



Markets Are Not Magic

The idea that government should serve a public interest largely distinct from private interests has suffered a decline in prestige in the face of an assault from the law and economics movement. We need to pay less attention to hypothetical concepts of “efficiency” and more attention to the question of how to make environmental law a source of demand for environmental innovation. Regulators must see themselves not as balancers of costs and benefits, but as catalysts for change

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Governor Michael O. Leavitt’s slogan “Markets Before Mandates” reflects the spirit of our times. Government at every level has engaged in a vast market emulation project, imitating the perceived virtues of free markets in a wide variety of areas. Even though the law of environmental protection seeks to cure some of the ills that unchecked markets create, environmental policymakers have not been immune from a tendency to view the free market as a magical solution to environmental problems.

Unfortunately, environmental reforms based on market emulation to date have not involved a serious effort to figure out how to secure the innovations that would enable us to cope with environmental problems that often grow worse over time. This omission seems strange, since many people admire the free market’s ability to encourage innovation. Instead, market emulation in this area takes the “economic efficiency” concept that economists use to model free markets — that production costs should match the value of benefits to consumers — and makes it into a guide for environmental policy.

The combination of ideological faith in markets and corporate political power has led to increased reliance upon cost-benefit analysis (CBA) and emissions trading as the regulatory reforms of choice, the first as a means of setting goals for environmental law, and the second as the preferred means of achieving them. The Western Governors’ Association’s Enlibra Principles — which the new EPA administrator helped draft when he was governor of Utah — conform to this tendency. These principles call for greater use of “market-based approaches” (like emis-

sions trading) and suggest that these approaches somehow provide an alternative to standard-setting and strict enforcement, while increasing people’s trust in government — in short that they work like magic. And they endorse an extraordinarily comprehensive and ambitious form of cost-benefit analysis.

Thus, rather than treating government standard-setting as an effort to prevent harm, economists analogize it to the purchase of a good. Government’s principal duty in “purchasing” clean air, water, or land through regulation, then, involves avoiding the vice of a stupid shopper’s paying more than an item is worth. This view leads to extensive use of CBA to make sure that the costs firms must pay to comply with environmental standards do not exceed the value of environmental “benefits” (i.e., harm reduction) that compliance delivers to the public.

Although most people think of efficiency as involving the question of the best way to achieve a given goal, this concept of efficiency helps determine what goal to achieve. It influences decisions about whether to demand a lot of pollution reduction or just a little. And CBA moves us away from an emphasis on figuring out how to protect public health and the environment toward a system where every conceivable environmental measure that would help prevent death, illness, and ecological harm gets met with the question: Yes, but is it worth it?

When government does set a standard protecting the environment, the efficiency ideal suggests market mechanisms to achieve the goal. In practice, policymakers have made emissions trading the market mechanism of choice. (While economists often prefer an alternative market mechanism — pol-

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A N O T H E R V I E W

Record Shows Profit-Seeking Drives Green Innovation

David Driesen is disappointed that market mechanisms such as trading pollution credits do not automatically spur innovations that further reduce pollution. But that's taking a short-term view. Trading reduces the often heavy cost of regulation, freeing up funds for other uses. And the success of the private sector in using its funds to improve the environment is quite impressive.

Most analysts recognize that the environment in a modern free-market country such as the United States is cleaner than it used to be, cleaner than socialist countries are, and cleaner than most developing countries are likely to be for some time. This fact is supported by studies around the world showing an "environmental Kuznets curve."

The environmental Kuznets curve is a graph showing the relationship of the income of a nation to its environmental quality. (The name comes from similar curves relating national income and wealth distribution developed by the economist Simon Kuznets.) Researchers have found that as a country's income increases from very low levels, pollution goes up at first, but after a certain income level is reached (about \$6,000 to \$8,000 per capita), pollution declines. Thus, increasing national wealth leads to a better environment.

Scholars debate the reasons for this relationship, and some give credit to environmental activism and government regulation. Yet history shows us that companies have made environmental progress even when regulation was minimal.

Companies face pressures to reduce pollution and waste. Over time, manufacturers reduced smoke-stack emissions because smoke is unburned fuel, and valuable fuel was escaping through their chimneys. One company's waste can be another's resource, so entire industries grew up using the byproducts

of established industries. In the 19th century, for example, lard, tallow, bones, and other waste products from meat packing became the sources of soap, margarine, beef extract, glue, fertilizer, and other products; exploiting these wastes helped develop the chemical industry.

The quest to lower material costs continues. The amount of aluminum in a beverage can has fallen by at least 27 percent since the 1960s. Fiber optics made from sand have replaced copper wires, the amount of steel used in skyscrapers has gone down dramatically, and the waste of wood in producing lumber has declined to less

than 2 percent.

In modern times, environmental factors have surged in importance. Workers are not willing to live under smoky skies or next to polluted rivers — so companies have to clean up. Corporate reputations hinge on environmental actions. Whether Union Carbide caused the disaster in Bhopal, India, or not, most people thought it did, and the company did not survive as an independent entity (it is now a subsidiary of Dow Chemical). Today, certification programs such as the LEED or "green" building standard and the Sustainable Forestry Initiative show that some consumers expect environmentally sound production processes. And many people pay more for organic grain, locally cultivated produce, and shade-grown coffee.

The history of air pollution control in the United States illustrates the environmental progress that occurred well before federal laws forced companies to meet emissions standards. Respected researchers have noted that air pollution fell in the United States long before the passage of the Clean Air Act of 1970.

Robert Crandall of the Brookings Institution concluded in *Controlling Industrial Pollution* that "pollution reduction was more effective in the 1960s, before there was a serious fed-

eral policy dealing with stationary sources." Paul Portney, president of Resources for the Future, came to virtually the same conclusion in *Public Policies for Environmental Protection*: "While we must be leery of trends based on such a small number of sites, these data are important because they suggest that air quality was improving as fast or faster before the Clean Air Act than it has since that time."

Of course, environmental improvements are not due solely to corporate actions. During the 20th century, families switched from coal to fuel oil and natural gas for home heating, helping to clear the skies. Local regulations played a role. But certainly, much environmental improvement came from profit-seeking companies.

Market competition is powerful. After World War II, both East and West Germany had a "people's car" — the Volkswagen in the west and the Trabant in the east. The Volkswagen, operating in a market system, became famous for its technological innovations. But the Trabant, produced in a non-market system, was an object of ridicule. Made about as cheaply as a car could be, the Trabant couldn't go faster than 66 miles an hour, was hard to handle, and didn't have a gas gauge. Furthermore, as *Car and Driver* reported, it "spewed a plume of oil and gray exhaust smoke." It was such a polluter that the Environmental Protection Agency didn't allow the editors to drive the car on public roads.

A dynamic market system forces innovations, and these innovations include environmental improvements. Market mechanisms such as emissions trading free up money that companies will use to satisfy the desires of consumers and employees. As peoples' desires for beautiful surroundings increase, suppliers of goods and services respond with even more measures that enhance environmental quality.

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lution taxes — policymakers have eschewed taxes as ideologically unacceptable and contrary to polluters' interests.) In a trading program, polluters can forego compliance with emissions limits if they purchase an equivalent reduction from somebody else. Because they will only trade when their compliance costs exceed the cost of making reductions somewhere else, this system lowers net compliance cost for the industry under the cap. The shuffling of compliance obligations thus advances economic efficiency, in the sense of lowering the cost of achieving a given environmental standard across a sector.

The Enlibra Principles' emphasis on efficiency-based reforms, such as emissions trading and cost-benefit analysis, reflects the influence of the law and economics movement that 7th Circuit Court of Appeals Judge and Professor Richard A. Posner has led from the University of Chicago. Posner explains the common law as an effort to pursue economic efficiency and argues for efficiency-enhancing legal reforms as a means of increasing wealth, which he regards as an important "value." In fact, however, innovation and change have played a very large role in producing wealth. And the law and economics movement has not faced the tension between "efficiency" and creativity. For innovation and change often require inefficient experimentation and even failures. This inefficient process lies at the heart of wealth creation.

The efficiency concept is fundamentally static and that has important consequences for environmental law. An efficiency-based approach like emissions trading tends to encourage compliance in the cheapest possible manner, which in practice usually means perfecting the current state of the art, rather than advancing it. Efficiency thus stifles the kind of leapfrog innovation necessary to solve the big environmental problems that confront society. Whether dramatic new processes that pollute less or new control technologies, these may never have a chance, as firms, acting in their rational self-interest, simply take a straight-line approach toward compliance, as efficiency commands.

To foster innovation effectively we need an understanding of the *economic dynamics of environmental law*. This new discipline would build on the law and economics movement's observation that economic incentives are important, but it would employ this insight for the new purpose of improving environmental law's capacity to encourage innovation to allow us to cope with change. It would recog-

nize the environmentally destructive economic dynamics that already exist in society and design policies that counter, rather than mimic or even exacerbate, destructive dynamics. It contributes to a post-Chicago law and economics that moves beyond merely noticing what incentives a law provides to ask how incentives actually influence people and institutions. It employs the insights of public choice theory, which predicts that special interests will have great influence over policy, to craft ideas about how to overcome excessive industry influence on environmental policy. It recognizes the importance of allowing ordinary citizens to shape the goals of environmental policy, while offering a large role for private initiative and environmental entrepreneurs, especially those who offer not just refinement, but innovation.

The efficiency-based reforms have not magically solved our environmental problems. CBA has not led to the series of nicely "balanced" regulations that the Enlibra Principles seem to long for. For example, in 1991 the 5th Circuit held that EPA must employ cost-benefit analysis in order to regulate under Section 6 of the Toxic Substances Control Act. This case, *Corrosion Proof Fittings*, reversed an EPA ban on asbestos, one of the most serious (and easily understood) threats to public health we have ever faced. The agency might have figured that if it could not regulate a substance that generated over \$1 billion in compensatory damage awards for victims of asbestosis and other diseases, it could not regulate anything under a cost-benefit test. In any case, after the decision requiring cost-benefit analysis, EPA has never used its broad authority under Section 6 to regulate hazardous chemicals. Even under statutes that do not impose a cost-benefit criterion, the Office of Management and Budget has demanded cost-benefit analysis and used it regularly to delay, weaken, and thwart regulation of serious hazards.

Emissions trading has sometimes proven less harmful than cost-benefit analysis, but it has not magically solved all our problems either. After years of failure with trading experiments, Congress created the first truly successful emissions trading program in 1990, with the passage of the Amendments to the Clean Air Act. The Acid Rain Program in this statute featured reasonably stringent mass-based limits on sulfur dioxide emissions and strict



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continuous emissions monitoring requirements. It allowed polluters to forego compliance with their limits if they purchased additional allowances from polluters who went beyond their limits. This program reduced electric utility sulfur dioxide emissions by half over a five-year period, generated compliance costs well below early estimates, and required little government investment in enforcement. While many observers attribute all of these benefits to trading, many pollution sources did not trade and still complied without incurring large expenses. The lack of need for costly government oversight comes from the requirement of privately installed continuous emissions monitors, which made the program work well in spite of the added complexity that trading can cause.

The magical allure of the free market, however, has prevented regulators from emulating this success and led to repetition of previous failures. New Jersey regulators, for example, took the “markets before mandates” idea a little too seriously and delegated its monitoring functions to a private agency, which failed to even keep track of the little data it had. A compliance audit so embarrassed the Department of Environmental Protection that it withdrew the program, while continuing to declare its faith in the free market religion, expressing its continued “commitment” to emissions trading. But a general commitment to trading makes no sense.

Trading just does not work without good monitoring, which is impossible in many cases. Examples include programs addressing nonpoint water pollution and volatile organic compounds polluting the air. And trading can offend ethical principles in some contexts, for example, by leaving minority communities subject to high cancer risks in exchange for an environmental benefit elsewhere that does little for the suffering community. This problem afflicted a trading program in the San Francisco area, which unfairly gave up toxic emission reductions from a petroleum refinery in a community of color facing high cancer risk, in exchange for credits from reductions in automobile use throughout the Bay Area. Trading would work better if regulators abandoned religious devotion to it in favor of viewing it as a tool that works in some contexts, but not others.

While promoters of the magic of the market point at the minimal enforcement necessary for the Acid Rain Program, they often fail to remember that it was the government that created the market in the first place, not just

the “supply” of emissions allowances but most importantly the “demand” for reductions by removing half of the permits from the market.

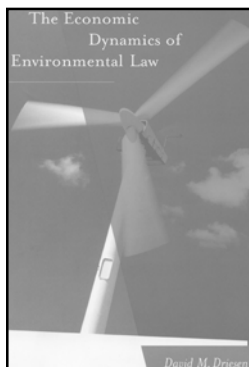
Trading programs require strict government limits and enforcement. Polluters purchasing emission allowances have no interest in the quality of the goods. Buyers of blue jeans care about whether they wear out; buyers of pollution reduction credits only care about whether regulators will accept them in lieu of local compliance. If regulators do not perform their traditional role of making sure that claimed reductions reflect real reductions, they will make trading programs into failures. The same problem shows up in the natural resources area, where developers can get permits to destroy wetlands by purchasing credits in a “wetlands mitigation bank” or by creating replacement wetlands themselves. Unfortunately, in many cases regulators do not check — conduct on-location audits with field crews of technical experts — to ensure that the created wetlands replace the lost biological, hydrological, and ecological functions, and return periodically, to ensure that the new wetlands do not fail. According to a recent study by the General Accounting Office, 80 percent of replacement wetlands indeed do fail after just a few years.

President Bush probably did not realize that he was undermining the success of market approaches when, in announcing the nomination, he praised the governor for rejecting “the old ways of command-and-control from above.” But if Leavitt takes the magic of the market too seriously and pays too little attention to the old ways, the magic will vanish and only the stench of failure will remain.

Unfortunately, opponents of pro-business regulatory reform often defend the status quo, rather than advance new ideas. But the weaknesses in CBA and emissions trading reflect a deeper problem with the efficiency concept that underlies it — a problem that should lead us to welcome new proposals. The efficiency concept is static. Indeed, economists define efficiency in terms of a balance of costs and benefits for a given technological state. But the environmental problems the efficiency concept seeks to address have a dynamic nature that we must take into account.

We need not worship the free market to learn something from it. An economic dy-

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dynamic exists that tends to diminish environmental quality over time. Any person can realize a profit by taking a natural resource and converting it into a product for sale to human beings. Hence, the free market provides a continuous incentive to find and deploy environmentally degrading innovations in order to meet human material needs and desires. A good example involves the invention and widespread deployment of giant drift nets, which have decimated fisheries throughout the world. The market also provides an incentive for producers to encourage expanding material desires over time, through advertising. Population increases and the human desire to have more stuff accelerate this dynamic tendency to increase resource use over time.

Accelerating resource use diminishes the stock of useful resources that can sustain wealth and welfare. Production converts low-entropy resources into high-entropy waste, with less economic potential. Thus, over time, use of nonrenewable resources (such as petroleum) or harvesting of renewable resources (such as trees) at rates exceeding their ability to renew themselves should lead to reductions in wealth.

While the free market offers substantial incentives to innovate in order to create more goods, the market offers no strong continuous incentive to innovate for the sake of improving environmental quality. The market may encourage bigger cars that carry more people on rougher terrain, but usually does little to encourage the most environmentally friendly automobile possible. The market regularly encourages entrepreneurs to take big risks in order to try to earn money satisfying our material desires, but offers no incentive for such risk taking for the sake of improving environmental protection.

The continuous possibility of profit from environmental degradation tends to limit countervailing government efforts to protect the commons. People who make profits from environmental degrading activities acquire the means to hire lawyers and lobbyists to limit government efforts to protect the environment. Even environmentalists subsidize anti-environmental lobbying through their gas and utility payments. And all of us have an incentive to favor reduced taxation, which limits the administrative capacity of government. Over time, these dynamics have a rather profound affect.

A major challenge for environmental law involves figuring out how to encourage suffi-

cient environment innovation to keep pace with the tendency to accelerate resource depletion and environmental destruction over time. Unfortunately, CBA is positively counterproductive in this respect and emissions trading is, at best, anemic.

CBA can lead to protracted disputes about valuation of benefits. These disputes allow polluters to delay, or avoid entirely, spending money to reduce pollution. Often we cannot quantify environmental effects that we know are serious. For example, scientists tell us that climate change will increase flooding from large storms in coastal areas. It does not follow that the science can produce good estimates of the number of deaths that result. Those estimates would require us to know whether the floods would occur in urban areas, how quickly they would come, how far they would extend, and even then, the prediction would be problematic. The Fifth Circuit's 1991 decision reversing EPA's ban on asbestos under the Toxic Substances Control Act rejected the agency's insistence on giving weight to asbestosis, when the data did not permit it to quantify the number of asbestosis cases produced. Often the range of uncertainty in making estimates of the number of deaths and illnesses a given regulation will prevent is so large that it gives no guidance at all for a decision, but it still provides fodder for endless industry lobbying and litigation holding up standards.

Even if one could quantify the various benefits from a particular regulation, comparing environmental benefits to cost proves very difficult. Conversion of consequences like death and illness to dollar terms requires many implausible assumptions and arbitrary value judgments. And CBA encourages neglect of non-quantifiable variables, such as damage to ecosystems.

The other side of the ledger has problems too, where EPA has regularly overestimated the cost of regulation. Under CBA, overestimation of cost tends to produce insufficiently stringent regulation. Economic dynamics help explain this pattern. Promulgation of a standard produces a robust market in the equipment and techniques that can be used to meet it. While polluters have every incentive to exaggerate control costs in regulatory proceedings, once a standard becomes effective, they have incentives to find the cheapest compliance methods. Indeed, when standards have been stringent, industry has frequently employed innovations not anticipated by regulators in order to bring down cost. While tech-



The economic dynamics of environmental law — a new discipline — would build on the law and economics movement's observation that economic incentives are important, to improve environmental law's capacity to encourage innovation.



nology-forcing has not always proceeded smoothly, statutes aimed at ambitious national goals for health and environmental protection (rather than economic efficiency) have yielded significant technological innovation when regulators pursue these goals with vigor.

Even if the model of matching costs and benefits works reasonably well as a description of markets that rely upon millions of relatively rapid decentralized transactions, it fails miserably as a basis for a regulatory system that makes decisions slowly through highly contested administrative decisionmaking processes. During long debates about the valuation of costs and benefits, pollution continues unabated, because absent government action, little pollution abatement occurs. Moreover, regulators cannot address every significant pollution source, as the ongoing failure to address non-point sources of water pollution demonstrates. Even in theory, a regulatory system that provides cost-benefit balanced regulation of some pollution sources, while failing to address small but cumulatively significant pollution sources, does not obtain optimal results for the society as a whole. CBA produces uncertainty that inhibits the advance of technological innovation.

Emissions trading's tendency to provide incentives for least-cost abatement strategies does not imply that it provides great incentives for innovation. Polluters in a trading program choose the cheapest abatement strategies available, not the most innovative or efficacious. Utility operators in the Acid Rain Program, for example, relied upon well established technological options like scrubbers and low-sulfur coal, rather than innovations in advanced renewable energy technologies, to achieve compliance. If one thinks in static transaction-based terms, the cheapest method of achieving current standards does appear to be the best solution. But the cheapest short-term cost does not necessarily coincide with the best environmental option or the cheapest long-term cost.

Take renewable energy, such as wind and solar energy, as an example. Renewable energy is sometimes environmentally superior, because it produces no appreciable emissions. Widespread use of renewable energy would radically improve environmental quality over time, permitting dead lakes to recover, drastically lowering urban smog levels, greatly

ameliorating the threat of global warming, and saving rivers, streams, and mountaintops from destruction from coal-mining operations.

While some renewable sources cost a lot today, the cost of new technologies tends to fall over time as manufacturers learn how to reduce costs through experience with production. The costs of renewable energy technologies have fallen significantly over time, and would probably fall faster, if only sufficient demand would materialize to catalyze improvement. Thus, a technology that is expensive today may prove cheaper and better tomorrow. This suggests that a program that starts us down the path of refining and creating advanced technologies will often prove environmentally better and cheaper in the long run than a program, like emissions trading, that always encourages the cheapest short-term option.

A rational homeowner does not automatically choose roof repair over replacement just because it's cheaper. A good new roof may, at times, be worth the extra expense. Likewise, the cheap fix is not always the best approach to environmental problems that can get worse over time absent fundamental changes in structure.

If we wish to emulate the virtues of free markets, we should emulate its most widely admired virtue, its tendency to spawn creativity, innovation, and changes that sometimes better our lives. We need to figure out how to make environmental regulation encourage environmental entrepreneurs, people with new ideas for technologies or approaches that can allow us to meet society's needs with less environmental damage, to provide technological changes enhancing environmental protection. To do this, we must analyze the economic dynamics of environmental law, the central tendencies that arise from economic and other types of incentives influencing relevant individual and institutional behavior.

Unfortunately, creativity, change, and innovation often stem from inefficient experimentation and failure. For example, some solar projects have failed, but the costs of producing solar energy have fallen dramatically as companies engaged in solar projects have learned from these failures. Efficiency and innovation, as the renewable energy example suggests, do not always (or even usually) coincide. We should be much less concerned

about short-term costs and much more concerned about the long-term.

In order to figure out how to make reforms that might encourage environmental innovation, we need to carefully analyze economic incentives. But this analysis must go beyond noticing what economic incentives the law provides and beyond a relentless pursuit of short-term static efficiency. It must include noticing how the incentive provided would actually influence the people the incentive nominally affects. Since the free market does not provide incentives to innovate for the sake of a cleaner environment, government must fill that role in some fashion. Just as consumers provide a source of demand that provides opportunities for companies to innovate to improve delivery of services and the usefulness of goods, government serves as a source of demand for environmental innovation.

Government provides especially strong incentives for innovation when it bans particular chemicals. For example, when we phased out ozone-depleting chemicals, this paved the way for a host of innovative substitute methods of accomplishing the jobs those substances used to do, without depleting the ozone layer.

Stringent standard-setting by the Occupational Safety and Health Administration in its early years also produced innovation. Employers eager to avoid potential high costs of compliance sometimes chose to change production processes instead of using more costly but obvious solutions envisioned by OSHA. Some of the process changes under its regulations improved the competitive posture of employers, such as those undertaken in meeting OSHA's cotton dust standard.

While the efficiency-based view of environmental protection emphasizes costs as fixed obstacles to be minimized, stringent standards sometimes lead to innovation that improves industry's competitive position. For that reason, Harvard Business School Professor Michael Porter has argued that strict environmental standards, when properly designed, often improve competitiveness of firms and of nations — the famous Porter Hypothesis.

The public choice component of economic dynamic analysis suggests, however, that government often will decline to impose bans or stringent standards. Public choice analysis predicts that powerful interests will have a disproportionate influence upon political decisions and thus upon the content of the law. The free market tends to empower those who have a stake in today's technologies and have

profited from exploitation of natural resources, not entrepreneurs with new environmentally superior approaches. Powerful corporations will put substantial pressure on environmental programs that threaten their interests.

This tendency of special interests to weaken government helps explain the attraction of free-market mechanisms; they seem to promise an escape from special interest influence. But they do not deliver on this promise. Governments establishing emissions trading programs must set the limits that create the demand to purchase credits, just as they write pollution limits for traditional regulations. And they usually face substantial pressure to make the limits weak. When California adopted a program in the Los Angeles Basin to reduce smog-causing nitrogen oxides from stationary sources, called RECLAIM, these pressures delayed emission reductions for a number of years through manipulation of baselines (the prior conditions from which reductions are calculated). The same problem of pressure to enact weak measures would afflict a government effort to impose pollution taxes, even though pollution taxes may do a better job at promoting innovation than trading programs based on giveaways of rights to pollute. The rapid demise of President Clinton's proposal to impose a rather weak BTU tax that would have raised fossil fuel costs shows that pollution taxes provide no magical solution either.

Special interests also seek broad trading programs that maximize flexibility by allowing almost any source of credits to satisfy their requirements. This puts pressure on regulatory agencies to allow reductions of pollution that it cannot effectively monitor to become available sources of credits, which can lead to fraud. In California, for example, credits or financial awards for junking pre-1982 model year cars in a program run by U.S. EPA with the Southern California Air Quality Management District have been awarded when people turn in cars that could not possibly run again anyway. In general, emissions trading encourages more innovation if limits are strict and potential sources of credits are few. If trading programs become too broad and limits are weak, no innovation is needed. Polluters can either engage in fraud, or, if program rules make that difficult, routine cheap reduction strategies and minor tweaking that usually costs much less than innovative strategies that would position us to better meet a broad array of environmental challenges.



An environmental competition law would reward firms that reduce pollution, creating an incentive to innovate. Companies that reduce their emissions below competitors' could collect their costs plus a substantial premium from those competitors.



The longing to escape the lugubrious nature of government processes makes sense, since government lethargy does limit its capacity to spur innovation. While some stringent traditional environmental regulation has spurred innovation, most of it has imposed limited demands that polluters can easily satisfy with standard end-of-the-pipe controls and has therefore not advanced the ball very much.

But if we wish to address the problem of lethargic non-dynamic government, we need to focus on it directly. Ironically, cost-benefit analysis promotes government lethargy in the name of efficiency, and emissions trading, while effective in some cases, can sometimes waste a lot of government resources by making pollution reductions more difficult to track.

One might ask, even if traditional regulation, emissions trading, and pollution taxes often fail to provide sufficient stimulus for environmental innovation, can we design approaches that do better? Can we circumvent slow, ponderous, and sometimes ineffectual government decisionmaking processes? In other words, do we have to accept the existing administrative law framework and all the associated litigation, delays, and strife?

Congress has sometimes circumvented slow, ponderous administrative processes by making detailed decisions itself. In the 1990 Clean Air Amendments, for example, Congress made very specific decisions about phase-outs of ozone-depleting chemicals, reduction of sulfur dioxide emissions from powerplants, and a first cut of vehicle emission standards. Detailed congressional decisionmaking can help reduce our reliance on administrative processes, but legislative time constraints limit the availability of this technique.

What about privatization? Obviously, just leaving all decisions up to private actors with no legal framework would only defeat environmental protection. But privatization has provided a source of vigor for environmental law. Privatized enforcement, in the form of citizen suits, has invigorated environmental law enforcement and the right-to-know law has stimulated some voluntary private pollution reduction. One could increase the economic incentives for citizen suits by providing higher fees for difficult cases (to reflect the risk of loss) and allowing successful litigants to keep some of the fees. And one could expand right-to-know laws.

A more ambitious privatization reform

might involve an *environmental competition law* requiring polluters with relatively high pollution levels to pay any costs that competitors incur in realizing lower pollution levels plus a substantial premium, thereby creating a significant incentive to be among the first to eliminate or drastically reduce targeted pollutants. Such a law would simply authorize any polluter to collect costs plus a premium from any competing firm with higher pollution levels. Thus, for example, a power plant that switched fuels to achieve a lower emissions rate per kilowatt-hour than its competitors might collect the cost of the fuel switching from its coal-burning competitor, plus a premium.

An environmental competition law directly attacks a fundamental problem with existing free market incentives: the polluting firm must absorb any cleanup costs. Because the firm does not experience all of the costs of pollution itself (most are externalized and felt by the general public) it rarely pays to clean up. If firms could systematically externalize the costs of cleanup without substantial administrative intervention, just as they externalize the cost of pollution, then even a fairly modest premium might create adequate incentives to control pollution.

This solves another problem as well. The free market system provides no systematic incentive for environmentally superior performance. The environmental competition statute regularly rewards superior environmental performance.

An environmental competition statute would create a private environmental law, with a few public decisions setting up the law, but substantial enforcement by low-polluting businesses against competitors. The law would create a private right of action that allows a business that realizes environmental improvements through investment in pollution-reducing (or low-pollution) processes, control devices, products, or services to secure reimbursement for expenses, plus some premium, from more-polluting competitors. Hence, the scheme would create economic incentives for some companies to become enforcers of the law, rather than creating incentives for most companies to resist enforcement. This would effectively privatize enforcement, making it a private activity, rather than a government activity with some public-spirited private support (as in the citizen suit mechanism).

Such a proposal overcomes the fundamental problem with traditional regulation, emissions trading, and pollution taxes. These

mechanisms rely on government decisions as the driver for pollution reductions. An environmental competition law makes private initiative, motivated by the prospect of gain and the fear of loss, the driver of environmental improvement, thus replicating free market dynamics. The magnitude of the incentive may depend upon the extent of industry fears about competitors' achievements, rather than only the limited cost government imposes through regulation (or pollution taxes). This uses the free market as a model for competitive economic dynamics.

Second, we could reform that administrative process to make it more fair and effective. Regulators now focus almost exclusively on addressing the concerns of the businesses they regulate, mostly the dirtiest existing polluters. Government officials must instead view regulation as an opportunity to give fledgling entrepreneurs with cleaner technologies a chance to sell their wares or even displace the existing dirty industries. A preliminary step might be to hold meetings with businesses that offer alternatives to the existing technologies generating the pollution early in the regulatory process and to take the input of vendors and competitors more seriously.

Currently, regulated industry provides the bulk of the input into administrative processes. Perhaps government should find ways to increase the influence of community groups hoping for pollution reductions and environmental entrepreneurs hoping for opportunities. Government could, for example, *use pollution taxes to pay for scientists, lawyers, and consultants to help community groups and environmental entrepreneurs* that cannot fully participate in highly technocratic administrative processes.

A third category of reforms would include improvements in regulatory design. Unfortunately, the project of bashing command-and-control regulation while lauding market-based mechanisms has produced a neglect of important issues of regulatory structure.

For example, regulators could improve regulation's capacity to encourage innovation by *shifting from rate-based to mass-based standards*. Many regulations, including both traditional regulation and state emissions-trading programs, limit emission rates. Emission rates limit the amount of pollution per unit of activity. For example, many regulations limiting air pollution coming from applications of paints, coatings, and solvents limit the pounds of emissions per gallon of

substance used, and traditionally, regulations of electric utilities limit the pounds of pollution per million British Thermal Units.

The Acid Rain Program and the regulations implementing the phase-out of ozone-depleting substances, however, actually limited the mass of permitted pollution. The CFC regulations limited the tons of substances produced per year. The Acid Rain Program limits tons of sulfur dioxide emitted per year.

This distinction between rate-based and mass-based limits matters a lot to the effectiveness of regulation and its economic dynamic. A rate-based regulation does not limit the total amount of pollution that a source may discharge. If a company's activity levels increase, so will its pollution. On the other hand, a mass-based regulation limits the actual quantity of pollution allowed. If a company wishes to increase its production, it must reduce its emissions rate so as to meet the mass-based requirement. This means that mass-based limits provide a built in economic dynamic for innovation that rate-based limits lack. A company wishing to produce more of a product to meet rising demand must find ways to obtain further pollution reductions in order to meet a mass-based cap.

This difference matters in the emissions trading context as well. A company subject to a rate-based limit need not purchase credits when its activity levels increase in a trading program based on emission rates. Under a mass-based emissions trading program, such as the Acid Rain Program, companies that wish to increase their activity levels must, at some point, either make additional reductions or purchase additional reduction credits. This means that more of an incentive exists for technological innovation and, thus, for environmental improvement — to meet the demands of expanding markets and society's needs for protecting the environment and public health, rather than for increasingly assaulting the environment as economic activity increases.

We live in a dynamic, changing world, a world ill-suited to static analytical frameworks. Our way of thinking about environmental law and policy must change to meet the demands of that world. We need to pay more attention to the question of how to make environmental law a source of demand for environmental innovation, and less attention to hypothetical concepts of efficiency. Regulators must see themselves not as balancers of costs and benefits, but as catalysts for change. •



Economic dynamics can spur innovation through the use of mass-based pollution limits. Unlike under most regulations, which limit the rate of pollution, firms increasing production would be forced to innovate to remain in compliance.