Kleit have demonstrated, for different market structures, how the CAFE regulation could have perverse effects on mileage and gasoline consumption, though simultaneously having favorable impacts on output and employment in the automobile industry.¹² Moreover, Kleit has shown how the CAFE mechanism, with its harmonic averaging across a company's fleet, could generate mix-shifting within a fleet and widening of the model spectrum (regulatory economies of scope with no beneficial resource-allocation effects).

The full tale of the CAFE standards also has to include at least a reference to the flexibility built into the system by provisions for the carryback and carryforward of credits that firms earned when they surpassed the set standard for a particular year. In several years, there was also some slippage in the standards themselves as particular firms requested permission to relax the standard, a request allowed under the statute, and this permission was granted by the agency.

10. *Id.*

11. *Id.*

12. See Kleit, *The Effect of Annual Changes in Automobile Fuel Economy Standards*, 2 *J. Reg. Econ.* 151 (1990); Kwoka, *The Limits of Market-Oriented Regulatory Techniques: The Case of Automotive Fuel Economy*, 98 *Q.J. Econ.* 695 (1983).

In presenting his alternative approach, Miller seeks to find a method that will serve better than "traditional cost estimates" as a guide for policy, and he turns to the CFC experience for instruction. Once again, it is important to distinguish between the use of cost estimates as an input to policy and the type of policy they are used to design or support. Recognizing the problems with traditional estimates of costs and benefits does not compel one to move to a policy based on technology-forcing standards, as Miller would suggest. For example, he cites the virtue of the CFC regulation that provided a gradual schedule for compliance in several stages.¹³ But the same gradual approach could have been induced with a rising tax schedule, a carefully tuned subsidy schedule, or a set of marketable permits.

Miller also lauds the cooperation the EPA induced by working with the affected industries to accelerate the diffusion of information about promising alternatives. Although such cooperation could be fostered under any one of several schemes, it does seem more likely to emerge when there is a common goal that everyone is seeking to achieve. But the risks that cooperative ventures generate for market performance are well known and particularly salient when the cooperation occurs closer to the production stages.

Moreover, in asking whether the experience with cooperation about CFC's can be replicated in other industries, one must be very cautious. Technological change is not a unitary phenomenon or process. It has a complicated character that varies from one industry to another, and indeed there can be subtle differences with regard to different kinds of technological change in the same industry. The delicate task of policymaking is to select approaches that match the industry and the type of technological change we seek.

I also am more skeptical than Miller is about the prospects for cooperation in setting standards. Why do we expect that creating the cooperative enterprise will overcome the cost-assessment problems he highlighted in his diagnosis of our regulatory ills? The problems of negotiation and collective decision making will be with us. For example, one can see similar difficulties in the structuring and operation of research joint ventures. How do we overcome the usual revelation problems, the usual difficulties of asymmetric and impacted information? Without answers to these

13. Miller, *Cleaning the Air while Filling Corporate Coffers: Technology Forcing and Economic Growth*, 1990 *Ann. Surv. Am. L.*, 69, 79.

concerns how can we be confident that the industry-government cooperation will succeed?

I worry a bit because Miller's proposal, that the nation adapt a Japanese style government-industry cooperation to achieve environmental goals, combining economic incentives to reinforce consumer demand with government involvement to support the long-term development of new technology,¹⁴ sounds similar to the oft-made recommendation that firms in one or another American industry should be permitted to cooperate on non-environmental goals to enable them to meet Japanese competition. Why should we believe the Japanese cooperative mechanism can be successfully transplanted to a different social and cultural terrain? Moreover, Miller suggests that such government involvement would reinforce competition because firms that refused to cooperate would risk being left out of new markets. But the cooperation among the firms that participate in the process cannot augur well for competitive outcomes.

Overall, Alan Miller has identified some significant shortcomings in our past environmental policy. But I am much less confident than he is that he has found the cure for these ills.

OPEN DISCUSSION—PANELISTS AND GUESTS

David Gordon :

In the foregoing discussion which is concentrated on costs, the critiques have really addressed the analytical fallacy of downplaying the costs. It is almost like shooting fish in a barrel to attack command and control schemes in terms of economic efficiency. Maybe Mr. Miller, in defending what we call the environmentalists' position, has addressed the issue of cost per se and said we really do not know what the costs are, but that is very difficult to assess.

I would like to propose a different kind of analytical framework and get everyone's reaction to it. In essence, it entails going beyond and restating the environmentalists' position in a different setting. My suggestion is that the whole concept of talking about costs really sticks in some people's throats, because they assume that there is a fundamental right to pollute. They also assume that in creating social policy we have to balance the costs of addressing what these people are doing with the benefits that will be gained. The critique, therefore, was correct in criticizing

14. *Id.* at 76.

Mr. Commoner—of course you cannot impose millions of dollars of costs against society without taking the benefits into account. But the present environmentalist position fails to address these concerns.

Professor David S. Schoenbrod:

Are you suggesting that there should not be a right or a privilege to pollute?

David Gordon:

What I am saying is that, in addition to your analysis, which I think is extremely valid, there is a corresponding analysis. We also must approach the situation from the point of view that there is no right to pollute and then decide what industries we absolutely need in our society. For example, I am not certain we need spray cans for hairspray or cars that get a maximum of twenty-five miles per gallon so that General Motors can sell big cars and make high profits.

Professor David S. Schoenbrod:

I am not sure what your statement adds other than to change the presumptions. I do not know what that really does, because ultimately the people who are making the decisions have to come up with a feasible scheme for all the reasons that we have discussed so far. But I think there is a danger in saying that there is no right to pollute. It sets up an us-them dichotomy: they pollute, we suffer. That is just ridiculous; we have to cook our dinner, and when we cook our dinner there are going to be emissions. So it seems to me that as a rhetorical twist to our discussion your statement is ultimately unhelpful.

Professor Richard L. Revesz:

Some of the discussion of this panel underscores the extent to which environmentalists allowed the debate to be skewed by opposing the quantification of benefits, and I think that is unfortunate. One thing we know for sure is that if you have an uncontrolled externality, then the cost of eliminating the externality would be cheaper than the benefits that result from the externality. Now of course it is true you might over-regulate—that is, you might regulate more than is necessary to maximize social welfare. You might also not regulate in a cost minimizing way. But, the costs we should worry about are the costs that go beyond elimi-

nating the externality in a cost minimizing way and not the full range of costs. If we were more disciplined about trying to do our best in quantifying benefits and quantifying costs in a systematic way, I think that the debate would be much clearer and in many cases these very large costs that are shown in the newspapers would seem much less threatening. We would have a much better understanding of what benefits result from the expenditure of those costs.

Timothy D. Searchinger:

I would just like to make two brief comments. First, concerning the taxes issue, one reason to favor an allocation trading system over taxes is the large distributional consequences. A good example is if you had sulphur dioxide without the acid rain taxes. Not only would people have to lower their control costs, but also they would be paying a tax even on the emissions that they had not controlled. This may not have any overall efficiency loss to the economy, but nonetheless, it will result in a major cost both politically and economically. Also, it is hard to determine the tax that is exactly necessary to get the desired economic benefits. Politically, it is much harder to put the benefit in terms of taxes than to put it in terms of the overall environmental gain. When we say, for example, that we need a ten million ton reduction of sulphur dioxide we have established a clear mandate as to what our environmental goals are. In the long-run, this approach is going to be a much more effective environmental tool than taxes. Secondly, the reason that environmentalists have become suspicious of the economist's cost benefit analysis is that there has been a persistent under-evaluation of environmental policy. While this result may be the product of shoddy economics and the wrong consultants, it means that we cannot quantify or even describe qualitatively many of the environmental harms.

Donald Elliott:

Just one comment on Alan Miller's point about cultural differences. I think that the notice and comment process, in a funny way, is an American way of having industry and government essentially negotiate what approach to take. While it is an open process, it is a realistic process and it is a process which the public and environmental groups can play, what is really going on is elaborate negotiations about what in fact can be done. The problem we have had in the past is that once negotiations are concluded at a particular time, we eliminate any incentive for people

to develop technology that surpasses those standards. It is this problem which really needs to be addressed.

Professor Howard A. Latin:

I could respond to a number of things, but let me just say that one of my principal interests is how things can go wrong. The environmental regulatory movement is a happy hunting ground for people who are interested in how things can go wrong.

One thing that we really have to focus on are the incentives that several other people have suggested. By incentives, I mean incentives of the parties who are going to be regulated, which is in part what Mr. Miller talked about. But it also means the incentives of the people who are going to do the regulating—both the states and the EPA. In my mind, a fundamental lesson of regulation in the toxics area is that agencies are much more uncomfortable about being forced to respond to questions that they cannot answer in a relatively quantifiable and reliable way than in being required to answer questions that result in both intellectually defensible and politically defensible responses. This entire panel criticized the best available technology approach as having all sorts of intellectual weaknesses. But what the BAT approach does is it gives the agencies a set of questions which they can get information about and answer in a reasonably defensible way. In comparison with that, how will an agency defend notions like: “well, we are going to cut emissions by ninety-five percent or eliminate emissions or we’re going to develop new technology?” In other words, if the EPA does not have something to fall back on, such as looking at what technology is available now, how are they going to establish supportable emissions levels? It is fine to say we should do technology forcing, but from where are agencies going to develop credible technology forcing targets? Are they just going to pull them out of thin air? Those of you who have worked in this area know that in the past we have had a zillion technology forcing programs: that is, programs intended to do technology forcing. Most of these programs have failed, in large part due to the inability of agencies to set credible, defensible targets.

Now, a different approach is harm-based regulation where you try to figure out how much harm is “acceptable” and then set emissions limits based on that determination. That approach was in the original Clean Water Act toxics provision. It was also in the original Act toxics provision. In the middle 1970s, the EPA

switched from a harm-based to a technology-based regulatory strategy in water. In the air context, the EPA did not do that in part because environmentalists sued them and prevented them from using costs and technological feasibility in setting air toxic emissions levels. The result is that we now have in excess of one hundred toxic substance standards for water, and roughly seven for air.

I generalize to say that harm-based regulatory strategies make agencies answer extraordinarily difficult questions because the questions are not whether a substance can be harmful or toxic. That is too easy. Rather, the central questions concern what level of the substance produces what kinds of harm and whether that level is acceptable or not. The proposed legislation, for those of you familiar with it, imposes technology-based controls. There are proposals in both the House and Senate to include more stringent harm-based standards as well.

Donald Elliott :

The current Act is a health-based standard. That is why we have only set seven or eight toxic substance standards. The proposals that the Administration made and that have been accepted in both houses of Congress go much more to establishing a technology-based standard like under the Water Act. After these standards have been imposed, there is a debate about what to do with the so-called residual risk over and above what technology mandates.

Professor Howard A. Latin :

My point is that the reason we are going to a technology-based strategy as the dominant strategy for the Act is because, in my estimation at least, the agency can answer those kinds of questions in a reasonably reliable way.

Donald Elliott :

Going from a health-based standard to a technology-based standard is not what we should be doing.

Professor Howard A. Latin :

Yes, almost everyone on the panel has said we should not be moving to a technology-based approach.

Professor Alvin K. Klevorick:

Professor Latin's remark reminds me of the story of the inebriated individual who looks for a lost wallet under the lamp post because that is the area that is best lit. You frame the policy in terms of the questions you can answer, where the light is best, even though those may not be the most relevant questions—you may not have lost the wallet anywhere near the lamp post.

I want to make several comments. First, I think that I am at one with Donald Elliott on the notion of an eclectic approach and a mixed system. In the comments on Alan Miller's paper, I was attempting to suggest alternatives to the technology-forcing standard of the command and control approach and did not mean to press for taxes or subsidies or the marketable permits as the approach appropriate in any particular circumstance. In fact, what is necessary is a mixed system.

The second comment I have concerns the point that there are distributional implications to a tax system. There are also distributional implications to a marketable permit system. Indeed, that ties in with the question that was raised about granting a right to pollute versus granting a right not to pollute because one alternative is to distribute those marketable permits precisely to the people who might be harmed by the emission. Thus, one should not think that the marketable permits system is free of distributional implications.

Let me address another point that Timothy Searchinger made about the setting of standards. Although I do want to emphasize that it may be with great clarity that we can say we want to reduce emissions by a certain amount, or want to attain a particular fuel-efficiency level implicit in that statement is some weighing of the marginal cost of damage and the marginal costs of damage control. It is inescapable. But from an analytic point of view, it is worth trying to specify what the costs are, and to explain how that standard came to be chosen.

Timothy Searchinger made a very different point about trying to sell the policy once it is determined. He argues it is easier to sell the policy politically, in terms of "here is what we are going to do to clean up the air. We are not going to charge X cents per gallon of gas, but we are going to say you have to reach a certain fuel efficiency." Selling the policy is one thing; but, in terms of understanding the policy's operation, it is imperative to realize that when you quote a standard you are implicitly quoting a set of costs.

Finally, I despair at the lack of confidence in the studies that have consistently underestimated the costs or the benefits of clean-up or the costs of the harm to the environment. Again, one of the advantages of laying out the costs and laying out the benefits in an explicit way is that it gives you a study to criticize along with all of the underlying assumptions.

Alan Miller took to task the Council of Economic Advisors' Report.¹⁵ I did not go back to read that report, but I have read the underlying Nordhaus study.¹⁶ You may disagree with the quantitative assessments to which Nordhaus comes, but his laying out of alternatives and his setting out the uncertainty about the assessment of costs and benefits are quite carefully done in that study. Indeed, the study enables someone who differs on those assumptions to put in different assumptions, come out with a different standard, and then indicate why that standard is better.

15. *Id.* at 69.

16. *Id.* at 69 n.4 and accompanying text.