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These days, the Environmental Protection Agency (EPA) rarely develops any pollution control program without including some form of environmental trading within it. The United States has used its diplomatic clout to spread trading internationally, so that it has become central to the Kyoto Protocol to the Framework Convention on Climate Change.[1] Trading has increasingly played a large role not only in pollution control law, but in natural resources law as well.[2]

For many trading advocates this must appear extremely heartening. Trading proponents have long argued that trading has the capacity to deliver the same environmental benefits that traditional regulation seeks to deliver, with substantially lower cost. Almost every expert in the field agrees that emissions trading can deliver cost effective reductions. The reason is fairly simple: if one assigns pollution reduction obligations to a group of pollution sources, usually some will face substantially higher compliance costs than others. In a trading program, those facing high marginal control costs can avoid those costs by paying facility operators facing lower marginal control costs to make extra reductions in their stead. These trades will tend to shift reductions to facilities with relatively low marginal control costs, thereby providing equal net environmental benefits at lower cost.

The most thoughtful experts, however, should find the prevalence of trading disturbing. Almost every expert in the field has cautioned that trading only works well when we can monitor the emission reductions or

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1. *See* David M. Driesen, *Free Lunch or a Cheap Fix? The Emissions Trading Idea and the Climate Change Convention*, 26 B.C. ENVTL. AFF. L. REV. 1, 3 (1998) (showing that the U.S. has made international emissions trading a centerpiece of its climate change policy).

2. *See, e.g.*, Alison Rieser, *Prescriptions for the Commons: Environmental Scholarship and the Fishing Quotas Debate*, 23 HARV. ENVTL. L. REV. 393, 410 (1999) (discussing transferable fishing quotas in the United States); C.J. Batstone & BMH Sharp, *New Zealand's Quota Management System: the First Ten Years*, 23 MARINE POL'Y 177 (1999) (discussing transferable fishing quotas in New Zealand)).

other environmental good being traded.[3] While good monitoring is technically feasible for some types of pollutants, it remains impossible for others.[4] While the acid rain program has shown that emissions trading can work well for sulfur dioxide trades in conjunction with continuous monitoring requirements, EPA and the states have used trading as a means of limiting volatile organic compounds, which are notoriously difficult to monitor.[5] These sorts of programs tend to lose emission reductions, since operators have an incentive to exaggerate the amount of reductions when they sell credits.[6] And operators can get away with such exaggeration when monitoring is not robust. The climate change case provides an interesting study of this monitoring problem, since the greenhouse gases causing climate change include some pollutants that can be well monitored and others that cannot.

Analysts often speak of the "hot spot" problem as another limit on the usefulness of trading.[7] In the context of cancer causing pollutants, for example, trades may produce relatively high emissions in some spots and lower emissions in others. Pollution policy makers have generally thought that exposing some populations to relatively high risks of cancer is a bad policy. As a result, EPA and the states have generally eschewed

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3. *See* Jeffrey C. Fort & Cynthia A. Faur, *Can Emissions Trading Work Beyond a National Program?: Some Practical Observations on the Available Tools,* 18 U. PA. J. INT'L ECON. L. 463, 467 (1997) (arguing that trading only works with accurate monitoring and quantification of emissions); Ann Powers, *Reducing Nitrogen Pollution on Long Island Sound: Is There a Place for Pollutant Trading?*, 23 COLUM. J. ENVTL. L. 137, 212 (1998) (contending that thorough monitoring is an essential element of a trading program).

4. *See* Thomas O. McGarity, *Missing Milestones: A Critical Look at the Clean Air Act's VOC Emission Reduction Program in Non-Attainment Areas*, 18 VA. ENVTL. L.J. 41, 57 (1999) (pointing out that direct emission monitoring for many stationary sources impossible or impractical).

5. *See* Richard T. Drury, Michael E. Belliveau, J. Scott Kuhn, & Shipra Bansal, *Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 DUKE ENVTL. L. & POL'Y F. 231, 280-81 (1999) (explaining that continuous emissions monitors work for nitrogen oxides and sulfur dioxide, but that volatile organic compounds present "severe" monitoring challenges).

6. David M. Driesen, *Is Emissions Trading an Economic Incentive Program?: Replacing the Command and Control/Economic Incentive Dichotomy,* 55 WASH. & LEE L. REV. 289, 310 (1998) (discussing the economic incentive of polluters to exaggerate the value of reduction credits and understate the value of debits in an emissions trading scheme); Gary C. Bryner, *Carbon Markets: Reducing Greenhouse Gas Emissions Through Emissions Trading*, 17 TUL. ENVTL. L.J. 267, 291 (2004) (contending that buyers and sellers have an incentive to inflate the reductions traded).

7. Drury et al., *supra* note 5, at 252 (discussing how pollution trading programs can create toxic "hot-spots" by concentrating pollution in communities surrounding major sources of pollution); James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, 53 STAN. L. REV. 607, 628-629 (2000) (describing how SCAQMD's Rule 1610 program exchanged diffuse vehicular emissions for refinery emissions to create a hot-spot problem).

trading of toxic air pollutants, except within plants.[8] On the other hand, regulators have agreed that trading programs to address acid rain and climate change pose fewer ethical issues, because acid rain and climate change result from total atmospheric loadings over a large geographic area, so the location of reductions does not seem critical.

The hot spot issue provides an example of a broader theoretical problem. Trading programs rest on the assumption that a common currency exists to facilitate trades.[9] These programs require an assumption that some fungible unit adequately measures the value of disparate actions in multiple locations undertaken to deliver environmental benefits. As long as this assumption holds true, it does not matter precisely what is done or where it was done, as long as the totals of currency add up.

But this assumption does not always hold up. For example, suppose that the Army Corps of Engineers allows a developer to fill in a 100 acre wetland, but requires it to purchase 100 acres of restored wetlands in order to make up for it. This sounds like an environmentally responsible trade. But is it? We cannot tell without a lot more information. Some wetlands play a critical role in preventing floods. Others are less important in that regard. Some wetlands provide critical habitat for endangered species; others do not. Wetlands also vary in their value in providing water filtration. The instinct to make trading an end in itself, rather than a means toward meeting objectives of environmental quality, leads to use of simple currencies, like acreage.[10] Evaluating a trade's validity according to ecological values offers a more responsible way of assuring that environmental objectives are met, but raises tremendous scientific and policy problems for evaluating trades. Suppose that the restored wetland has great value in preventing floods, but the destroyed wetland has great value in providing habitat for migratory birds. How should we evaluate the trade-off? It seems obvious that no expert can answer this question authoritatively and public participation should play a big role in deciding whether the trade meets public objectives. But public participation in trading decisions raises transaction costs and can impede trades.[11] Concerns about fungibility have led, for example, to a

8. *See* 40 C.F.R. § 63.150 (1997) (authorizing limited trading among units at synthetic organic chemical plants).

9. Salzman & Ruhl, *supra* note 7, at 611 (explaining that all trading programs assume a common currency and providing examples).

10. *Id.* at 629 (arguing that heterogeneity of habitats makes the application of a simple currency of acreage inappropriate).

11. David M. Driesen & Shubha Ghosh, *The Functions of Transaction Costs: Rethinking Transaction Cost Minimization in a World of Friction*, 47 ARIZ. L. REV. 61, 81-82 (2005) (some writers have recommended eliminating opportunities for public participation as a way to reduce the transaction costs associated with government

tendency to confine water pollution trading to particular watersheds, since the value of any reduction varies greatly with location.[12] This fungibility concern suggests another limit, that trading only works well where a simple currency corresponds reasonably well with important environmental values.

Thus, several limits apply to trading. Trading tends to work well when pollutants can be well monitored, when equitable concerns about geographic tradeoffs are minor, and where a good fungible unit exists to measure the value of disparate activities. When these requisites are not present, trading often proves very problematic. These limits suggest that trading will function well for some environmental problems and offer a poor method of addressing other problems. From this perspective, the reflexive across the board embrace of trading in the United States appears troubling, even if some applications of trading work just fine.

Trading programs in practice depend a lot upon design rules. The acid rain program worked well, in part, because of caps on the mass of emissions.[13] By contrast, EPA has allowed states to create programs that rely upon calculation of credits for changes in emission rates without requiring compliance with mass-based caps.[14] These programs raise complicated design issues that often result in widespread emissions fraud.[15] While most people tend to be either pro or anti-trading, a more thoughtful position would oppose poorly designed programs and support well designed programs that focus on problems that trading can address reasonably well.

Limits matter and so does design, but often ideology seems to govern many responses to trading programs. People who tend to view private markets with great love tend to favor trading. Those who tend to view private markets with suspicion, tend to reject trading.

Attitudes toward trading tend to track more general positions about law and economics. Thus, for example, supporters of cost-benefit analysis (CBA) tend to like emissions trading and opponents tend to

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approval of trades).

12. *See, e.g.,* Powers, *supra* note 3, at 198 (illustrating that the complexity of Long Island Sound hydrology necessitates trading using holistic geographic approach called for in a watershed strategy).

13. Byron Swift, *Command without Control: Why Cap and Trade Should Replace Rate Standards for Regional Pollutants,* 31 ENVTL. REP. 10330 (contrasting the mass-based caps in the acid rain program with previous rate-based standards).

14. *See* Driesen, *supra* note 1, at 40 (explaining that EPA has encouraged state rate-based trading programs without caps).

15. *See* Drury et al., *supra* note 5, at 259 (illustrating how pollution trading in Los Angeles, which primarily relied on industry self-reporting, resulted in under-reporting of actual emissions from industry and an over-reporting of claimed emission reductions from cars).

dislike it.[16] This coincidence of views is more than a little bizarre. In practice, CBA works extremely poorly in the environmental area because of the difficulty of quantifying benefits.[17] Well-designed emissions trading can, however, work reasonably well. Furthermore, emissions trading makes CBA even less reliable than it normally is. While there is widespread agreement that trading reduces compliance costs, nobody has a good way of predicting the magnitude of the cost savings. CBA is even more likely to be wrong when a trading approach is used than when it is not used. Furthermore, CBA proponents often cite risk/risk tradeoffs as a reason to conduct CBA.[18] The idea here is that when the government mandates an environmental improvement of some kind, the response may exacerbate some other environmental problem.[19] With or without CBA, the government can evaluate risk/risk tradeoffs if it keeps control of the techniques being used to meet environmental goals. But if it leaves the decisions about how to meet the goals up to the unfettered choices of regulated parties, it has no timely means of evaluating risk/risk tradeoffs.

Personally, I find the concerns about risk/risk tradeoffs exaggerated, so this concern does not lead me to categorically oppose trading. However, those who think that risk/risk problems are extremely pervasive and serious should oppose trading, and they usually do not.

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16. *See, e.g.*, Richard H. Pildes & Cass R. Sunstein, *Reinventing the Regulatory State*, 62 U. CHI. L. REV. 1, 8-10 (1995) (recommending increased reliance on "market incentives" together with CBA).

17. *See* David M. Driesen, *Is Cost-Benefit Analysis Neutral?*, 72 COLORADO L. REV. (forthcoming 2006) (explaining scholars agree that requirements for CBA have throttled decision-making under TSCA and FIFRA); Thomas O. McGarity, *Professor Sunstein's Fuzzy Math*, 90 GEO. L.J. 2341, 2343, 2366 (2002) (arguing that cost-benefit analysis is "occasionally comprehensible, but frequently preposterous and always manipulable number spinning" that has throttled regulation under TSCA and FIFRA); Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 U. PA. L. REV. 1553, 1557 (2002) (characterizing monetary valuation of benefits of life, health, and nature as problematic); Henry S. Richardson, *The Stupidity of Cost-Benefit Analysis*, 29 J. LEGAL STUD. 971, 972 (2000) (finding many of the value choices implicit in CBA "stupid"); Donald T. Hornstein, *Lessons from Pesticide Regulation on the Paradigms and Politics of Environmental Law Reform*, 10 YALE J. ON REG. 369, 436-37 & n. 395 (1993).

18. Cass R. Sunstein, *Health-Health Tradeoffs*, 63 U. CHI. L. REV. 1533 (1996); RISK VERSUS RISK: TRADEOFFS IN PROTECTING HEALTH AND THE ENVIRONMENT (John D. Graham & Jonathan Baert Wiener eds., 1995); W. KIP VISCUSI, FATAL TRADEOFFS: PUBLIC AND PRIVATE RESPONSIBILITY FOR RISK (1992); Ralph L. Keeney, *Mortality Risks Induced by Economic Expenditures*, 10 RISK ANALYSIS 147 (1990); AARON WILDAVSKY, SEARCHING FOR SAFETY (Social Philosophy and Policy Center 1988); Aaron Wildavsky , *Richer is Safer*, 60 PUB. INT. 23 (1980).

19. *See, e.g.*, Jonathan H. Adler, *Free and Green: A New Approach to Environmental Protection*, 24 HARV. J. L. & PUB. POL'Y 653, 681 (2001) (citing a correlation between downsizing of automobiles to meet federal fuel economy standards and a reduction of crashworthiness, resulting in increased highway fatalities).

Ideology tends to govern responses to proposed reforms to an unhealthy extent.

I want to close by questioning the most fundamental assumption supporting trading. Indeed, the assumption I wish to question is so fundamental that most analysts do not realize it is being made. That assumption is that the best approach to meeting any regulatory goal involves choosing the least cost compliance option. That assumption lies at the heart of support for trading.

There is a lot to be said in support of this fundamental idea. Society has limited resources. It may make sense to meet environmental goals as cheaply as possible. Furthermore, cheaper cost may, at times, offer political advantages that make it easier to introduce needed safeguards.

But in the long run, sometimes expensive approaches to near term goals have advantages.[20] Ask yourself, would you prefer that we get the next increment in emission reductions in sulfur dioxide through the least expensive approach, probably further refinement in scrubbers and more use of low sulfur coal across the country, or would you prefer a more expensive approach reducing emissions to zero in some small part of the country where we experiment with fuel cells or solar energy? Good reasons exist to prefer the more expensive approach.

A transition from fossil fuels to renewable energy resources offers enormous potential to realize huge benefits over time and to lower long term costs, even though measures needed to begin that transition are initially expensive.[21] Use of coal produces not only acid rain, the problem motivating the sulfur dioxide reduction requirements, but also particulate pollution, which is associated with tens of thousands of deaths annually in this country, and ozone, which exacerbates the sometimes serious breathing difficulties millions of asthma sufferers face.[22] Burning of coal also plays an important role in causing global climate change. Coal use also denudes mountains and ruins streams. So, a movement to renewable energy promises very wide ranging benefits over a long period of time. Renewable energy costs have fallen over time.[23]

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20. *See generally* DAVID M. DRIESEN, THE ECONOMIC DYNAMICS OF ENVIRONMENTAL LAW (2003) (explaining why long term economic dynamic considerations should command more attention than short term efficiency). *See also* David M. Driesen, *The Economic Dynamics of Environmental Law: Cost-Benefit Analysis, Emissions Trading, and Priority-Setting*, 31 B.C. ENVTL. AFF. L. REV. 501 (2004) (outlining some of the implications of this idea for environmental policy in a brief article).

21. *See* David M. Driesen, *Does Emissions Trading Encourage Innovation?*, 33 ENVTL L. REP. 10094, 10097 (2003) (innovations that decrease reliance on fossil fuels offer qualitative superiority and the possibility of future cost savings).

22. *See* DRIESEN, *supra* note 20, at 85 (discussing some of the pollution associated with coal and its impacts).

23. NREL Energy Analysis Office, Graphs of Cost Trends, www.nrel.gov/

A program to increase its use would likely further reduce its costs. Furthermore, coal is not a renewable resource. Its price will not reflect its ever-growing depletion, except to the extent that its scarcity raises extraction costs. Eventually, however, it will become very scarce and costly and then run out altogether. So, the least expensive short term approach—use as much coal as we can now, but control it with end of the pipe controls or by preferences for low sulfur deposits—may have the highest long term costs. There is no reason to expect the cheapest short term cost to coincide with the greatest long-term benefit or the lowest long-term costs. The lowest long-term costs may involve speeding the transition from coal, thus obviating the need for costly end of the pipe controls to deal with an inherently dirty process that we ought to move to abandon. But emissions trading favors the lowest short term cost systematically.[24]

To the extent that we value relatively expensive, but potentially very valuable technological change, we may prefer to give stimulation of meaningful innovation a greater priority than immediate cost savings. This can be done through bans, restrictive design of trading programs, or simple commands to use renewable energy (which we have seen in the form of renewable portfolio requirements). I have also proposed an environmental competition statute that aims to maximize innovation, rather than efficiency.[25] This statute would authorize any polluter who reduces target pollutants below the levels of a competitor to charge the competitor for the full cost incurred and a modest premium set by the government. This would provide something that emissions trading does not provide, an incentive to maximize emission reductions, not just to deliver the net amounts timid government regulators mandate at the lowest possible cost. It would stimulate a competition to lead in environmental protection, just as companies compete to provide the best computer or other product or service. It would rely on fears of losing revenue to market competitors and greed to get revenue from market competitors to motivate improvements. By contrast, trading programs rely on the limited incentives government regulators create when they set the limits guiding the trading program.

Conclusion

Trading programs can work well in some circumstances, but not

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analysis/docs/cost_curves_2002.ppt.

24. Driesen, *supra* note 21, at 10097 (explaining how trading favors least cost approaches).

25. *See* DRIESEN, *supra* note 20, at 151-161 (explaining the environmental competition statute idea and defending it).

others. Good design plays a critical role in making trading effective, and poor design can wreck a trading program. Finally, we ought not reflexively assume that the cheapest method is always the best method. For some environmental problems, we may want to give initially expensive technological transformation more priority than cost effectiveness.