A Return to Common Sense:

Protecting Health, Safety, and the Environment Through 'Pragmatic Regulatory Impact Analysis'

By Rena Steinzor, Amy Sinden, and Sidney Shapiro, CPR Member Scholars, and James Goodwin, CPR Policy Analyst

CPR CENTER FOR PROGRESSIVE REFORM

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WHITE PAPER #909

October 2009

About the Center for Progressive Reform

Founded in 2002, the Center for Progressive Reform (CPR) is a 501(c)(3) nonprofit research and educational organization comprising a network of scholars across the nation dedicated to protecting health, safety, and the environment through analysis and commentary. CPR believes that sensible safeguards in these areas serve important shared values, including doing the best possible to prevent harm to people and the environment, distributing environmental harms and benefits fairly, and protecting the earth for future generations. CPR rejects the view that the economic efficiency of private markets should be the only value used to guide government action. Rather, CPR supports thoughtful government action and reform to advance the well-being of human life and the environment. Additionally, CPR believes that people play a crucial role in ensuring both private and public sector decisions that result in improved protection of consumers, public health and safety, and the environment. Accordingly, CPR supports ready public access to the courts, enhanced public participation, and improved public access to information. The Center for Progressive Reform is grateful to the Public Welfare Foundation for funding this report, as well as to the Bauman Foundation, the Deer Creek Foundation, and the Open Society Institute for their generous support of CPR's work in general.

This report is a collaborative effort of the following Member Scholars and staff of the Center for Progressive Reform: **Rena Steinzor**, University of Maryland School of Law; **Amy Sinden**, Temple University Beasley School of Law; **Sidney Shapiro**, Wake Forest University School of Law; and **James Goodwin**, CPR Policy Analyst.

For more information about the authors, see page 29.

www.progressivereform.org

For media inquiries contact Matthew Freeman at mfreeman@progressivereform.org

or Ben Somberg at bsomberg@progressivereform.org.

For general information, email info@progressivereform.org

Acknowledgments

The Center for Progressive Reform is grateful to the Public Welfare Foundation for its generous support of this project.

Printed in the U.S.A.

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Introduction

Health and safety regulations have a more powerful impact on the quality of life in America than any other affirmative decision the government makes, except perhaps decisions to go to war or pull in the social safety net. To a great extent, the purity of the food we eat and all the medicines we take, the quality of the air we breathe and the water we drink, the safety of industrial workplaces, and the preservation of the myriad natural systems that support life as we know it are dependent on how effectively government polices the side effects of manufacturing. Yet the process used to write those regulations is a mystery to the vast majority of Americans. Except in periods of crisis—when an outbreak of salmonella, a recalled medicine, or an explosion at a chemical plant stirs public outrage at federal, state, and local officials—only a few thousand people understand the gauntlet regulations must run before they take on the power of law. Like much of the Center for Progressive Reform's (CPR) work, this paper is an effort to pull back the opaque curtain that hides the regulatory process from public view. Over the years, Congress has passed and Presidents from both parties have signed into law a slew of statutes that are precautionary, seeking to *prevent* injury rather than *compensate* people after they are hurt. Congress has also funded a large workforce of scientists, engineers, lawyers, economists, and other technicians to write regulations that flesh out the crucial details of those big picture goals. Congress expects that the experts would collaborate with each other to develop these detailed rules, and to undertake the arduous and resource-intensive efforts to gather the relevant science, gauge the damage caused by industrial activities, understand the technology available to mitigate it, and weigh potential compliance costs that comprise most of the effort that individual agencies like the Food and Drug Administration FDA), the Consumer Product Safety Commission (CPSC), and the Environmental Protection Agency (EPA) put into rulemaking. These decisions are fundamentally "pragmatic," by which we mean that the agency experts make the best judgments they can, using the science and technology that is available and considering what solutions will be most acceptable to their various constituencies, from regulated industry executives to public interest organizations to their congressional overseers and the courts.

Because common industrial practices caused widespread harm and the statutes gave the agencies authority to require expensive changes to prevent those injuries, a backlash developed among American business, which in turn contributed (among many other factors) to the election of President Ronald Reagan. Among President Reagan's lasting policy reforms was the creation of an additional layer of regulatory impact analysis—cost-benefit analysis (CBA), driven not by collaboration among policy experts of different fields, but rather by agency economists, who are in turn overseen by the White House Office of Management and Budget (OMB). President Reagan implemented this reform by executive order, and subsequent presidents have done the same. Although their wording has changed over time, these orders have retained their central characteristics. The current version is Executive Order 12866, issued by President Clinton and continued by President George W. Bush.

Never approved by Congress, this new stage in the regulatory gauntlet in effect puts the economists at the White House in a position where they can demand changes in those health and safety rules that they dislike. The objective of imposing CBA over top of the agency's existing, statute-driven methods of regulatory impact analysis was to subject the agencies to greater control by the White House, and to make economic efficiency the highest value in the regulatory process. If preventing deaths from unsafe products cost industry too much, or if preventing unsafe chemicals from polluting the air and water cost a dollar more than the expected return on the "investment," then industry would simply be relieved of the burden.

The result has been an amalgam of inconsistent values, warring factions, and excessive delay. Agencies still proceed as they always have, pragmatically weighing the myriad statutory factors involved in crafting regulations to implement congressional mandates. But now they must also employ their own economists to conduct CBAs on all "major" rules imposing costs over $100 million before they submit their proposals to OMB for approval. And that is only the beginning of OMB's influence. The agency has used CBA as a tool to weaken, rewrite, or scuttle regulations, going far beyond its area of economic expertise to second-guess complex policy judgments by the agency experts to whom Congress has delegated the responsibility for making just such judgments.

CBA's flaws are profound. The methodology reduces all the factors considered by the agencies—from the incidence of cancer caused by exposure to a toxic substance to the importance of clean air and water—to dollar terms, a practice known as "monetizing" in the economists' lexicon. These calculations typically underestimate the "benefits" that a strong regulation will provide the public. At the same time, CBA systematically overestimates industry compliance costs. Such analyses consume hundreds of pages covered with dense formulas, charts, graphs, and complicated explanations of the "assumptions" the economists used in translating facts into numbers. The methodology has been remarkably successful in making regulatory decisions the province of experts only, even though the lay public is profoundly affected by the choices those experts make. Because it is so opaque, CBA has been susceptible to manipulation by political appointees in the OMB and in the regulatory agencies themselves, turning CBA into a one-way ratchet for weaker regulations. The economists at the White House have come out in favor of stronger regulation that an agency had been considering in only a handful or fewer circumstances at best. The rest of the time the methodology has been used to demand weaker regulations or has proved irrelevant to the substance of a final regulatory proposal.

This paper proposes the liberation of pragmatic decisionmaking from the constraints of cost-benefit analysis. Because the relevant literature is preoccupied with CBA and, conversely, commentators have paid so little attention to the process the health and safety agencies use to make decisions apart from CBA, we have developed a new name for our alternative—"pragmatic regulatory impact analysis" or "PRIA." Health and safety agencies have applied many of the elements of the process we call PRIA for 40 years. We propose one significant

new addition: The agencies should make their decisionmaking more explicit and transparent by explaining the questions they are asking, the information they need to know, and steps they will take at the beginning of a rulemaking.

We intend for PRIA to replace CBA. Because PRIA is based on the agencies' "authorizing" statutes—the laws that create the regulatory programs they administer—and because it maintains the agencies' multi-disciplinary, "weight-of-the-evidence" approach to decisionmaking, it is far superior to the erratic and deeply flawed application of CBA. *One critical assumption behind this approach is that agencies must focus, first and foremost, on the factors that Congress told the agencies to consider in the health and safety statutes.* In contrast, CBA superimposes the numerical evaluation of costs and benefits whether or not a statute allows that kind of process. As we explain further below, the result has been to distract agencies from the statutory mandates Congress intended for them to fulfill.

PRIA is a term that includes both the ***process*** for making government decisions to protect health, safety, and the environment and the ***document*** that agency experts write to explain what regulations they will adopt and why they adopted them. This methodology occurs in three essential steps. First, agencies characterize the threats to public health, worker safety, and the environment posed by the industrial practices at issue. Second, they consider the feasibility of the remedies available to address those problems. Third, where appropriate, they evaluate best estimates of the costs involved in implementing those solutions.

To conduct this analysis, agencies would assemble a working group of carefully selected experts in science, health, safety, technology, economics, and the law to investigate how an industry works, when and why industrial practices hurt people, and what can be done to avoid those injuries. While the individuals that compose this group may change during the time it takes to develop a regulation, the fundamental concept—that a multi-disciplinary group must engage in active work together to come up with the best solution—is the core characteristic of PRIA. In sum, the hallmarks of PRIA are:

- An analytical process focused on the law that an agency must implement and the factors that Congress told the agency to consider when it makes decisions whether to control industrial activities that threaten health, safety, and the environment;
- A broad inquiry into the nature of the threat and the remedial options conducted among an interdisciplinary group of experts and administrators;
- The assembly of the best available scientific research and other information regarding these issues;
- Evaluation of the weight of this evidence, considering both the strengths and weaknesses of the individual studies that were assembled;
- Proposal of a remedy for the problem identified;
- Public comment from a full range of stakeholders about the costs and benefits of that proposal; and
- Arrival at a judgment—or series of judgments—about what kind of limits or controls to impose in order to protect health, safety, and the environment.

PRIA demands that regulators explain their reasons in narrative form, rather than in obscure calculations. Often described as "discursive," this format requires analysts to explain their reasons for choosing one policy option over another and to respond to the major criticisms that were raised in opposition to those judgments. Although numbers are considered in those analyses, the emphasis is on an informed dialogue among experts and the exercise of policy judgment and accumulated wisdom. This process is highly rational, but we do not pretend that the results of PRIA are in any way objective or scientifically verified "truths." In fact, one of our major objections to CBA is that its proponents claim it is grounded in "science" and is therefore "factual," when in fact it is riddled with predictable errors, omitted values, and controversial policy judgments. PRIA is nothing more—and nothing less—than the best judgment of fully informed experts and administrators.

By contrast, as practiced at these same agencies, CBA is a process that involves convening a group composed almost entirely of economists to review the information collected and recorded by the other experts. The economists then use a series of formulas that reduce this information down to two sets of numbers—total "costs" of imposing the regulation versus total "benefits" that will be achieved as a result of its implementation. Increasingly, the two sides of this equation are stated in broad ranges (*e.g.,* "the anticipated benefits of this action are between $X million and $Y million").

On the cost side, the numbers are the product of elaborate calculations that try to quantify how much industry will pay in compliance costs, what other investments could be made with the amount of money that would be spent on compliance (so-called "lost opportunity costs"), and what the rule could cost society as a whole by, for example, increasing the price of food or electricity. On the benefits side, economists "monetize"—or quantify in monetary terms—the value of every injury that would be prevented by the rule. So, for example, if a toddler would avoid visiting the hospital emergency room to receive treatment for an asthma attack as a result of reducing ozone concentrations (or smog), EPA monetizes the incident as worth $194 in its report on the benefit of air pollution control regulations. If babies *in utero* and infants would suffer less brain damage because an EPA rule reduces methylmercury contamination of fish in the human food chain, EPA counts the "benefit" as worth $8,800 per IQ point saved.

Because PRIA includes scientists, engineers, enforcement officials, and other experts in preparing the paperwork used to determine whether protective rules should live or die, and because it rejects the ethically problematic and misleading practice of converting benefits such as "lives saved" into monetary terms, it is a significantly more constructive and accessible way to carry out the agencies' statutory mandates.

Two examples illustrate why PRIA is preferable to CBA. First, consider the challenge posed by lead contamination in the 1970s. Scientific research showed that this heavy metal is extraordinarily toxic to children under six, even in very small amounts. Ingestion of lead in an amount no larger than three grains of sugar puts a small child's body into positive lead balance, beginning the poisoning process. Once "poisoned"—a level defined as ten decili-

ters per microgram of lead in the blood, although many experts think this number should be even smaller—a baby *in utero* or a child under six loses IQ points and can suffer other neurological damage. (A deciliter per microgram is roughly proportionate to one-quarter of a cup of liquid in an Olympic-size swimming pool.) Higher blood lead levels can cause permanent mental retardation and even kill a child. At the time that EPA began working on the lead poisoning problem, gasoline vapors from motor vehicles accounted for as much as 90 percent of human-made contamination. (Lead was added to the fuel to prevent engine knocking.) Faced with this evidence of harm, EPA officials deliberated about how to proceed, taking into account that it would be expensive to get the lead out and that it was not certain that fuel could be reformulated. Ultimately, they reached an expert judgment that the human toll from tolerating the use of lead was unacceptable based on the reasons that agency officials had offered in favor and against various options. The decision to phase-out lead has proven to be one of the most important actions that EPA has ever taken to protect people and the environment.

A second scenario involves the withdrawal of hundreds of billions of gallons of water from lakes, rivers, and streams annually in order to cool down the equipment used to provide power for industrial plants across the country. This "cooling water" is circulated through the plants and then discharged close to where it originated. The process kills some three billion aquatic organisms annually—everything from microscopic bits of marine life to fish you would eat for dinner—when they are impaled on the intake equipment or sucked up into the machinery. EPA had to decide what such plants should do to prevent these aquatic kills, which could disrupt food chains and entire ecosystems, causing damage for years to come. Applying a CBA that accounted for the damage of *less than two percent* of the aquatic life killed by cooling water intakes, EPA issued a weak rule that will allow the continuation of much of this destruction. Had the agency been allowed to use PRIA, it would likely have adopted a more appropriate rule—one that accounted for the full range of harms that Congress intended to avert.

For years, battles have raged behind the scenes between those who favor a pragmatic, multi-disciplinary approach to decision-making and those who support OMB's efforts to trump that approach with economist-driven cost-benefit analysis. These battles are among the most important—and least visible—events that determine the level of health and safety protection for American families, consumers, and workers. We begin with an analysis of why PRIA is more consistent with the statutory mandates passed by Congress than CBA. We explain the three fatal flaws of CBA as practiced. Our two case studies illustrate these distinctions. We close with a series of recommendations for reinstating PRIA as the methodology of choice within the federal government.

Statutory Mandates

Over the last four decades, Congress has passed a series of laws asking health and safety agencies to make informed judgments regarding a wide range of threats to health, safety, and the environment. Some of these statutes are relatively brief and leave a great deal to agency discretion. Others cover hundreds of pages and contain hundreds of specific mandates that the agencies must accomplish. Several of the statutes instruct agencies to consider what regulated industries will have to spend to comply with a rule. But a few important laws focus agencies on forging strong public health protections, considering compliance costs only during implementation of those standards. Many laws tell agencies to look for the best available technology to control pollution or human exposure to toxic substances. Others mandate that the agencies figure out how "clean" the environment has to be, and leave it up to state regulators to figure out how to get there by imposing pollution control requirements on individual sources.

Protective regulation proceeds in two steps. An agency must first determine whether a statutory "risk trigger" is met. This trigger specifies when a threat is sufficiently serious to warrant regulation under the applicable statute. When Congress created the risk triggers, it authorized regulators to act on the basis of anticipated harm because it wanted to shift to a legal scheme that prevented injury, as opposed to one that compensated people for injuries after the fact. For example, EPA is authorized to regulate new stationary sources of air pollution under the Clean Air Act whenever a source creates "air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S. Code§7411(b)(1)(A) (2006). The FDA is authorized to regulate food color or food additives if they cause cancer in animals or humans. 21 U.S.C. §§348(c)(3), 379e(b)(5)(B) (2006). And OSHA is mandated to protect workers when "reasonably necessary or appropriate to provide safe or healthful employment," language that the Supreme Court has interpreted to mean that the agency must show a "significant risk" before it intervenes. 29 U.S.C. § 652(8); *Indus. Union Dep't v. Am. Petroleum Inst.*, 448 U.S. 607, 642 (1980).

Once an agency has determined that the risk trigger is met, it must then determine how strict to make the rule that will prevent or reduce that harm. This second decision is governed by "regulatory standards" set forth in the statute. For example, some laws require agencies to figure out whether industrial pollution has risen to a level in the air or water that the contamination threatens health. The Clean Air Act requires that EPA protect public health with respect to criteria air pollutants (*e.g.,* smog, fine particulates, and nitrogen oxides) with an "adequate margin of safety." 42 U.S.C. §7409(b)(1)(2006); *Whitman v. Am. Trucking Ass'ns, Inc.*, 531 U.S. 457 (2001). Under this standard, EPA considers everything that scientists and other technical experts can tell them about the release of pollutants, their "fate and transport" through ambient air, the exposure levels experienced by the population as a whole and, especially, by vulnerable populations (*e.g.,* the elderly, young children, or young wildlife), and the health effects likely to result from those exposures. Once EPA establishes such a National Ambient Air Quality Standard (NAAQS), it delegates to the states the job of forcing

factories and other sources to reduce emissions below that overall level, a process that takes into account compliance costs.

Other laws known as "technology-based standards" require agencies to study the technologies available to prevent the harm at issue, such as cut-off valves on heavy machinery in the workplace, for example, or changes in the manufacturing process that will reduce worker exposure to harmful chemicals. For example, OSHA's mandate to impose "feasible" remedies means that it must adopt the lowest limit on exposure that can be achieved by the best possible technology, provided that adoption of the technology will not cause significant economic disruption of an industry. 29 U.S.C. §655(b)(5) (2006).

Costs are a factor in the selection of technologies because these standards generally do not mandate the selection of experimental, extraordinarily expensive pieces of equipment. Modifying adjectives are added to the statutory standard to denote how rare and how expensive equipment must be before it is considered out of regulatory bounds. So, for example, depending on the extent of air pollution in a given geographical area, the Clean Air Act requires the use of *Reasonably Available* Control Technology, *Best Demonstrated* Available Technology, *Best Available* Control Technology, *Maximum Achievable* Control Technology, and *Lowest Achievable* Emissions Reduction. (Emphasis added in all.) The Clean Water Act has a similar list of standards.

Sometimes, Congress employs a mixture of health-based and technology-based standards, instructing agencies to engage in "open-ended balancing" that evaluates a variety of factors but gives the agency discretion over how much weight to give each one. EPA regulates pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) by imposing conditions on the use of a pesticide to the extent necessary to avoid "unreasonable adverse effects on the environment" that pose "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits" of a pesticide's use. 7 U.S.C. §§136(bb) (definition of adverse effects), 136a (a) (basic regulatory authority) (2006). In deciding whether a pesticide use is *unreasonable* (obviously, the key adjective here), the agency considers what kinds of problems might arise if people or nature are exposed to high levels of the pesticide; whether those problems are reversible or long-lasting; how important the pesticide is to the preservation of the food supply or the control of pests that cause a threat (*e.g.,* vector-borne disease); and the availability of alternative pesticides that might do a worse or better job for more or less risk. The agency also considers whether the remedies it has available—placement of warning labels on pesticide containers and special training for people who apply pesticides in large quantities—could reduce these risks to reasonable levels.

To reiterate a point that cannot be overemphasized: People from a broad range of disciplines must collaborate to get these decisions right. Biologists, toxicologists, epidemiologists, neurologists, pediatricians, and similar experts must participate to predict the effect of a pollutant or other safety threat on people and natural resources. Meteorologists, climatologists, chemists, statisticians, modelers, and engineers must participate to estimate what happens

to a pollutant as it travels through the environment at stake (workplace, ambient air, surface and ground water, soil). Engineers with different specialties (pollution control equipment design, heavy machinery design, motor vehicle design, pollution monitoring) must participate to evaluate both threats and potential remedies. Enforcement and administrative law experts must participate to help gauge whether remedies will work in practice. And lawyers must participate to evaluate whether the final rule conforms to statutory requirements. The need for collaboration among all these disciplines is the reason why rules take a long time to develop. It is also the reason why narrowing power over the final decision to a small group of economists who take the rich, granular detail of those collaborations and reduce them to a set of numbers that are rife with error makes little sense.

Despite the wide variety of problems addressed by these statues and the different approaches used to protect the public, Congress expects regulators to follow the same basic process of framing questions, doing research, asking for public comment, and making judgments about what to do. One of an agency's greatest challenges in meeting Congress' expectation is that the so-called "health and safety statutes" are designed to *prevent* harm rather than compensate people for their damages after the fact. This "precautionary principle" applies in the context of problems that were not—and still are not—very well understood by science. So, for example, we know that lead poisoning hurts children but we have made limited progress in pinpointing whether the lead in a child's body comes from gasoline additives, lead paint in the home, or other, more minor sources. We know that killing huge quantities of aquatic life could severely disrupt an ecosystem, but we do not know what the implications of that disruption might be. A wise federal appellate judge named Skelly Wright explained these problems in a court opinion that upheld the lead-in-gas regulation:

> Man's ability to alter his environment has developed far more rapidly than his ability to foresee with certainty the effects of his alterations. It is only recently that we have begun to appreciate the danger posed by unregulated modification of the world around us, and have created watchdog agencies whose task it is to warn us, and protect us. . . . [U]nequipped with crystal balls and unable to read the future, [the agencies] are nonetheless charged with evaluating the effects of unprecedented environmental modifications, often made on a massive scale. Necessarily, they must deal with predictions and uncertainty, with developing evidence, with conflicting evidence, and, sometimes, with little or no evidence at all.
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> — *Ethyl Corporation v. EPA*, 541 F.2d 1, 6 (D.C. Cir. 1976) (en banc).

One of an agency's greatest challenges is that the "health and safety statutes" are designed to prevent harm.

Given these challenges, the agencies have made tremendous progress in (1) framing the right questions; (2) conducting the research necessary to answer them; (3) evaluating the evidence; and (4) drawing the line on how much precaution is warranted. They have discovered that scientists cannot tell them with numerical precision how serious the risks to health actually are. They have also learned that in the vast majority of regulatory decisions—indeed, in all but a tiny number of circumstances—informed judgments to err on the side of being protective were vindicated by subsequent research. Few and far between are the instances in

which health and safety agencies were persuaded by subsequent evidence that chemicals or industrial practices were *less* hazardous than they originally thought and therefore decided to relax National Ambient Air Quality Standards under the Clean Air Act, water quality criteria under the Clean Water Act, pesticide tolerance limits under the Federal Insecticide Fungicide and Rodenticide Act, or permissible exposure limits under the Occupational Safety and Health Act.

As the agencies became more aggressive and more effective in protecting the public, the most heavily regulated industry sectors—tobacco producers, auto manufacturers, electric utilities, petrochemical producers—mounted a vigorous counterattack. With the election of Ronald Reagan, this backlash had gathered its own powerful momentum. One of his Administration's first innovations was the effort to trump the interdisciplinary process at the agencies by forcing them to submit final rule proposals to economists housed at OMB's Office of Information and Regulatory Affairs (OIRA). The economists demanded that, as a prerequisite for approval, the agencies perform a much narrower analysis regarding whether the *monetized* costs of the proposed rules outweighed the *monetized* benefits they were likely to bring to the public. This methodology was dubbed "cost-benefit analysis," or CBA.

Cost-benefit Analysis

As practiced by the federal government in the regulatory process, traditional CBA is plagued by four fundamental flaws that undermine its usefulness in the implementation of laws that protect people and the environment: (1) overstated costs; (2) understated benefits; (3) elimination of future benefits through discounting; and (4) a fundamental obscurity that makes these decisions mysterious to the public and the elected officials who represent them.

Overstated Costs

When projecting future compliance costs, government economists typically rely on estimates submitted by the firms that are going to be regulated. The firms have strong incentives to overstate costs in order to discourage strict regulation, yet the government has spent far more time attempting to monetize uncertain benefits than studying how to avoid overstated costs. Consider the National Highway Traffic Safety Administration's (NHTSA) experience with airbags. Before the agency required that automobile manufacturers provide automatic occupant protection in cars, the industry claimed that the cost per car for a single, driver-side airbag would be $1,000. This time, in an unusual move, agency experts actually took steps to test this claim, taking apart an airbag, identifying all of its parts, and determining what each part would cost if it was purchased in the open market by a car company. The experts then put the airbag back together, calculated the time, and multiplied that by industry wage standards. When they added up the individual costs of the components, the labor costs to assemble the bag, and a reasonable profit, the estimated cost of an airbag was $300. Most of the time, however, industry's claims about regulatory costs go untested.

Understated Benefits

On the benefits side of the equation, economists multiply the estimated number of lives saved by the estimated value of a single life, using numbers from $2.5 to $6.8 million for the value of a life. So, for example, if experts predict that a respirator will save one worker from getting a fatal cancer, economists translate that benefit into money. If, however, exposures to hazardous conditions cause subtle neurological damage, reduce fertility, produce birth defects, or exacerbate chronic but non-fatal diseases, these economic calculations become even more convoluted because economists lack any reliable method to monetize such costs.

How did the economists arrive at the above figures for a statistical life saved and why is there such a large range between them? One way to derive such a number would be to count the wages lost when a person dies prematurely. This approach is applied by the courts in civil wrongful death suits when juries can focus on one, or at the most, a few specific lives to compensate the victim's family for the harm that occurred. But even putting aside the ethical questions raised by a calculation that deems the lives of rich people more "valuable" than the lives of poor people, this approach does not work with respect to decisions designed to *prevent* harm because it is much harder to average the wide range of wages earned by a large group of people exposed to anticipated hazards.

Economists therefore instead estimate the monetary value of preventing a premature death by using data on "wage premiums." Wage premiums are the amount of additional compensation that workers are paid in exchange for accepting the risks that accompany a dangerous job. In theory, a wage premium indicates how much a worker is willing to pay for a safer work environment because if the worker moves to a safer job, she has to give up the wage premium. Because companies do not quantify and disclose these amounts, economists extrapolate the differences by comparing average wages in non-dangerous occupations (for example, office worker) with those in riskier occupations (for example, production line worker in a petrochemical plant). To bargain for full compensation, workers must be able to calculate precisely the value of the risks presented by the more dangerous job, and then get the employer to agree to pay that amount. Advocates of cost-benefit analysis have never demonstrated that employees actually receive wage premiums nor, for that matter, that they have safer employment opportunities at their fingertips.

Economists draw the value of avoiding non-fatal risks from how much money consumers pay for safer products or, in one particularly strange example, from the monetary value of how much time mothers spend buckling their children into car seats correctly. In that study, economists watched women putting infants into car seats and calculated the difference in the amount of time spent by mothers who did it correctly and mothers who did it incorrectly. Instead of concluding that some women did not understand how to use car seats, the economists assumed that the women who spent less time were willing to accept a greater risk that their children would be injured in a crash, and translated this saved time into dollars on the basis of the wages paid for the typical blue collar jobs. Like the assumption that evidence of wage premiums accurately represents worker risk preferences, cost-benefit advocates have never demonstrated that consumers have adequate information about risks and can afford to purchase the level of safety they prefer.

Discounting

The third flaw in CBA is that the methodology includes the "discounting" of both costs and benefits. Discounting practice rests on the idea that a regulation is like an investment in the sense that it will produce future results that have a monetary value, and the value of those results is worth less today than in the future because of the time value of money. The time value of money recognizes that a dollar invested today is worth more in the future because interest payments will increase its value. By this logic, regulatory benefits worth $10,000 in ten years have a present value of $4,751 using a seven-percent discount rate. Current OMB guidelines recommend that agencies apply both a three-percent and seven-percent discount rate when conducting cost-benefit analysis. So, for example, a life worth $6.1 million in 25 years, at a seven-percent discount rate, would be worth only $1.1 million today. Discounting discourages regulatory action to prevent cancer because the costs of the regulation occur in the near future while the benefits occur in 20 or 30 years. The benefits are delayed because the onset of cancer generally does not occur until later in a person's life. For example, if 100 people are exposed to a toxic chemical today that will cause them to de-

Discounting discourages regulatory action to prevent cancer because the costs of the regulation occur in the near future while the benefits occur in 20 to 30 years.

velop cancer in 30 years, discounting at a seven-percent rate would result in the assumption that only 11.474 worth of lives would actually be saved. At a three-percent discount rate, this calculation would result in an estimate of 38.834 lives saved. Yet, as Richard Parker has pointed out, if 1 million people are exposed to a toxic chemical that produces a 1 in 10,000 probability of a fatal cancer, the odds are quite high that approximately 100 people, not 38.8, will lose their lives to cancer.

Opacity

Written by economists for economists, traditional cost-benefit analyses are laden with jargon, elaborate formulas, and dense graphs and charts. We doubt that these reports are ever read carefully by agency decisionmakers, and are even more certain that they are not read, and certainly not understood, by members of the public.

Consider the effort to analyze the costs and benefits of EPA's standard for limiting exposure to arsenic in drinking water. According to Professor Cass Sunstein, available information indicated that arsenic reduction could produce net benefits ranging from a negative $210 million up to a positive $3.584 billion. Cass R. Sunstein, *The Arithmetic of Arsenic*, 90 Geo. L.J. 2255, 2288 (2002). The choice of any one number, or even a narrower range of numbers, requires numerous assumptions that are unlikely to be clear to the reader. As an illustration, try to decipher EPA's description of why it established an exposure limit of 10 parts per billion rather than 5 parts per billion:

> In comparing [the 5 parts per billion] level to 10 [parts per billion], we note that both the net benefits and the benefit-cost relationships are less favorable for 5 [ppb] as compared to 10 [ppb]. Total national costs at 5 [ppb] are also approximately twice the costs of an MCL of 10 [ppb]. At 10, EPA notes that the lung and bladder cancer risks to the exposed population after the rule's implementation are within the Agency's target risk range for drinking water contaminant of 1 x 10-6 to 1 x 10-4 or below. EPA recognizes that there is uncertainty in this quantification of cancer risk (as well as other health endpoints) and this risk estimate includes a number of assumptions, as discussed previously. EPA did not directly rely on the risk range in selecting the final [standard], since it is not part of the [statutory] criteria; however, it is an important consideration, because it has a direct bearing on our estimates of the benefits of the rule.
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> — National Primary Drinking Water Regulations; 66 Fed. Reg. 6976, 7022 (Jan. 22, 2001).

Put differently, it will cost twice as much to cut the amount of arsenic in drinking from 10 parts per billion to 5 parts per billion, but it will save more lives. EPA doesn't think these lives are worth the extra cost. Yet after undertaking these long and convoluted calculations, EPA appropriately decided to ignore its number-crunching because its authorizing statute—the Safe Drinking Water Act—never instructed the agency to take this approach.

The Implications of CBA

Economists claim that CBA improves regulatory decision-making. But empirical analysis has shown that the most common impact of applying CBA to regulatory proposals is to weaken them significantly. David M. Driesen, *Is Cost-Benefit Neutral?*, 77 Colo. L. Rev. 335 (2006). Two case studies illustrate these effects and also show how pragmatic analysis produced better, more protective decisions.

CASE STUDY NUMBER 1: Getting the Lead Out

The Invention of Tetra-ethyl Lead

Science has documented the dangers of excessive human exposure to lead for many decades; some researchers believe that even the early Greeks and Romans realized they had made themselves ill by drinking and eating out of leaden containers. As early as 1922, the head of General Motors (GM), Pierre DuPont, described "tetra ethyl lead " or "TEL," the formulation of the heavy metal that the company patented as an additive to gasoline, as "a colorless liquid of sweetish odor, very poisonous if absorbed through the skin, resulting in lead poisoning almost immediately." What we have learned since those early days is that much lower doses of lead also cause irreversible brain damage, especially among children younger than six years of age. How, then, did lead get into gas?

Early engines tended to "knock" because gasoline ignited too fast. Among the many chemicals that it could have used to address this problem, GM settled on TEL because its production could be patented, and therefore would remain under the profit-making control of the company and its partners. The choice is particularly lamentable because other, more benign chemicals could have done the job equally well, especially the common chemical ethanol. The lethal effects of TEL were swept under the public radar by manufacturer claims that it could be produced safely and would not be made in amounts large enough to cause a widespread public health problem.

After TEL was introduced as a gasoline additive, an estimated seven million tons of lead were burned in motor vehicles throughout the country. Because lead is extraordinarily "persistent," meaning that it retains its original chemical structure and does not bio-degrade into more benign components as it travels through the environment, and because lead is also relatively heavy, meaning that it falls to the ground rapidly after it is emitted in gaseous form, these huge quantities of combusted byproducts ultimately infiltrated the soil and the water in communities across the country.

The Convergence of Science, Policy, and Politics

Three things happened in the late 1960s and early 1970s to prepare the way for EPA's lead in gas rule. The first was the discovery by Clair Patterson, an eminent geochemist at the California Institute of Technology, that atmospheric levels of lead had grown *1000-fold* and the human body burden of lead had grown *100-fold* during the Industrial Age, putting a definitive end to the claim that lead additives and other industrial uses, as opposed to lead's occurrence in nature, were a major source of human exposure. The second event was the birth of modern environmentalism with the publication of Rachel Carson's *Silent Spring* in 1962, and the public's gradual realization that motor vehicles were major sources of air pollution, including ozone (or smog) that was threatening both public health and natural resources. This movement resulted in the creation of EPA by presidential Executive Order in 1970, followed shortly by passage of a series of landmark laws, including the 1970 Clean Air Act Amendments. Lastly, because of these developments, automobile industry executives understood that they could no longer placate or stonewall the environmentalists and their allies in Congress. The result was their grudging acceptance of the catalytic converter, a relatively delicate piece of equipment that could not operate well as long as lead additives remained in gas. The stage was set for the newly born EPA to craft perhaps the most important regulation it had ever issued.

Geochemist Clair Patterson discovered that atmospheric levels of lead had grown 1000-fold and the human body burden of lead had grown 100-fold during the Industrial Age.

The Regulatory Process

EPA's mandate under the 1970 Clean Air Act at the time was to "control or prohibit the manufacture, introduction into commerce, offering for sale, or sale of any fuel or fuel additive for use in a motor vehicle . . . if any emission products of such fuel or fuel additive will endanger the public health and welfare." 42 U.S.C. §1857f-6c(c)(1)(A). The Agency concluded that TEL in gas was a major source of the elevated blood lead levels that were prevalent in the American population at the time. It was also concerned that the additive would disrupt the operation of catalytic converters, the technological breakthrough that could make it possible to trim emissions causing smog, a growing problem in many American cities. EPA interpreted its statutory mandate as requiring it to consider scientific research showing that lead in gas was contributing, along with other sources of lead contamination, to the problem of elevated blood lead levels in the American population. EPA chemists and biologists reasoned that when lead came out the tailpipe in gaseous form, it had a sufficient molecular weight that it fell to the ground. Because TEL is a "very persistent" organic chemical—meaning that it does not break down into more benign byproducts when exposed to sunlight, moisture, and other atmospheric conditions—the lead remained in a highly toxic form as it mixed with other particulate matter and became part of the overlay of dirt and grit that permeated people's everyday environment. The agency knew that large amounts of lead went into gasoline. It concluded that the sheer physics of the combustion process meant that this chain reaction posed significant risks for public health. It also noted that lead from gasoline accounted for approximately 90 percent of lead that was initially *airborne* because total lead additive usage was well over 200,000 tons annually.

This reasoning, as far as it went, was unassailable. No one disputed the so-called "fate and transport" of combustible lead in gasoline. Rather, the powerful coalition of gasoline refiners and TEL manufacturers that organized to fight EPA's initiative, and in fact managed to string out the final elimination of lead from gasoline until 1986, argued that EPA did not have definitive evidence of how much lead from gasoline actually migrated into people's bloodstream. Lead paint in housing and other products such as dishes and batteries were a much more significant source of the problem, they argued, and EPA should pursue those sources first.

The industry coalition also disagreed vehemently with EPA's interpretation of its statutory mandate. EPA thought that the statute required it to take steps to *prevent* injury—after all, this goal was repeatedly invoked by Congress as it passed landmark environmental laws like the Clean Air Act in the early 1970s. EPA argued that if the goal was to wait until people were injured and then to prove that their injury was caused by a specific occurrence of pollution in the environment, Congress could have relied on a robust regime of personal injury lawsuits that required exactly that kind of proof in court. Instead, EPA said, it needed only enough information to conclude that unacceptable harm was likely to occur if it allowed an industrial activity to continue and that stopping the activity would improve public health.

The industry coalition responded that Congress never intended for EPA to purify the environment to the point that no risks were present and that the air, water, and soil were as clean as they were in some pre-industrial epoch. Industrial activity, including the automobile, had brought tremendous advantages to society and should not be curtailed lightly. If EPA went after every potential source of contamination without having to draw causal links between the industrial practices and specific, measureable harms, the resulting compliance costs would halt these advances.

This fundamental debate rapidly devolved into a *battle royale* over the available science. The industry coalition highlighted studies that failed to find a direct correlation between heavy industrialization in urban areas and higher blood lead levels in urban populations, in comparison to rural areas and populations. Those studies compared available figures on blood testing for lead with the projected amounts of airborne lead from automotive emissions. In some instances, rural populations had higher blood lead levels than urban populations, a counter-intuitive result. EPA countered with different studies showing correlation between airborne lead and blood lead levels, but the industry coalition argued that it was up to EPA to provide a clear prevalence of studies documenting the association. The coalition also questioned whether microscopic lead particles in dust were the real cause of childhood poisoning, as opposed to the disease called "pica" among low-income children in the inner city that caused them to eat lead paint chips.

In the end, EPA stuck to its core argument: Its statutory mandate was to identify sources that posed a "significant risk" and did not obligate it to either prove causation or begin with the numerically largest source. The *Federal Register* notice published on December 6, 1973, setting forth EPA's decision to control lead in gas said:

> The Agency's position is that numerous sources contribute to childhood lead exposure including lead in food, water, air, dust and dirt as well as paint. Among these sources, contaminated dust and dirt from motor vehicles exhaust are believed to be *important* exposure routes. . . .
> [T]he contention that lead contamination of dust and dirt by automotive emissions is a significant source of lead exposure is a hypothesis consistent with information provided by a variety of studies. However, at this time, not all links in the argument have been established beyond dispute. . . . Despite the existing uncertainties, comments received from the majority of scientists not affiliated with *industrial or environmental* groups support the contention that dust is an important source of exposure.
>
> — 38 Fed.Reg. 33734, 33735-36 (emphasis added).

The remainder of the *Federal Register* notice sets forth a detailed analysis of alternative technologies EPA had considered to reduce lead in gas, the reasons why they were not preferable to simply requiring that producers stop using lead as an additive, and the reasons why EPA believed that it had developed a livable compliance schedule for producing unleaded gasoline. In the end, large refineries were required to remove about 80 percent of the lead in gasoline by 1979, while small refineries were required to meet the same target by 1982. EPA made no effort to conduct a cost-benefit analysis because this methodology was in its infancy and was not required as a *quid pro quo* for new rules, as it is today.

Battle in the Courts

The industry coalition challenged the EPA rule, which imposed a gradual phase-down of TEL, before the federal Court of Appeals. The Court of Appeals first decided the case in the traditional way, by hearing and decision of a three-judge panel, which set aside the regulation. EPA then appealed to the entire court, which rendered a decision *en banc,* meaning that every judge sitting on the court participated. Judge Wright's opinion for the 5-4 majority stressed the preventative goals of the statute:

> A statute allowing for regulation in the face of danger is, necessarily, a precautionary statute. Regulatory action may be taken before the threatened harm occurs; indeed, the very existence of such precautionary legislation would seem to demand that regulatory action precede, and, optimally, prevent, the perceived threat. As should be apparent, the "will endanger" language of [the Clean Air Act] makes it such a precautionary statute.
>
> — 541 F.2d 1, 13 (D.C. Cir. 1976) (en banc).

The majority explicitly rejected the argument made by the petroleum refining and lead additive industries that EPA's judgment should be based on an accumulation of facts amounting to the kind of proof one would expect to result from a trial before a jury.

In contrast, dissenting Judge Wilkey repeatedly emphasized the "paucity" of scientific evidence relied upon by EPA, ultimately setting up a far higher burden of proof for EPA than his majority colleagues:

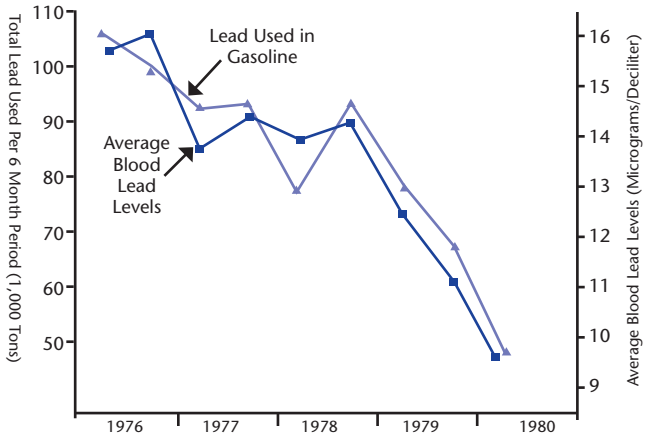
> We think that the statute *does* require that, before the Administrator can prescribe the regulations involved here, he must find that *the lead from auto emissions by itself or alone* contributes a *measurable increment of lead to the human body*, and that this measurable increment causes a significant health hazard. To repeat, only if the Administrator can say that an identifiable measurable increment of lead in the human body is derived from auto fuel additives and that this measurable increment of lead itself (taking into consideration all other sources of lead) causes a significant health hazard, can the Administrator claim that controlling or prohibiting lead would reduce significantly such health hazard.
>
> — Id. at 71, 95 (emphasis added).

None of the participants in the proceeding thought that EPA could satisfy this burden of proof. However, until and unless the Agency could satisfy it—and we make this point without a hint of irony—economists could not have developed a cost-benefit analysis showing that the *costs* of the proposal were outweighed by the *benefits*. Such an analysis would have depended on establishing the direct causal relationship between the increment of lead contributed by car emissions and the exact kinds of neurological damage and cardiovascular damage suffered by specific portions of the population—a connection that the science at the time could not make.

Huge Benefits

It is literally impossible to find a single credible expert in environmental law, science, or policy who does not think that taking the lead out of gas was one of EPA's greatest accomplishments. When EPA first began to consider the issue, blood lead levels of 60 micrograms per deciliter were considered tolerable. In the years after the initial phase-down, thanks largely to the path-breaking work of pediatrician Herbert Needleman, we learned that as little as 10 micrograms per deciliter or above of lead in blood could cause neurological damage to children under six. A 1988 report to Congress by the Agency for Toxic Substances and Disease Registry shows that on an annual basis, blood-lead levels of as many as two million children were reduced below toxic levels between 1970 and 1987 as use of leaded gasoline decreased. The following figure, borrowed from Robert Percival and Christopher Schroeder's fine book *Environmental Regulation, Law Science and Policy*, illustrates these dramatic improvements.

Lead Used in Gasoline Production and Average NHANES II Blood Lead Levels (Feb. 1976-Feb. 1980)



Source: Small Refiner Lead Phasedown Task Force V. EPA 705 F.2d 506, 528 (D.C. Cir 1983)

The rule ratified by the court in 1976 did not eliminate TEL from gasoline, but instead required that it be phased down by 80 percent. Following the election of Ronald Reagan, a "Task Force on Regulatory Relief" was established under the direction of Vice President George H.W. Bush. The industry coalition brought the lead phase-down rule to the Task Force, hoping to both weaken the standards and avoid an outright ban on the additives. To defend against this assault, EPA chartered a cost-benefit analysis of the phase-down rule, which concluded that its benefits far outweighed its costs. Conservative champions of the methodology frequently invoke this episode to prove CBA can be used to support more aggressive regulation. Unfortunately, this claim is more wishful thinking than statement of fact. For it was only after the phase-down had been in effect for several years that the economists were able to quantify concrete reductions in blood lead levels. The initial rule would never have survived the application of cost-benefit analysis.

Pragmatism at Work

The story of how EPA came to regulate lead illustrates the process of pragmatic decision-making and the benefits of this approach. EPA focused on the Clean Air Act and the factors that Congress told it to consider in regulating hazards such as lead. An interdisciplinary group of experts conducted a broad and thorough inquiry into the threat posed by lead and the remedies available to head off this threat. This was accomplished by assembling the best scientific research and other information regarding these issues, evaluating the weight or persuasiveness of this evidence. This analysis brought EPA to the fundamental issues in the rulemaking—what degree of proof of dangerousness was required before it could regulate a hazard and did the agency have the necessary evidence. EPA proposed a remedy that reflected its deliberations and then took into account the robust input of the automobile industry among others. Its solution of how to balance uncertainty and precaution was not only upheld by the courts, it became the blueprint for regulation under the Clean Air Act.

Even if EPA had been able to conduct a cost-benefit analysis, it is difficult to see what it would have contributed to the process of reaching a sound decision. EPA had to resolve difficult scientific, legal, and policy issues, and did so in part by having the experts explain themselves in response to the major criticisms that were raised by industry. These policy debates were out in the open—not obscured from public understanding by a raft of impenetrable economic calculations. On the problem of uncertainty, the agency took its cue from the statute, adopting a precautionary stance. But a cost-benefit analysis would have rested on a set of policy assumptions hidden deep within the foundations of economic theory, and antithetical to the precautionary approach Congress mandated in the Clean Air Act. Finally, because this process was interdisciplinary and discursive, all participants had the benefit of talking directly to and educating each other. A cost-benefit analysis, in contrast, would have been limited to a conversation among economists.

CASE STUDY NUMBER 2: The Cooling Water Slaughter

Billions of Gallons a Day

Power plants withdraw billions of gallons of water a day from rivers, lakes, streams, and estuaries for cooling purposes. In the process, billions of fish, shellfish, plankton, and other aquatic organisms are killed—either squashed against the screens that cover the intake structures, or sucked up into the mechanism and destroyed. The consequences are devastating to aquatic ecosystems. Innumerable populations of fish and shellfish that we rely on for food are needlessly decimated. But even more ominously, these cooling systems destroy billions of other organisms that we may never have even heard of, but that play a crucial role in the ecosystem as a whole.

These cooling systems destroy billions of organisms that play a crucial role in the ecosystem as a whole.

Congress was aware of this problem when it passed the Clean Water Act in 1972 and so included a provision specifically directing EPA to issue regulations governing cooling water intake structures. Congress specified that EPA "shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." 33 U.S.C. § 1326(b).

EPA implemented this mandate in the New Facilities Rule with a pragmatic process similar to that used in the lead rule, but it abandoned this approach in favor of cost-benefit analysis in its Existing Facilities rule. Comparing the episodes once again illustrates the merits of PRIA over cost-benefit analysis.

The New Facilities Rule

EPA dragged its feet for many years on this problem, failing to begin writing a rule that would require power plants to use "best technology" to safeguard ecosystems. In 2001, 29 years after the original statutory mandate was enacted, EPA finally issued a rule governing cooling water intake structures at new facilities. In designing this rule, EPA took its marching orders directly from the language of the statute, identifying "the best technology available for minimizing adverse environmental impact." 66 Fed. Reg. 65260. Its pragmatic analytical process involved four steps. First, the agency evaluated the environmental impacts of cooling water intake structures. Second, it identified the various alternative technologies available, assessing their feasibility or "availability." Third, it evaluated the costs (or economic "availability") of those technologies, observing that the legislative history of the Act indicated that "'best technology available' should be interpreted as 'best technology available commercially *at an economically practicable cost*.'" 65 Fed. Reg. 49094 (emphasis added). And, fourth, it evaluated the effectiveness of each technology in reducing environmental impacts. This process required the agency to convene a wide variety of experts, including aquatic biologists, ecologists, and engineers.

In evaluating environmental impacts, EPA took a *qualitative*, as opposed to a *number-crunching* approach, explaining that "it is not feasible confidently to assign monetary values." *Economic Analysis of Final Rule*, 11-1. EPA experts did have enough information, however, to know

that the environmental impacts would be large. Indeed, the federal Court of Appeals panel that later reviewed the EPA regulation agreed with the agency's pragmatic judgment, calling these ecological effects "staggering." 358 F.3d. at 181. A single plant can kill more than a million large fish and 200 million smaller fish and organisms in only *three weeks* time.

As for available technologies, cooling water systems basically come in three varieties:

1. The cheapest option, and the one used by most facilities, is a "once-through" system, which simply withdraws water, circulates it through the facility, and then discharges it into the same waterbody.
2. Somewhat more expensive is a "closed-cycle cooling system." These systems still withdraw water, but by re-circulating the same water repeatedly, they use far less and therefore suck in far fewer aquatic organisms.
3. Some systems use a more expensive technology, so-called "dry cooling," which does not involve the use of water at all, instead circulating air through cooling towers.

When it came to evaluating costs, EPA considered various approaches, including a cost-benefit balancing test that would have attempted to ensure that costs were not "wholly disproportionate" to benefits. Ultimately, however, the agency concluded that its data on environmental impacts were too "imprecise" to conduct such an analysis. Instead, EPA decided to use a test for which data were available. It adopted the "compliance cost/revenue test," which evaluates costs by comparing a facility's projected compliance costs to its projected revenues from selling its electricity. EPA found that this test "provides a reliable measure of whether costs are 'economically practicable'" because "the data needed to perform the test are available or can be readily projected." 65 Fed. Reg. 49095.

Under this test, EPA concluded that dry cooling would not be economically practical. Such systems are ten times more expensive to operate than closed-cycle cooling. Requiring dry cooling, then, would impose compliance costs that were more than 4 percent of revenues for all 83 of the projected new facilities and greater than 10 percent of revenues for the 12 worst off. 66 Fed. Reg. 65,282. Closed-cycle cooling, in contrast, would result in costs of less than 1 percent of revenues for all but nine of the facilities. Moreover, EPA determined that dry cooling is only incrementally more effective at reducing harm to fish than closed-cycle cooling, which can be up to 98 percent effective. On top of that, dry cooling would cause collateral environmental harm, since air cooled systems are less energy efficient, and therefore produce more air pollution than other systems. Consulting a diverse group of experts and weighing all the evidence, EPA ultimately concluded that closed-cycle cooling was the best technology available for minimizing environmental impact. Accordingly, it wrote a rule that required new plants to either install closed-cycle cooling or take alternative measures that would deliver equivalent environmental benefits.

Because the rule was subject to OMB review, EPA prepared a CBA of sorts. But, concluding that it was "not feasible to confidently assign monetary values" to the ecological benefits of the rule, EPA punted, making no effort to quantify or monetize any of the benefits and, accordingly, making no effort to conduct the comparison of costs with benefits that is the

hallmark of CBA. EPA, *Economic Analysis of Final Regulations* 11-15. Nonetheless, despite the inadequacies of the CBA, OMB signed off, tweaking the rule in a few places but allowing EPA to finalize it in substantially the same form.

The Existing Facilities Rule

When the new facilities rule was in its final stages, EPA went to work on a rule governing *existing* power plants. Because it costs more to retrofit an existing plant than to incorporate closed-cycle cooling into a new plant's design, EPA was concerned that closed-cycle cooling would not be "economically practicable" for all existing plants. Indeed, EPA determined that if it imposed such a requirement, 5 of the 539 plants subject to the rule—less than one percent—would have to shut down altogether. 67 Fed. Reg. 17188.

While 5 out of 539 amounts to less than one percent, EPA was worried by even this small number because it was operating in a political atmosphere inside the Washington "Beltway" that was increasingly hostile to regulation. Accordingly, EPA proposed to allow most existing power plants to make relatively modest changes to their intake structures—new types of screens and filters more friendly to fish, barrier nets that would deflect fish away from intakes, and fish "return" systems. Nonetheless, with respect to the 59 largest and most damaging plants, EPA proposed to require closed-cycle cooling. As it had done for the new plants, EPA assessed the "economic practicability" of this proposal by comparing compliance costs to annual revenues. Its conclusion was that compliance costs would be "low." Indeed, 82 percent of firms would incur compliance costs of less than 0.5 percent of revenues, and 91 percent would incur costs of less than 1 percent. 67 Fed. Reg. 17158. EPA also found that: (1) closed-cycle cooling is "the most effective technology" for reducing harm to fish; (2) it is "commercially available and economically achievable" and already in use in 21 percent of existing facilities; and (3) "facilities can and have installed these technologies years after the facility began operation." *OMB Review Draft* 74-75.

Concluding that this rule was, like the earlier one, subject to OMB review under Executive Order 12866, EPA prepared a CBA and submitted it along with the draft rule to John Graham's OIRA on December 28, 2001. This time, however, rather than declining to attempt any quantification of benefits, as it had wisely done with the earlier rule, EPA spent a large amount of time and resources attempting to devise a fully quantified and monetized CBA. The analysis EPA ultimately came up with was vastly incomplete, arbitrary, and ultimately meaningless—a perfect poster child for what's wrong with CBA.

First, as is typical of attempts to estimate the environmental benefits of regulations, available data were shockingly incomplete because scientists had no data on most of the wide variety of aquatic creatures that comprise the ecosystems destroyed by the intakes, including phytoplankton and zooplankton, endangered sea turtles, and even certain commercially valuable species, like shrimp, lobsters, crabs, and mussels. In the absence of data, EPA simply ignored the damage to these species that would have been averted by a strong rule, even though scientists agreed that they play crucial roles in the aquatic food chain and other

aspects of the aquatic ecosystem, and that the destruction of such species could perturb ecosystems in ways that would destroy their normal functioning, perhaps irreversibly.

But even focusing just on those fish species EPA did include in its analysis, the agency's economists managed to count less than *2 percent*. This tiny fraction of the total population represented the fish that commercial or recreational fishermen might actually catch once they escaped the cooling water intake structures. EPA candidly admitted that it had vastly undercounted the fish, stating that its estimate "does not account for the benefits from the remaining 98.2 percent of the . . . aquatic organisms estimated to be protected nationally under today's rule." 69 Fed. Reg. 41660-61.

EPA's benefits estimate was grossly incomplete, making a meaningful comparison with costs impossible.

Once it had arrived at this grossly incomplete quantification of the number of fish benefited by the rule, EPA faced the difficult task of trying to attach a dollar figure to the saved fish. With respect to the tiny percentage of fish that would be commercially caught, EPA simply used the market price. But expressing the value of recreational fishing in monetary terms posed more of a challenge. EPA used a controversial model that inferred fishermen's "willingness-to-pay" for the pleasure of fishing based on their travel costs for visiting particular fishing sites and then used a mathematical model to estimate how that willingness-to-pay would likely increase in response to increased catch levels.

Even putting aside the difficulties with this model (and putting aside that EPA was dealing with less than two percent of the fish), EPA acknowledged that monetizing only the commercial and recreational value of these fish accounted for a small slice of their overall ecological value. Initially, in the CBA accompanying its proposed rule, EPA used several methods to attempt to monetize at least some of these missing ecological values. These methods proved controversial, however, and after receiving considerable criticism in the comments to the proposed rule, EPA finally threw up its hands and simply attached no dollar value to these ecological values at all. Thus, by the time it issued the final rule, EPA's benefits estimate—grossly incomplete by its own admission to begin with—had shrunk by nearly tenfold, from $735 million in the proposed rule to just $83 million in the final rule.

In the end, EPA flatly acknowledged that the exercise had been a failure. Its benefits estimate was grossly incomplete, making a meaningful comparison with costs impossible: "EPA notes that these analyses are based on a comparison of a partial measure of benefits with a complete measure of costs; therefore, the results must be interpreted with caution." 69 Fed. Reg. at 41666. Perhaps stating the obvious, EPA said: "A comparison of complete costs and incomplete benefits does not provide an accurate picture of net benefits to society." EPA, *Economic and Benefits Analysis*, D1-5. When it submitted its draft rule to OMB, EPA included an explicit warning about the serious limitations of its CBA: "EPA cannot perform a complete benefit-cost comparison because not all of the benefits resulting from the proposed regulatory alternative can be valued in dollar terms." *OMB Review Draft,* 211.

It is impossible at this point to know exactly what transpired between EPA and OIRA, since such records are not made public. But when the rule emerged from OIRA review 60 days

later, it was drastically changed. Among other things, the closed-cycle cooling requirement for the 59 most damaging plants had been removed, making those plants subject to the same weak standards that applied to everyone else. And the only reason EPA cited for the change was the numeric results of its cost-benefit analysis—the dollar benefits of the rule did not outweigh the dollar costs. 67 Fed. Reg. 17158. We can only assume that OIRA ignored EPA's admonition to interpret the results of its CBA "with caution."

In the end, the Supreme Court upheld EPA's weak rule and affirmed the agency's discretion to use CBA to set standards for cooling water intakes under the language of the Clean Water Act. In doing so, the Court relied on a longstanding doctrine that requires courts to defer to administrative agencies' judgments. Looking forward, then, the important point is that the agency retains *discretion*, and thus faces a choice whether to use CBA or not in setting such standards.

If the agency takes a PRIA approach, it will conclude—as EPA did in connection with the new facilities rule—that quantification and monetization of the values at stake is impossible and that CBA accordingly provides no helpful information to the decisionmaking process. In EPA's words, it "does not provide an accurate picture" of what is actually going on. Indeed, the CBA that EPA ultimately produced in connection with the cooling water intake rule illustrates perfectly the old adage about being "penny wise but pound foolish." It may take years—even decades—for us to understand the damage to aquatic ecosystems caused by essentially uncontrolled cooling water intakes at the nation's power plants. What is clear is that the OMB economists' insistence on forcing EPA to crunch numbers in an inept and incomplete way saved a powerful industry some money at the margins, but allowed it to continue wreaking havoc on natural resources—and the human beings who depend on them.

CBA Run Amok

As is so often the case when attempts are made to apply CBA to environmental, health, or safety regulations, EPA's effort to assign a monetary value to the benefits of the existing facilities rule for cooling water intakes was hopelessly incomplete. It accounted for less than two percent of the fish benefited by the rule and a far smaller percentage of the rule's overall ecological value. Accordingly, any attempt to compare the CBA's complete estimate of costs with its grossly incomplete estimate of benefits did "not provide an accurate picture of net benefits to society." Indeed, it was nonsensical. Although EPA is legally able to consult a cost-benefit study, we are at a loss to see what it contributed to determining what constituted an appropriate regulation. The pragmatic process used to construct the New Facilities Rule, by comparison, took full account of the potential benefits of regulation although the benefits could not be quantified. As in the lead regulation, deliberations focused on the statutory criteria and involved a full and fair consideration of the benefits and detriments of the three policy options, paying particular attention to a comparison of costs. The final version of the rule reflected a full-bodied debate over the relevant policy issues and scientific evidence, rather than a consideration of less than two percent of the benefits that could be quantified.

Transforming Pragmatic Analysis into "PRIA"

Despite its longevity, the use of cost-benefit analysis as the centerpiece of regulatory analysis seldom helps and often harms the effort of agencies to implement the nation's safety, health, and environmental laws. Although Congress requires agencies to assemble as much information as they can find about the sources of health, safety, and environmental threats, considerable uncertainty is inevitable when gauging the nature and scope of these risks. Agencies have developed a pragmatic, multi-disciplinary approach to writing regulations that has regulators exercising their best judgment and that tolerates not just imprecision but controversy over the choices that are made. But because of Executive Order 12866, the current version of the decree handed down originally by President Reagan, agencies must then switch to a cost-benefit analysis that excludes all the other disciplines, elevates economists as the final "deciders," and produces deeply flawed number crunching that is inconsistent with the pragmatic method of decisionmaking that agencies use. The result is that most rules are delayed for many years, many are weakened unnecessarily, and a few are suppressed outright. These outcomes also cost lives and impose irreversible injury on people and natural resources.

Although many supporters of the methodology admit to at least some of its flaws, they assert that no one has ever proposed a better alternative. This claim reflects both wishful thinking and determined stubbornness: As our case studies show, agencies are perfectly capable of conducting a pragmatic, multi-disciplinary process that results in wise policies. The question is whether these policies can then survive the last-minute CBA gauntlet.

In any event, this white paper marks an effort to take the tradition of pragmatic analysis and add three procedural reforms to it:

1. **Pre-decisional development.** A document labeled a "pragmatic regulatory impact analysis" (PRIA) would be developed as soon as an agency began the process of considering a new regulation. At the outset, the PRIA would serve as the repository of the substantive issues the agency's multi-disciplinary team believed it must investigate before formulating an actual rulemaking proposal. PRIAs would thus become the blueprint for the process, undergoing constant change, as the agency understood the issues better.
2. **Public notification**. The first time that the public usually becomes aware of how an agency has sorted out the issues relating to a proposed regulation is the Notice of Proposed Rulemaking (NPR). The pragmatic regulatory impact analysis that we propose would constitute, in effect, a discussion draft of that document. It would provide a discussion of the key issues an agency has to resolve before it can issue a NPR. An NPR, by comparison, typically proposes a tentative resolution of those issues as part of proposing and justifying a rule. PRIA therefore would not only assist agency officials in formulating a NPR, it would provide the public with the background to the NPR in an accessible and understandable format, making this document more transparent than a cost-benefit centered regulatory impact analysis.

3. **Public Input.** Moreover, agencies could invite public comment on the PRIA in appropriate situations. Under current practice, an agency sometimes issues an Advanced Notice of Proposed Rulemaking ("ANPR"), which proposes various policy options to the public and requests comment on them. But the PRIA would provide a more in-depth analysis of the issues at stake and the advantages and disadvantages of policy options. Accordingly, it would produce more informed public input and be of more assistance to the agency.

While PRIA would fully consider available numerical data on the magnitude and impact of risks, it would not convert that information into monetary estimates of the value of regulatory benefits, but instead describe such benefits in a qualitative manner. PRIA does not assume, as practitioners of CBA do, that a quantitative framework is essential, when in fact available data are simply insufficient to monetize regulatory benefits accurately and without bias.

Conclusion

Across the government, experts from a broad range of disciplines confer every day about threats to public health, worker safety, and natural resources. Scientists tell lawyers their best estimates of risk, and explain why those estimates could change as they learn more. Lawyers explain to engineers how the courts have interpreted the agency's statute in order to assist the technical experts in structuring their search for practical solutions. People with experience in enforcing the previous requirements draft the text of regulations to define violations as clearly as possible. Economists study industry estimates of compliance costs to determine whether they are accurate.

When the government experts are finished, they write up their analysis and a proposed rule and publish it for comment. Their counterparts in the private sector then examine these assumptions and conclusions, discuss their concerns about the soundness of the government's analysis among themselves, and prepare lengthy, inter-disciplinary responses to the government's proposals. The comments, often covering tens of thousands of pages, are reviewed by government experts, and a final rule—representing the best, informed judgment of all the scientists, lawyers, economists, and engineers—is drafted.

The only difference between all of these events and what happens behind the scenes all too often these days is that sometime late in the proceedings, a group composed only of economists goes off into a separate room and, without the benefit of this discourse among experts, takes this rich dialogue and subjects it to withering, reductionist scrutiny. The entire series of qualitative descriptions of reality are then reduced to a set of numbers that lose all those details, nuances, and qualifications. Think of any complex decision you have ever watched any group reach—from a city council to the Congress, from trial courts to scientific peer review panels, from corporate boards to nonprofit organizations—and consider whether the pragmatic, multi-disciplinary process or the number crunching is more likely to be wise and comprehensible to those affected most directly by the decision.

PRIA, unlike a cost-benefit centered impact analysis, is based on the longstanding, successful pragmatic decisionmaking methodology used by regulatory agencies. PRIA consists of a formal document that would record the preliminary deliberations conducted by agency experts and eventually present that analysis to the public. It would also open the door to public comment on the regulatory analysis document in appropriate cases. Like pragmatic decisionmaking itself, PRIA is based on qualitative analysis, making it is more accessible to agency officials and the public alike, unlike the impenetrable calculations of a cost-benefit centered analysis. And, like pragmatic decisionmaking, PRIA is focused on the issues generated by the statute an agency is administering, making it more useful and relevant to agency decisionmakers than cost-benefit analysis. Finally, again like pragmatic decisionmaking, PRIA accommodates the uncertainty that regulators inevitably face when administering the precautionary approach that Congress has mandated, unlike cost-benefit analysis which cannot accurately calculate benefits when such uncertainty exists.

Defenders of cost-benefit analysis are quick to claim that there is no alternative method of undertaking regulatory analysis. The alternative, however, is staring us in the face: It is a regulatory analysis that formalizes the results of the pragmatic decisionmaking practices that agencies have long successfully used to protect people and the environment.

Additional Sources

For additional information on the issues discussed in this paper:

Books

Frank Ackerman & Lisa Heinzerling, Priceless: On Knowing the Price of Everything and the Value of Nothing (New Press 2004)

Thomas O. McGarity, Sidney A. Shapiro, & David Bollier, Sophisticated Sabotage (Envtl. L. Inst. 2004)

Thomas O. McGarity, Reinventing Rationality (Cambridge Univ. Press 1991)

Sidney A. Shapiro & Robert L. Glicksman, Risk Regulation at Risk: Restoring a Pragmatic Approach (Stanford Univ. Press 2002)

Rena I. Steinzor, Mother Earth and Uncle Sam: How Pollution and Hollow Government Hurt Our Kids (Univ. of Texas 2007)

Articles

Frank Ackerman, Lisa Heinzerling, & Rachel Massey, Applying Cost-Benefit to Past Decisions: Was Environmental Protection Ever a Good Idea?," 57 Admin. L. Rev. 155 (2005)

Frank Ackerman, The Unbearable Lightness of Regulatory Costs, 33 Fordham Urb. L.J. 1071 (2006).

David M. Driesen, Is Cost-Benefit Neutral?, 77 Colo. L. Rev. 335 (2006) and Distributing the Costs of Environmental, Health, and Safety Protections: The Feasibility Principle, Cost-Benefit Analysis, and Regulatory Reform, 32 B.C. Envtl. Aff. L. Rev. 1 (2005).

Lisa Heinzerling, Regulatory Costs of Mythic Proportions, 107 Yale L.J. 1981 (1998) and The Rights of Statistical People, 24 Harv. Envtl. L. Rev. 189 (2000)."

Jamie Lincoln Kitman, The Secret History of Lead, The Nation (March 2000), available at http://www.thenation.com/doc/20000320/kitman.

Douglas A. Kysar, Discounting . . . On Stilts, 74 U. Chi. L. Rev. 119 (2007).

Thomas O. McGarity, Professor Sunstein's Fuzzy Math, 90 Geo. L. J. 2341 (2002).

Catherine A. O'Neill, Mercury, Risk, and Justice, 34 Envtl. L. Rep. 11,070 (2004).

Richard W. Parker, Grading the Government, 70 U. Chi. L. Rev. 1345 (Fall 2003).

Sidney A. Shapiro & Christopher H. Schroeder, Beyond Cost-Benefit Analysis: A Pragmatic Reorientation, 32 Harv. Envtl. L. Rev. 433 (2008).

Amy Sinden, Cass Sunstein's Cost-Benefit Lite: Economics for Liberals, 29 Columb. J. Envtl. L. 191 (2004).

Robert R.M. Verchick, The Case Against Cost-Benefit Analysis, 32 Ecology L. Q. 101 (2005).

About the Authors

Rena Steinzor is a Professor of Law at the University of Maryland School of Law, with a secondary appointment at the University of Maryland Medical School Department of Epidemiology and Preventive Medicine. Among the courses she teaches are risk assessment, critical issues in law and science, and a survey of environmental law. Professor Steinzor received her B.A. from the University of Wisconsin and her J.D. from Columbia Law School. She joined the Maryland faculty in 1994 from the Washington, D.C. law firm of Spiegel and McDiarmid. From 1983 to 1987, Steinzor was staff counsel to the U.S. House of Representatives' Energy and Commerce Committee's subcommittee with primary jurisdiction over the nation's laws regulating hazardous substances. She is the President and a Director of the Center for Progressive Reform.

Sidney Shapiro holds the University Distinguished Chair in Law at the Wake Forest University School of Law and is the Associate Dean for Research and Development. He is a member of the Board of Directors of the Center for Progressive Reform. Professor Shapiro has taught and written in the areas of administrative law, regulatory law and policy, environmental policy, and occupational safety and health law for 25 years. Professor Shapiro has been an active participant in efforts to improve health, safety, and environmental quality in the United States. He has testified before congressional committees on administrative law and occupational safety and health issues.

Amy Sinden is a Member Scholar and a Director of the Center for Progressive Reform, and an Associate Professor of Law at the Temple University Beasley School of Law in Philadelphia. Professor Sinden graduated summa cum laude from the University of Pennsylvania Law School in 1991. Before joining the Temple Law faculty in 2001, Professor Sinden served as senior counsel for Citizens for Pennsylvania's Future and a staff attorney with Earthjustice. She has written extensively in the area of environmental law and regulatory analysis. Her recent academic writings have criticized the misuse of economic theory in environmental law and have analyzed the application of classical human rights norms to environmental conflicts.

James Goodwin works with CPR's "Clean Science" and "Government Accountability" issue groups. Mr. Goodwin joined CPR in May of 2008. He earned his B.A. in Political Science from Kalamazoo College, his J.D. (with a certificate in environmental law) from the University of Maryland School of Law, and his M.P.P. (with a concentration in environmental policy) from the University of Maryland School of Public Policy. Prior to joining CPR, Mr. Goodwin worked as a legal intern for the Environmental Law Institute and EcoLogix Group, Inc. He is a published author with articles on human rights and environmental law and policy appearing in the *Michigan Journal of Public Affairs* and the *New England Law Review*.

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