The Feasibility Principle

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Introduction

Advocates of cost-benefit analysis (CBA) frequently claim that rational regulation requires CBA and suggest that all other ways of setting standards are irrational. The Center for Progressive Regulation (CPR) believes that several competing approaches to standard setting are rational, and ethically superior to CBA. CPR's rationality series explains why these alternatives offer rational approaches to limiting pollution.

Executive Summary

This paper explains the feasibility principle, which undergirds many statutory provisions found in environmental statutes. The feasibility principle generally demands the most stringent standards feasible to protect people from potentially serious health effects and environmental harms. The concept of feasibility, however, discourages regulations producing widespread plant shutdowns. Because stringent standards that do not produce plant shutdowns frequently generate jobs — jobs in engineering, installing, and operating pollution control technologies or new processes — the feasibility principle may help explain why environmental standards have generated a small net increase in employment. While corporations and the think tanks they fund frequently claim that environmental regulation destroys jobs, economic studies of regulation's impact reveal that on balance, environmental standards have had a positive impact on employment. Certainly, environmental standards have not generated widespread layoffs, as mergers and acquisitions have.

The combination of strict environmental protection with acceptance of some restraint to avoid widespread shutdowns makes sense. These standards protect people from harms that can devastate individuals and their families. These harms include cancer, birth defects, and asthma (including cases requiring hospitalization). Many regulated pollutants can kill people, and just about all of them can produce illnesses that devastate afflicted individuals. Environmental harms often manifest themselves not as a cost spread nice and evenly among a large population, but as a devastating experience for the individual who suffers from cancer, the parent who cares for a child suffering from a serious birth defect, or the asthmatic child who cannot attend school because of difficulty breathing.

While pollution concentrates harms on selected individuals, companies usually can spread around the cost of stringent environmental protection or even avoid some or all of that cost through innovation. Even firms that fail to innovate shop around for the least costly contractor and equipment when they reduce pollution and usually manage to spend less than agencies predict on compliance.

Moreover, firms often have the ability to distribute the compliance cost they cannot avoid widely, so that it has minimal impacts on individuals. Firms generally prefer to pass compliance cost on to their customers in the form of price increases. Price increases, while sometimes inconvenient, rarely devastate individuals in the way that cancer or birth defects do. The cost of complying with environmental standards generally makes up a tiny percentage of industry profits, often less than 1 percent, so that firms often can pay to meet their environmental responsibilities with relatively little pain.

The feasibility principle conforms more closely to ethical precepts than a cost-benefit approach. Firms

have a responsibility to avoid seriously harming people, just like individuals do. While the feasibility principle does not require that all pollution associated with potentially serious harm cease, it does demand that firms engage in all feasible efforts to reduce pollution. It is demanding without being absolutist. It only allows pollution to the extent necessary to guard against very serious concentrated economic harms, such as the shutdown of an industry or a large number of plants.

By contrast, CBA-based approaches allow firms to kill and injure people if it would cost "too much" to refrain. And it allows high costs to justify killing, even when the cost of behaving ethically would have only minimal impacts on individuals.

The feasibility principle also encourages efficient and well-informed standard-setting. Implementing the feasibility principle requires a "feasibility analysis." This analysis informs government agencies of the projected cost of pollution control requirements. Government officials then must compare these costs to the economic capacity of the regulated industry to make sure that costs do not render an otherwise desirable requirement infeasible. This analysis, however, does not require agencies to quantify benefits, since it requires no comparison of costs to benefits. Feasibility analysis, however, follows detailed evaluation of science to make sure that the pollutants that feasibility-based standards address raise serious health and environmental concerns.

CBA, by contrast, requires an arcane and inefficient analytical process designed by industry to reduce government efficiency. It evaluates cost in precisely the same way that feasibility analysis does. But CBA also requires regulators to do the near impossible – i.e. put a dollar figure on the value of harms that a new standard could avoid. This requires the agency to engage in wide-ranging guesswork to estimate the number of deaths and illnesses a given standard would avoid. Even where strong scientific evidence exists that a pollutant causes serious harms, science rarely provides comprehensive enough data to allow reasonably good numerical estimates of harms. In the many cases where agencies cannot generate numbers, CBA-based approaches tend to ignore scientific evidence of harm. But CBA demands more of an agency than just quantifying frequently unquantifiable effects. It also requires it to assign a dollar value to harms like death and illness to facilitate comparisons of costs to benefits. In order to do this, agencies frequently must engage in quite controversial and often fantastic assumptions. The requirement that agencies make implausible assumptions in order to generate numbers from very limited data makes them easy targets for industry litigation resisting standards. The entire process of making and debating benefits estimates has proven so inefficient that industry has seized upon it as a means to stop regulation altogether.

Feasibility analysis offers a much more modest and sane approach. The feasibility principle, like any principle suffers from some problems. But it does offer a rational alternative to CBA.

I. The Feasibility Principle: A Description

CBA proponents often claim that the only available alternative to CBA is cost-blind environmental decision-making. Yet, nearly every provision in our modern environmental statutes requires consideration of cost, without authorizing CBA.[1] Cost-blind provisions, while important, are actually quite few and far between.

A. The Feasibility Principle's Meaning

Many of the provisions requiring consideration of cost are animated by the feasibility principle. The Supreme Court recognized that the feasibility principle requires consideration of cost without authorizing CBA in *American Textile Mfrs. Inst. v. Donovan*,[2] the cotton dust case. In that case, the Occupational Safety and Health Administration (OSHA) responded to evidence that textile workers breathing in cotton dust suffered from a lung ailment called byssinosis, which is called "brown lung disease" when sufficiently severe. Brown lung is a chronic and irreversible disease, similar to chronic bronchitis and emphysema. It can be severely disabling and can contribute to death from heart

failure. Some 1 in 12 cotton mill workers suffered from the most disabling form of byssinosis and some 25 percent suffered from at least some form of the disease. Thus, cotton dust concentrates harms, often severe harms, on a relatively discrete group of workers.

Union leaders sought a cotton standard limiting exposure to 100 micrograms per cubic meter of air (ug/m^3). Industry proposed a 500 ug/m^3 limit for yarn manufacturing. OSHA set the standard for yarn manufacturing at 200 ug/m^3, but relaxed the standard for other industry segments. It found that industry's proposed standard would leave many workers with byssinosis, and rejected it for yarn manufacturing. It rejected the union proposal, because the industry was not technically capable of achieving a 100 ug/m^3 level. It chose the 200 ug/m^3 level, because industry was capable of achieving it both economically and technologically.*

In that case, textile manufacturers argued that OSHA must ensure that the costs of standards for toxic pollutants in the workplace bear a reasonable relation to the benefits (in reduced numbers of deaths and illness) that they create. The Court rejected that argument. The Occupational Safety and Health Act requires OSHA to "set the standard which most adequately assures, to the extent feasible . . . that no employee will suffer material" health impairment. Accordingly, the Court concluded that OSHA should not balance costs and benefits, because Congress had already considered cost and decided to put the health and safety of workers above all other considerations, save that of feasibility.

The Cotton Dust Court defined feasibility in terms of what one is capable of doing. This implies that government agencies need not require the impossible. The feasibility principle authorizes government agencies to forego physically impossible environmental improvements, a technological constraint. The feasibility principle also embodies a cost constraint, a presumption against requirements so costly as to require widespread plant shutdowns. This principle led OSHA to reject the 100 ug/m^3 standard the labor unions had advocated in the Cotton Dust case. The cost and technology constraints together create a feasibility principle demanding those environmental and safety improvements that industry can make while continuing to produce goods for consumers. While the feasibility principle guards against widespread economic harm, it does not allow the inability of a few poorly managed firms to meet generally reasonable standards to limit the stringency of general rules governing an industry.

The feasibility principle does not consist wholly of constraints. The principle requires maximizing emission reductions and the associated saving of life, up to the point where plant closures begin to occur. This principle led OSHA to reject the 500 ug/m^3 alternative for yarn manufacturing in the regulatory decision generating the cotton dust case. This maximization principle generates significant improvements in environmental, health, and safety protections, because often a great deal can be done without forcing any plant closures. Many regulations adopted under the feasibility principle impose costs equaling a tiny fraction of the value of industry sales. The maximization principle demands that agencies seize opportunities to protect people from environmental hazards, when the cost of doing so does not threaten plant closures.

Many other statutory provisions embody a similar principle. For they contain language that suggests a desire to maximize environmental health and safety protection on the one hand, and to avoid infeasible measures on the other. For example, the Clean Air Act requires standards for hazardous air pollutants reflecting the "maximum . . .reductions. . . achievable."[3] This language suggests both maximizing protection from these pollutants, which are associated with cancer, birth defects, and other

* It promulgated a more relaxed standard of 750 ug/m^3 for slashing and weaving operations and 500 ug/m3 for all other industry segments, largely because of limitations of technological and economic feasibility in those segments.

serious ailments, and limiting stringency to what is "achievable" i.e. what is feasible. The Clean Water Act requires the effluent reduction achievable with the "best available technology," language suggesting the lowest rate that can be achieved.[4] Similarly, regulation of new sources under the Clean Air Act demands the "lowest achievable emission rate," the "best available control technology," and the standard reflecting the "best system of emission reduction" considering cost and other factors.[5] The feasibility principle animates numerous statutory provisions.

The feasibility principle can aid agencies in figuring out what it means to require the "lowest" emissions rate, the "best technology" while still making sure that the limits are "achievable." The agency can interpret these phrases as embodying the feasibility principle. The combination of a requirement to consider cost and to maximize "feasible" or "achievable" reductions may yield the feasibility principle.

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In fact, the courts have interpreted the best available technology standards and the feasibility principle similarly, in saying, based largely on legislative history, that both allow standards to be set that might force some marginal plants to close.[6] The implication of a feasibility or availability limit, however, must embody at least a presumption against shutting down an industry.[7] And, in fact, the implementing agencies have not promulgated standards causing widespread shutdowns under these provisions.

The Supreme Court recently recognized that the best available control technology requirement for new sources in the Clean Air Act does require some maximization of reductions bounded by a facility's economic and technical capabilities. This focus on a single facility's capabilities is not appropriate for rules establishing industry-wide standards, but can apply to decisions to set a facility-specific standard. The relevant case, *Alaska Department of Environmental Conservation v. EPA*,[8] arose from the Teck Cominco Alaska, Inc. (Cominco) effort to obtain a permit authorizing an expansion of its zinc mine, which would increase nitrogen oxide emissions by more than 40 tons a year. A dispute developed when the Alaska Department of Environmental Conservation (Alaska) authorized Cominco to use low NOx burner technology, a technology capable of realizing a 30-percent reduction in emissions per unit, in the face of an EPA order stopping construction of the expansion on the grounds that Cominco should use selective catalytic reduction, capable of realizing a 90-percent reduction per unit. The Court upheld EPA's order. Alaska relied on the "disproportionate cost" of selective catalytic reduction, thus adopting a position similar to that of the textile manufacturers in the cotton dust case. EPA, like OSHA in the Cotton Dust case, argued that the stricter standard should be adopted, because it was "economically feasible." The Court recognized that words like "best" and "maximum" in the statute constrain the permitting authority's discretion to forego stringent standards. And it upheld EPA's decision, since no record evidence disclosed any negative economic impact on the facility's "operation . . . and competitiveness."

While the feasibility principle's requirement to maximize emission reductions applies fully to cases like Cominco, the principle of avoiding widespread plant shutdowns does not appear to work in this context of individualized standard setting. In this setting, the principle embodies a presumption against requirements that would prevent a project from going

forward altogether. But this presumption might be overcome, if putting competitors on an equal footing from the standpoint of pollution control required imposition of costs too great for a marginal project. This would be consistent with the approach used for industry-wide standard setting.

While the feasibility principle aids interpretation of a wide range of statutory provisions, CPR does not claim that existing statutes make this principle the sole relevant consideration in all cases using maximizing language. For example, the provision requiring maximum achievable emission reductions from major sources of hazardous air pollution authorizes EPA to consider non-air environmental and health impacts.[9] Surely, EPA could forego maximization of stringency when pursuit of maximum air pollution reductions causes serious increases in water pollution under this statutory provision. Nevertheless, using the feasibility principle as a strong presumption would improve the coherence of environmental law and would be consistent with the various nuances found in the widely varying statutory provisions that it should inform.

The feasibility principle, however, does not govern all technology-based standard setting, even presumptively. Many statutory provisions embody the cost and technology constraints, but not the maximization principle. These statutory provisions avoid use of superlatives like "best" and "maximum" in favor of calls for "reasonably" available technology. While these provisions offer much less clarity than the feasibility principles, they make sense when put in context. Most of these provisions govern standard setting as a first step before fully implementing provisions governed, at least in part, by the feasibility principle. So, for example, the Clean Air Act requires reasonably available control technology,[10] but contemplates that pollution sources will eventually have to modernize to keep operating, thus becoming subject to stricter new source standards. Congress originally established best practicable control technology standards under the Clean Water Act as a first step prior to promulgating more demanding best available technology standards, where the feasibility principle would provide useful guidance.[11] It makes sense to afford the agency wide discretion to balance a lot of factors, as these laxer standard setting provisions do, when this is just a first cut toward meeting a more sharply defined goal. While the feasibility principle does not apply to these first step provisions, it typically should apply to many second phase statutory provisions.

Proponents of CBA often confuse feasibility criteria for standard-setting with "command and control" regulation. Command and control regulation suffers from a very poor reputation as overly rigid and costly. But the feasibility principle can come into play whether or not the regulation promulgated pursuant to the principal commands application of a particular pollution reduction technique. Historically, the feasibility principle has most often led to performance standards- requirements to meet a particular pollution reduction target.[12] These performance standards offer some flexibility in choosing technological options, unlike true command and control regulations that dictate the choice of technology. Regulators sometimes require use of specific techniques when it is not possible to monitor performance.[13] But this sort of requirement is a consequence of the inability to monitor, not the choice of criterion for determining stringency. The feasibility principle offers a criterion for establishing the stringency of requirements, but does not require any particular implementation mechanism.[14]

Indeed, some states have applied technology-based standard setting to establish the pollution limits that govern pollution trading programs.[15] Pollution trading programs allow polluters to avoid compliance with pollution reduction requirements if they purchase equivalent reductions from polluters who have gone beyond compliance. Trading programs reduce the cost of pollution control and improve flexibility by allowing polluters to trade their reduction obligations among themselves. Pollution trading programs, however, begin with regulators establishing requirements for the amounts of reduction the program will demand.[16] If regulators are going to consider the cost of reductions as part of the process of establishing these basic requirements, then they must consider technological capabilities. The

feasibility principle provides a rational principle for bounding the maximum and minimum stringency, even though trading should justify more stringent regulation than would be feasible without it (because of the reduced cost from trading). In short, the feasibility principle can be used as part of an emissions trading program.

Similarly, feasibility criteria can, in principle, be used to establish a pollution tax. Economists generally favor taxing pollution, charging a fee for each pound of pollution emitted. One of the earliest proposals to establish a pollution tax suggested precisely this approach.[17] Government officials can decide to set the tax at a level that maximizes the incentives for reductions, but avoid setting it so high as to drive an industry out of business, employing a feasibility test to aid in the establishment of an appropriate tax rate. Hence, the adoption of the feasibility principle does not involve a commitment to any particular point of view about the use of economic incentives or any other question of regulatory form.

Conversely, CBA can be used to write a command and control regulation. One can employ a CBA and then require implementation of the technology that generates the cost-benefit ratio favored by the regulator. Hence, the choice of the test for establishing the stringency of standards or fees is a wholly separate issue from the choice of mechanisms to meet agreed upon standards. The feasibility principle and command and control regulation are not one and the same.

B. Feasibility Analysis

Advocates of CBA often claim that CBA improves the "rationality" of regulation. In defending this idea, they often write as if the alternative to cost-benefit analysis is no analysis at all. But all standard-setting criteria generate analysis, and the feasibility principle is no exception. While the feasibility principle provides agencies with a meaningful goal, i.e. to write standards maximizing reductions without generating widespread plant closures, implementing that goal requires analysis.

The feasibility principle should lead agencies to engage in feasibility analysis. Feasibility analysis begins with the identification of the capabilities of technological approaches to reducing pollution. These technological options need not be limited to end-of-the pipe controls, but can include efforts at pollution prevention. The feasibility analysis analyzes the question of how much reduction the technologies can deliver. Agencies must, however, go on to estimate the cost polluters will incur to employ the technologies an agency is considering. This evaluation of the cost and capabilities of technology is basically identical to the evaluation of cost that occurs under CBA. In order to correlate costs and benefits, agencies must evaluate the costs associated with particular levels of pollution reduction. Those costs will equal the cost incurred to employ a technology reducing pollution. Hence, CBA and feasibility analysis share a need to evaluate the costs and capabilities of technology. This is an important point, for CBA proponents often write as if the CBA somehow magically freed agencies from the need to evaluate technological capabilities.

Feasibility analysis, however, differs from CBA in what agencies do with these cost estimates. Determining whether a reduction is feasible requires a comparison between the cost of pollution control and the economic capabilities of the industry that that would pay the cost. In other words, regulators implementing the feasibility principle should compare costs to net earnings and the value of corporate assets, rather than to the "benefits" of regulation.[18] The goal of this comparison is to avoid costly controls that would lead to widespread plant shutdowns, while maximizing reductions until that point is reached. Thus, the feasibility principle requires analysis, but this analysis involves analyzing the feasibility of various regulatory options, not a comparison of costs to benefits.

C. The Feasibility Principle's Advantages

The feasibility principle has proven successful in practice.[19] It has accounted for significant reductions in pollution under the statutes that use similar principles. These reductions have made the water

cleaner and the air safer to breathe. It has also done so without causing huge hardships.

The feasibility principle may help explain why environmental law has generated a small increase in net employment,[20] not a decrease as some advocates of CBA suggest. Feasibility-based requirements usually increase employment by forcing polluters to hire or contract with people to install pollution control equipment or implement environmentally desirable process changes.[21] Since the cost and technological constraints disfavor widespread plant shutdowns, the costs of meeting these requirements have not had significant negative impacts on employment.

The principle of maximizing reduction on the one hand while constraining regulation to avoid widespread plant closures on the other involves a reasonable approach to handling the distribution of costs and benefits. Most environmental problems create concentrated harms that seriously affect randomly selected individuals. For example, a carcinogenic pollutant creates a risk that a few of the people exposed to it will contract the disease, rather than all of them. Those few people, however, will suffer immensely and may die. Health is not like most goods, which are nice to have, but unessential. Illness fundamentally threatens the capacity of afflicted individuals to lead enjoyable and productive lives. The key factor justifying stringent environmental protection, therefore, is not so much the magnitude of harm, but the nature of the harm and its distribution. While this concentration feature justifies stringent regulation for risks of serious harms, the distributional problems are magnified by the concentration of multiple high pollution facilities in some communities, frequently communities of people of color.

The principle of maximizing reduction on the one hand while constraining regulation to avoid widespread plant closures on the other involves a reasonable approach to handling the distribution of costs and benefits. Most environmental problems create concentrated harms that seriously affect randomly selected individuals.

Normally, however, imposition of cost upon regulated industry does not concentrate harms upon individuals. Especially when regulations are strict, industry has an incentive to innovate to avoid some or all of the cost. Because most feasibility-based standards specify a level of reduction that must be achieved, rather than requiring that operators use the technologies the agency evaluates in setting standards, innovation remains a viable option. Many companies, for example, responded to stringent regulation of exposure to toxic pollution in the work place by changing processes in ways unanticipated by government regulators.[22] After the Supreme Court upheld OSHA's cotton dust standard, many textile manufacturers met the standards by modernizing their equipment, rather than employing the techniques OSHA had evaluated in setting its exposure limits.[23] This modernization improved the industry's competitive position. Innovation often reduces compliance cost and sometimes improves the competitive positions of firms making the innovations as well.

Even when costs remain high in spite of the incentive stringent regulations create to innovate, polluters often distribute added cost as widely as possible. Industry prefers to pass increased cost on to their customers in the form of increased prices. If that is not possible, many industries can absorb the cost without hardship, since the cost constraint and political realities prevent agencies from imposing regulations shutting down numerous plants under feasibility-based statutory provisions.

Such widely distributed cost does not have a major impact on people's lives. A very large cost generating small price increases among a large number of customers will generally not devastate the lives of individuals; it constitutes a nuisance, not a catastrophe. Thus a large cost may generate minimal impacts. For example, a regulation costing industry $100 million a year might appear quite costly, because most of us think in terms of individual incomes and therefore regard $100 million as an enormous sum of money. But a regulation costing $100 million a year may distribute that cost among hundreds or even thousands of regulated firms. Each of those firms may distribute the costs among thousands of customers. One hundred million paying an extra dollar a year for electricity simply does not constitute a catastrophe that would justify allowing people to die from cancer, suffer from birth defects, or find themselves unable to breathe on a summer's day.

Nevertheless, the feasibility principle does constrain regulation when costs concentrate themselves in ways that can devastate individuals. When costs might lead to widespread plant shutdowns, workers can lose their jobs. Job loss can have a devastating impact on the affected workers, especially if the economy does not generate a reasonably good substitute job. While regulations shutting down plants can sometimes trigger demand shifts increasing net employment, such regulations still can impose serious individual hardships. The cost and technological constraints found in the feasibility principle may be justified on the theory that unemployment can prove debilitating in a way that is at least roughly comparable to a serious health impact. The risk of unemployment proving debilitating for some of the people experiencing this setback may justify avoiding widespread plant closures.

While opponents of environmental regulation often posit that environmental regulation can produce layoffs, this is unlikely, except when costs exceed the economic capacity of an industry and therefore seem likely to produce shutdowns of facilities. As mentioned previously the direct impact of cost increases for environmental protection usually involves hiring more people, not firing workers. If a company remains in business, firing workers and thus reducing cost is usually a constant goal of many companies, regardless of environmental regulation. But cutting workers that would not be cut anyway for efficiency reasons only makes sense if a company cuts back production. Cutting production involves a decrease in the earnings stream that can support mostly fixed environmental expenditures. Hence, it's unlikely that environmental regulation will motivate production cutbacks generating layoffs. While in principle a perfect analysis would consider the possibility of non-shutdown related layoffs, in practice, such an analysis would likely prove very subjective, difficult, and inaccurate.

This does not mean that the feasibility principle is the only possible rational approach to addressing the distribution of costs and benefits. But surely it is a rational approach.

More widespread adoption of the feasibility principle could address another problem sometimes associated with "command and control" regulation, differentials between the regulation of existing and new sources. Some statutes impose much stricter burdens on new sources than old, because of the high costs of retrofitting older sources. This has given rise to concerns that the differential might discourage modernization and environmental improvement. More widespread use of the feasibility principle, which already plays a large role in the regulation of new sources, would help correct the differential and improve environmental protection.

In general, the feasibility approach constrains agencies by both maximizing reductions and constraining agencies to avoid widespread plant shutdowns. These constraints employ a feasibility analysis, which considers cost, but does not compare cost to benefits. Instead, feasibility analysis should compare cost to an industry's economic capabilities. The feasibility principle provides a rational approach to key distributional issues. And its adoption does not imply any particular position on the issue of using economic incentives as a means for meeting environmental goals.

II. Cost-Benefit Analysis

Because of the feasibility principle's success in reducing pollution, regulated companies have long supported greater reliance on CBA as a means of setting regulatory standards. They understand that CBA offers significant potential for slowing, weakening, and sometimes halting efforts to make them clean up their messes.

Some scholars and lawmakers have joined in supporting CBA. Some supporters view CBA as a rationalizing reform, as a useful pragmatic tool for setting standards. These supporters, however, have not carefully compared CBA to other available cost sensitive principles, like the feasibility principle. Instead, they have assumed that CBA must make environmental regulation more rational, because the alternative is irrational chaos. Given the complexity of environmental law, this view is understandable. But the discussion of the feasibility principle offered above shows that alternative rational principles for standard setting are available. These supporters of CBA have failed to show why CBA is preferable to realistic alternatives, such as the feasibility principle.

This part lays the groundwork for some comparison by describing CBA and recounting its history. CBA involves the quantification of costs and benefits. As explained above, cost estimation for CBA does not differ significantly from the analysis of cost undertaken in a feasibility analysis. In order to estimate costs and set the stage for choosing a standard (or imposing a tax), an agency conducting CBA must consider the capabilities of technology and the cost of employing available technology, just as in a feasibility analysis.

CBA differs from feasibility analysis in requiring the quantification of regulatory benefits in dollar terms and a comparison of costs to those benefits.* For purposes of CBA, the harms that regulation stops constitute benefits. This means that standard setting under CBA requires the quantification of benefits such as saved human lives, avoided illnesses, and preserved environmental amenities in dollar terms.

For many important health and environmental effects, quantification is simply impossible.[24] Methods just do not exist to estimate the number of birth defects that pollutants cause, for example, even though scientists agree that this is a serious cause for concern. While CBA proponents recognize this and urge that non-quantified benefits be considered, in practice decision-makers often ignore non-quantifiable benefits when making decisions, even though they are potentially serious.[25]

We have some techniques for making quantitative estimates of certain health endpoints, like cancer. Usually, however, we have too little data to provide a sufficiently reliable estimate to help much in standard setting. For many chemicals, we have no testing data at all. For others, we typically have some test data from animal experiments. Because we cannot test enough individual animals to mimic the effects of exposing large human populations to ubiquitous hazardous substances, scientists usually expose relatively small groups of animals to high doses of the subject chemical. Estimating the number of cancers that widespread exposure to relatively low doses of carcinogens causes in humans requires extrapolation from these high dose animal experiments. Since we do not fully understand how cancer works in human beings, we do not know what assumptions to adopt to make this interspecies comparison. Even when we

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* Best practicable technology (BPT) effluent limits under the Clean Water Act requires a third form of analysis, marginal cost effectiveness analysis. While the statute requires EPA to determine that costs are not disproportionate to benefits, the courts have construed the benefits assessment requirement narrowly in accordance with the underlying legislative history. Ass'n of Pac. Fisheries v. EPA, 615 F.2d 794, 805 (9th Cir. 1980). Because quantifying the benefits in dollar terms is usually close to impossible for national water pollution regulations, Congress did not expect monetization. Hence, EPA analyzes the dollars of compliance expenditure per pound of effluent reduction. This marginal cost effectiveness analysis should not be confused with CBA, which requires monetization. Nor should it be seen as particularly helpful in implementing the feasibility principle, which arguably does not apply to BPT standards.

have data about human health effects from epidemiological studies (which look at the health of humans exposed to pollution) we often encounter similar problems. Typically, good epidemiological data comes from accidents that expose a small group of people to an abnormally high dose of a chemical. Extrapolation from this data to low dose exposure of a very large population requires guesswork about how the number of cancer cases will vary as exposure declines. As a result, the numbers of cancer cases depend on the selection of models for making these extrapolations, not actual data about pollution. The National Academy of Science has recommended using benefit ranges to deal with this problem.[26] When risk assessment is done honestly with the range of possible benefits estimates identified the range is usually too huge to effectively guide standard setting.[27]

Benefits estimation, however, requires more than problematic quantitative risk assessment. It requires that a bureaucrat assign a dollar value to human life, illnesses, and various ecological consequences. This is quite questionable morally. If you asked somebody how much you must pay to kill her with a toxic substance, she would probably say that her life is not for sale. It also requires many quite questionable assumptions. The additional step of quantifying benefits that CBA demands makes the technique quite controversial and difficult to use. CBA is much more complicated than feasibility analysis, because it involves all of the steps used for feasibility analysis plus the extraordinarily problematic step of quantifying benefits.

Historically, CBA has thoroughly paralyzed the few regulatory programs that relied upon a cost-benefit test. After a Court rejected a ban on asbestos,[28] one of the most obvious hazards EPA has ever regulated, largely because of difficult judgment calls in its CBA, EPA never again used its authority to regulate toxic chemicals under section 6 of the Toxic Substances Control Act. Likewise, a cost-benefit test thoroughly stymied pesticide regulations under the provision imposing the test.[29]

Despite (or, in some cases, because of), this record of failure, support for CBA has grown in many circles. A series of Executive Orders beginning the Reagan administration and continuing through the Clinton Administration have required its use in conjunction with most major rulemakings. Congress, which had initially been very skeptical of CBA, codified these orders in the Unfunded Mandates Act of 1995. The second Bush Administration claims to rely heavily on CBA in making environmental decisions.

CBA has made standard setting into a murky inter-agency negotiation under statutes that do not contain cost benefit tests, at least for major rules. Yet, the belief persists among some that CBA is a pragmatic rationalizing reform.

Under the Executive Orders, CBA functions as a supplement to other environmental laws, usually supplying an additional hoop an environmental regulation must jump through to get adopted. Thus, for example, agencies now commonly conduct CBA as they choose standards that are legally governed by variants upon the feasibility principle. While legally, the agencies may not apply a cost-benefit test in setting feasibility-based standards, in practice agencies must conduct a CBA and receive approval from the Office of Management and Budget (OMB) for major rules. Since the executive orders charge OMB with implementing the executive orders, agencies often weaken their rules to satisfy objections from OMB, some of which are based upon the demand for CBA.

Thus, CBA has produced two kinds of results. It has paralyzed implementation of statutory provisions employing cost-benefit tests. It has made standard setting into a murky inter-agency negotiation under statutes that do not contain cost benefit tests, at least

for major rules. Yet, the belief persists among some that CBA is a pragmatic rationalizing reform. A comparison between CBA and the feasibility principle shows that this position is not correct.

III. Feasibility v. CBA

While the feasibility principle has proven much more effective than CBA in protecting the environment, one might ask whether CBA offers some advantages in advancing rationality and democratic values. It turns out that the feasibility principle fares relatively well on these grounds as well.

The feasibility principle advances democratic values. It represents a considered Congressional judgment about how to address the distribution of costs. It reconciles important value choices, emphasizing, quite understandably, the importance of health and environmental protection, while seeking avoidance of serious economic catastrophes for potentially vulnerable workers. While elected officials have their foibles, their livelihoods depend on their understanding of their constituents' values and desires. And the feasibility principle takes into account factors most people find important.

By contrast, advocates of CBA often state that unelected bureaucrats should consider CBA. This "indeterminate position" seems to envision administrative agencies considering all conceivable relevant factors, and just doing whatever they think is wise. Important value choices under such an approach are transferred from elected officials to unelected officials at OMB and other bureaucracies.

Sometimes, however, cost-benefit proponents advocate a principle that costs should not exceed benefits. This principle acts as one-way ratchet that sometimes stands still, but can move in only one direction. Its principal function is to justify rejection of some regulations. While the rule that costs should not exceed benefits sometimes has no influence, allowing some regulations justified on other grounds to remain in place, it never pushes regulators to adopt more stringent standards. When the rule has any effect at all upon stringency, it makes standards weaker. Worse, advocates often suggest that unelected bureaucrats or judges should adopt this principle, even though Congress has so far rejected legislation that would adopt similar tests. This seems profoundly anti-democratic.

Some advocates of CBA like it precisely because of its anti-democratic nature. They view the public as frequently hysterical and regard CBA as a check on efforts to stringently regulate trivial risks.

The more thoughtful advocates of CBA recognize that distributional considerations matter, and therefore recommend that agencies be allowed to write regulations with costs exceeding benefits when distributional consequences justify this result.[30] But they have not specified when these distributional considerations should trump. It seems more democratic for elected officials to decide this question than to leave it in the hands of bureaucrats. The feasibility principle represents a legislative decision about precisely this issue.

Some advocates of CBA like it precisely because of its anti-democratic nature. They view the public as frequently hysterical and regard CBA as a check on efforts to stringently regulate trivial risks.[31]

But most regulatory debates involve several reasonably plausible views, not just hysteria. People who fear cancer, for example, are not irrational. They know that cancer causes enormous suffering and death and want vigorous efforts taken to limit their risks of contracting the disease. Experts disagree about how important a role pollution plays in causing cancer, because of huge data gaps. When data is sparse, it's understandable that reasonable people

might differ substantially on the appropriate degree of response.

While hysteria does not play as strong a role in regulatory affairs as CBA proponents suggest, it is important to note that the existing system without CBA contains technocratic means of avoiding baseless regulation. Existing statutes only regulate pollutants that regulators have determined pose potentially serious risks.[32] Government officials listing pollutants act knowing that they have limited resources to combat environmental and health problems. They want to target the most serious risks, and spare themselves the trouble and embarrassment of regulating things that do not matter. Furthermore, regulatory targets put substantial pressure on them not to regulate their pollutants. The statutes also contain delisting mechanisms that allow regulators to stop regulating pollutants that turn out to pose no risk.[33] Thus, the feasibility principle works in a world that contains substantial technocratic checks on public hysteria, even without CBA.

The feasibility principle can make regulatory decisions reasonably transparent. Feasibility analysis can help make the reasons for feasibility decisions clear. In practice, however, administrative translation of any criterion into a numerical standard will be less than wholly transparent. It's very difficult to fully explain some of the choices involved.

The layering of CBA on top of the feasibility principle, however, largely defeats transparency. It becomes very difficult to determine precisely why an agency adopted a decision when its decision involves a negotiated solution between bureaucracies following two different mandates.

In principle, disclosure of any analysis that matches the criteria governing a decision should aid transparency somewhat. Thus CBA would aid the transparency of a decision based on a cost-benefit criterion. But in another respect, CBA hinders transparency. The benefits estimates in CBA appear as facts. But they are not facts; they are quite subjective extrapolations from facts. Thus, CBA can only be transparent if the assumptions underlying it are fully revealed and debated. While both CBA and feasibility analysis can aid transparency, feasibility analysis makes that transparency easier to achieve, just because of its relative simplicity.

CBA also enhances special interest influence over decisions. CBA and feasibility analysis share a problem in having to rely on industry cost estimates to price technology. But CBA requires the quantification of benefits as well. Because this exercise is so complex, subjective, and highly technocratic, parties with superior resources have greater influence upon benefits estimates than the general public. This means that industry has a greater advantage in influencing CBA than in influencing feasibility analysis. Also, the delays inherent in using such a complex process advantage regulated polluters over the public. Delays expose people to additional years of health hazards while reducing industry costs.

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The feasibility principle applies meaningful constraints upon agency decision-making. If interpreted properly, it would constrain both maximum and minimum stringency. It would rule out a lot of options. For example, it should rule out lax standards when stricter standards could be met without plant closures. It also rules out shutting down an industry. On the other hand, it does leave an area open for administrative discretion. Agencies have some latitude to decide how many plant closures constitute "widespread" shutdowns which should be avoided. In practice, however, the feasibility principle has produced more consistent decision-

making than one might imagine. Many regulations adopted under federal feasibility-based statutory provisions shut down no plants, because available pollution control options are often very cheap compared to other costs that plants routinely deal with, such as labor, materials, and transportation.[34] In most court cases mentioning plant closures, the agency writing the standards estimated the number of plant closures at 3 percent of an industry or less.[35] While few or no closures have been the norm, EPA expected a couple of its most stringent feasibility regulations for exceptionally dirty industry to close up to 14 percent of an industry group.[36] One must take these numbers with a grain of salt, however, as EPA has regularly overestimated pollution control costs, because it typically relies on industry for cost data in regulatory proceedings and industries frequently innovate in unanticipated ways to avoid really threatening cost burdens.[37] But the main point is that the feasibility principle can place meaningful constraints on agencies, reducing ad hoc decision-making.

Perhaps the most bizarre claim that cost-benefit proponents make involves CBA's potential to reduce ad hoc decision-making. Many cost-benefit advocates see CBA as a species of comprehensive rationality. Instead of implementing a fairly narrow Congressional mandate, they see CBA as a means of allowing agencies to consider all potentially relevant factors, including all costs, all benefits, and facts about their distribution. Of course, telling an agency to consider everything does nothing to reduce the ad hoc nature of agency decision-making. It makes the possibilities infinite.

A cost-benefit criterion (as opposed to cost-benefit analysis by itself) has some potential to limit discretion. But the most frequently mentioned criterion, that costs should not exceed benefits, does less to constrain agencies than the feasibility principle does. For the criterion that costs should not exceed benefits, at least in theory, limits stringency, but does nothing to require some degree of minimum stringency. More liberal criteria, such as the principle that costs should not grossly exceed benefits or that costs should not exceed benefits unless a special justification is offered provide even less constraint on stringency, and still do nothing to assure some minimum degree of environmental protection. By contrast, the feasibility principle bounds discretion on both ends.

While it is possible to develop a cost-benefit criterion that appears to bound discretion on both ends, that appearance would prove illusory. Because the analysis is so dependent on methodological choices about how to value benefits, political actors can easily manipulate results by changing assumptions in either the risk assessment or in the economic methods used to put dollar values on the identified risks. In practice, CBA often functions as a vehicle for economists from conservative think tanks to advocate junk science.[38]

Finally, CBA proponents argue that CBA helps rationalize priority setting. This argument involves some fundamental misunderstandings of CBA's role. CBA often aids industry in limiting the stringency of environmental standards. When an industry gets a weaker standard because of OMB intervention based on CBA, no mechanism exists to channel the cost savings to a more worthy priority.[39] So CBA adjusts the stringency of regulation, rather than influencing priority setting.[40] It does not influence the order in which regulations are promulgated or the selection of items for regulation.

If one imagines that decisions about the stringency of regulation amount to priority setting, then this still does not establish CBA's superiority as a priority setting mechanism. A cost-benefit test presumably gives priority to regulations with favorable cost-benefit ratios (by allowing them) over regulations with unfavorable ratios (which it strangles). The feasibility principle gives priority to feasible regulations while disfavoring regulations causing hardship through widespread plant closures. It's perfectly rational to prefer the feasible over the infeasible.

Advocates of CBA have argued that CBA enhances rationality by allowing consideration of everything, while arguing, paradoxically, that CBA

somehow constrains agencies and minimizes ad hoc decision-making. They also argue that it somehow enhances democracy while countervailing people's desire for environmental protection. They argue that it minimizes special interest influence, a position belied by history. In fact, special interests and the think tanks they fund have been the most consistent and dedicated advocates of CBA. And they argue that a test that acts as a one-way ratchet weakening regulation improves priority setting. None of this makes much sense.

By contrast, the feasibility principle offers a reasonable democratic choice about how to address costs and benefits. It provides balance without pretending that value choices can be eliminated or avoided through dubious and extremely difficult quantification procedures. It meets people's demands for environmental protection in a reasonable balanced way. And it does not maximize special interest influence as CBA does. It offers a rational alternative to CBA.

No procedure functions perfectly in the real world. In practice the enormous political pressures on government officials tend to limit their adherence to any coherent principle. But if we wish to engage in rationalizing reform, an effort to get agencies to hew more closely to the feasibility principle than they do now offers a far more promising avenue for reform than to emphasize quantification of frequently non-quantifiable benefits as a substitute for a coherent principle that really grapples with the values people find important.

Conclusion

The feasibility principle offers a rational alternative to CBA. It offers balance without dubious numerology. And it responds in an appropriate way to the really important concerns involved in environmental protection, the problem of concentrated harms.

About the Author

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End Notes

1. *See* Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 U. Penn. L. Rev. 1553, 1557 (2002) (development of environmental regulation has almost always involved the consideration of cost); Thomas O. McGarity, *Media-Quality, Technology, and Cost-Benefit Balancing Strategies for Health and Environmental Regulation*, 46 Law & Contemp. Probs. 159, 164 (1983) (cost is "invariably" a criterion used to set technology-based standards); Kennecott v. EPA, 780 F.2d 445, 456 (4th Cir. 1985) (Congress did not permit EPA to ignore cost and EPA carefully analyzed compliance cost in developing technology-based effluent limits).

2. 452 U.S. 490 (1981).

3. 42 U.S.C. § 7412(d)(2).

4. 33 U.S.C. § 1311(b)(2)(A).

5. 42 U.S.C. §§ 7411(a)(1), 7503(a)(2), 7475(a)(4).

6. Cong. Research Service, 93d Cong., 1st Sess., 1 A Legislative History of the Water Pollution Control Act Amendments of 1972 170 (EPA need not determine economic impact of a plant upon a single community or plant) (Comm. Print 1973); Ass'n of Pac. Fisheries v. EPA, 615 F.2d 794, 818 (9th Cir. 1980) (Congress contemplated the closure of some marginal plants under BAT standards); E.I. du Pont de Nemours & Co. v. Train, 430 U.S. 112, 127 n. 17 (1977) (effluent limitations under section 301(b) of the Clean Water Act may go beyond limits within an individual owner's economic capability); Industrial Union Dep't, AFL-CIO v. Hodgson, 499 F.2d 467, 478 (D.C. Cir. 1974) (Occupational Safety and Health Act does not "guarantee the existence of individual employers"); United Steelworkers of America v. Marshall, 647 F.2d 1189, 1272 (D.C. Cir. 1980) (showing of technological infeasibility for a few operators will not defeat a standard).

7. Because a polluter can always meet even a zero pollution standard by shutting down, it's possible to regard all pollution reductions as feasible. But that interpretation would render the feasibility constraint meaningless. Hence, a feasibility limitation must, at least presumptively, rejected shutting down an industry. *Accord* Portland Cement Ass'n v. Ruckelshaus, 486 F.2d 375, 388 (D.C. Cir. 1973) (directing EPA to consider whether its regulation "unduly precludes the supply of cement"); Industrial Union Dep't, AFL-CIO v. Hodgson, 499 F.2d 467, 478 (D.C. Cir. 1974) (Occupational Health and Safety Act does put employers out of business by requiring unavailable technology or destroying financial viability).

8. 124 S. Ct. 983, 999, 1002 n. 13 (2004).

9. 42 U.S.C. § 7412(d)(2).

10. *See* Natural Resources Defense Council v. Thomas, 805 F.2d 410 (D.C. Cir. 1986)

11. *See, e.g.*, Texas Oil and Gas Ass'n v. United States Environmental Protection Agency, 161 F.3d 923 (5th Cir. 1998).

12. *See* David M. Driesen, *Is Emissions Trading an Economic Incentive Program*, 55 Wash. & Lee L. Rev. 289, 297-301 (1998).

13. *See, e.g.*, 42 U.S.C. §§ 7411(h)(1), 7412(h).

14. *See* Driesen, *supra* note 12, at 299.

15. *See, e.g.*, Approval and Promulgation of Air Quality Implementation Plans, Maryland Reasonably Available Control Technology Requirements for Major Sources of Nitrogen Oxides, 64 Fed. Reg. 8034 (1999), *to be codified at* 40 C.F.R. part 52 (proposing approving of emissions trading as a mechanism for meeting reasonably available control technology limits).

16. *See* Driesen, *supra* note 12, at 324.

17. Sidney A. Shapiro & Thomas O. McGarity, *Not So Paradoxical: The Rationale for Technology-Based Regulation*, 1991 Duke L. J. 729, 745 n. 88.

18. *See* National Wildlife Federation v. EPA, 286 F.3d 554, 564 (D.C. Cir. 2002); (plant closures predicted when net earnings fall below the salvage value of a regulated mill).

19. Frank B. Cross, Environmentally Induced Cancer and the Law 90, 147 (1989) (feasibility regulation has proven the "most effective").

20. *See* Richard D. Morgenstern, William A. Pizer, and Jhih-Shyang Shih, *Jobs Versus the Environment: An Industry Level Perspective*, 43 J. Envt'l Econ. & Management 412 (2002); Eban Goodstein, The Trade-Off Myth: Fact and Fiction About Jobs and the Environment 171 (1999).

21. *See* Lisa Heinzerling & Frank Ackerman, *The Humbugs of the Anti-Regulatory Movement*, 87 Cornell L. Rev. 648, 669 (2002) (environmental regulation is big business employing people who make and install pollution control technology).

22. U.S. Congress, Office of Technology Assessment, Gauging Control Technology and Regulatory Impacts in

Occupational Safety and Health—An Appraisal of OSHA's Analytical Approach at 64, 89-90, 95 (1995); Nicholas A. Ashford et al., *Using Regulation to Change the Market for Innovation*, 9 Harv. Envt'l L. Rev. 419, 440-41 (1985). *See also* Ozone Depletion in the United States: Elements of Success (Elizabeth Cook, ed. 1996).

23. OTA, *supra* note 22,, at 90.

24. *See* Thomas O. McGarity, *A Cost-Benefit State*, 50 Admin. L. Rev. 7, 13 (1998) (discussing lack testing vehicles for many ecological or health risks); Ellen K. Silbergeld, *The Risks of Comparing Risk*, 3 N.Y.U. Envtl. L. J. 405, 413-14 (1995) (book review); *Regulatory Reform: Hearings Before the Senate Comm. On Government Affairs*, 104th Cong. 122 (1995) (statement of Linda Greer, Ph.D. Senior Scientist, Natural Resources Defense Council); Portland Cement Ass'n v. Ruckelshaus, 486 F.2d 375, 387 (D.C. Cir. 1973) (discussing the difficulty, if not impossibility, of quantifying the benefit to ambient conditions from New Source Performance Standards).

25. Frank A. Ackerman & Lisa Heinzerling, Priceless: Of Knowing the price of Everything and the Value of Nothing 207 (2004) (the Office of Management and Budget "gives the back of the hand to unqauntified values.").

26. National Research Council, Science and Judgment in Risk Assessment 12 (1994) (recommending disclosure of major sources of uncertainty and quantification of the degree of uncertainty in risk assessment).

27. Richard W. Parker, *Grading Government*, 70 U. Chi. L. Rev. 1345, 1411 (2003) (pointing out that the range of uncertainty frequently would "vitiate the relevance of numerical ranges.")

28. *See* Corrosion Proof Fittings v. EPA, 947 F.2d 1201 (5th Cir. 1991).

29. Thomas O. McGarity, *Professor Sunstein's Fuzzy Math*, 90 Geo. L. J. 2341, 2343 (2002) (CBA thoroughly stymied government action under TSCA and FIFRA).

30. *See, e.g.*, Cass R. Sunstein, *Constitutionalism After the New Deal*, 101 Harv. L. Rev. 420, 462 (1987) (recognition of goals of resource distribution should temper use of CBA); Richard H. Pildes & Cass R. Sunstein, *Reinventing the Regulatory State*, 62 U. Chi. L. Rev. 1, 46-47 (1995) (suggesting analytical techniques for taking distribution into account, but not discussing the normative theory of how and when distribution should matter); Matthew D. Adler & Eric A. Posner, *Rethinking Cost-Benefit Analysis*, 109 Yale L. J. 165, 168 (1999) (suggesting modification of costs and benefits to reflect the higher marginal value of dollars to the poor).

31. Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 Stan. L. Rev. 683, 753 (1999).

32. *See* David M. Driesen, *Getting Our Priorities Straight: One Strand of the Regulatory Reform Debate*, 31 Envt'l L. Rep. (Envt'l L. Inst.) 10003, 10006-10008 (2001) (describing the law governing listing of pollutants). *See, e.g.*, Ethyl Corp. v. EPA, 541 F.2d 1, 10 (D.C. Cir. 1976) (discussing agency examination of lead's health effects prior to regulation); Industrial Union Dep't, AFL-CIO v. American Petroleum Inst., 448 U.S. 607, 616-23 (1980) (plurality opinion) (discussing information found in OSHA's analysis of benzene's health effects prior to regulation).

33. *See, e.g.*, American Forest & Paper Ass'n v. EPA, 294 F.3d 113 (D.C. Cir. 2002) (litigating EPA action on a delisting petition under section 112 of the Clean Air Act).

34. *See, e.g.*, Cerro Copper Products Co. v. Ruckelshaus, 766 F.2d 1060, 1064-65 (7th Cir. 1985) (agency predicts no plant closures or job losses from requirements demanding 90-percent reduction in pollution); Kennecott v. EPA, 780 F.2d 445, 456-57 (4th Cir. 1985) (after "careful analysis" EPA concluded that compliance costs would close no plants); American Frozen Food Inst. v. Train, 539 F.2d 107, 139-40 (D.C. Cir. 1976) (predicting "no significant impact" upon frozen food industry, because it would probably raise prices to pass on costs of effluent controls); American Petroleum Inst. v. EPA, 661 F.2d 340, 356 (5th Cir. 1981) (finding of no significant impact reversed as insufficiently explained). *See also* American Dental Ass'n v. Martin, 984 F.2d 823, 825 (7th Cir. 1993) (Posner J.) ($813 million dollar a year rule is "clearly not enough to break the multi-hundred-billion-dollar a year healthcare industry"); National Greed and Feed Ass'n v. OSHA, 866 F.2d 717, 727 (5th Cir. 1989) (cost estimate of less than 1 percent of after tax profits, but with significantly higher costs for some industry segments); Forging Industry Ass'n v. Secretary of Labor, 773 F.2d 1436, 1442 (4th Cir. 1985) (cost of compliance equals less than .0148 percent of sales and .1932 percent of profits); Lignite Energy Council v. EPA, 198 F.3d 930, 933 (D.C. Cir. 1999) (New Source Performance Standards for utility and industrial boilers will only modestly increase electricity prices); United Steelworkers of America v. Marshall, 647 F.2d 1189, 1282 (D.C. Cir. 1980) (even if industry could not pass on costs in raised prices as predicted, cost would amount to roughly 2 percent of industry profits).

35. *See, e.g.*, National Wildlife Federation v. EPA, 286 F.3d 554, 564 (D.C. Cir. 2002) (EPA chose an option closing 2 plants over an option closing 4); American Pac. Fisheries, 615 F.2d 794, 808 (9th Cir. 1980) (28 out of 172 plants expected to close); Weyerhauser v. Costle, 590 F.2d 1011, 1047 (D.C. Cir. 1978) (agency projected that 8 out of 270 mills would close in another case); American Federation of Labor v. Brennan, 530 F.2d 109, 120 (3rd Cir. 1975) (Secretary of Labor rejects safety standard that would be impossible for 47 percent of all power press operators and would eliminate many presses because of cost); National Grain & Feed Ass'n v. OSHA, 858 F.2d 1019, 1040 (5th Cir. 1988) (standard predicted to cause 183 grain elevators to have "negative net income," but that represents less than 1 percent of the industry); Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177, 250 (5th Cir. 1989) (predicting that BAT limitations under Clean Water Act would close 14 percent of all indirect discharging chemical plants and reduce industry employment by 1.2 percent). *Cf.* American Iron & Steel Inst. v. v. EPA, 526 F.2d 1027, 1054 (3rd Cir. 1975) (agency projects a 14 percent closure rate for integrated steel plants, but claims that these plants are so marginal that they would likely close anyway even without regulation); Ford Motor Co. v. EPA, 718 F.2d 55, 58 (3rd Cir. 1983) (a worst case estimate that 56 out of 4700 integrated plants might close their in-house electroplating operations).

36. *See* American Paper Institute v. Train, 543 F.2d 328, 339 (D.C. Cir. 1976) (predicting closure of 7-10 out of 188 mills); American Iron & Steel Inst. v. v. EPA, 526 F.2d 1027, 1054 (3rd Cir. 1975) (agency projects a 14 percent closure rate for integrated steel plants, but claims that these plants are so marginal that they would likely close anyway even without regulation); Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177, 250 (5th Cir. 1989), *clarified on rehearing*, 885 F.2d 253 (predicting that BAT limitations under Clean Water Act would close 14 percent of all indirect discharging chemical plants and reduce industry employment by 1.2 percent).

37. *See* Thomas O. McGarity & Ruth Ruttenberg, *Counting the Cost of Health Safety and Environmental Regulation*, 80 Tex. L. Rev. 1997, 1998 (2002) (*ex ante* cost estimates have been higher than actual costs incurred, sometimes by orders of magnitude); Winston.Harrington, Richard D. Morgenstern, and Peter Nelson, *On the Accuracy of Regulatory Cost Estimates*, 19 J. Pol'y Analysis and Management 297 (2000).

38. *See* McGarity, *supra* note 30 (examining the estimation of the benefits of removing arsenic in drinking water in detail, and criticizing conservative think tank economists' unjustified scientific analysis).

39. *See* Driesen, *supra* note 32, at 10015-16 (2001); McGarity, *supra* note 25, at 34.

40. *See* Driesen, *supra* note 32, at 10014.

About the Center for Progressive Regulation

Founded in 2002, the Center for Progressive Regulation is a nonprofit research and educational organization of university-affiliated academics with expertise in the legal, economic, and scientific issues related to regulation of health, safety, and the environment. CPR supports regulatory action to protect health, safety, and the environment, and rejects the conservative view that government's only function is to increase the economic efficiency of private markets. Through research and commentary, CPR seeks to inform policy debates, critique anti-regulatory research, enhance public understanding of the issues, and open the regulatory process to public scrutiny. Direct media inquiries to Matthew Freeman at mfreeman@progressiveregulation.org. For general information, email info@progressiveregulation.org. Visit CPR's website at www.progressiveregulation.org. The Center for Progressive Regulation is grateful to the Deer Creek Foundation for its generous support of this project and CPR's work in general.

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