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THE GOALS OF ENVIRONMENTAL LEGISLATION

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Abstract: In the past thirty years, Congress has enacted and revised numerous statutes involving environmental protection. Federal public policy toward environmental pollution has evolved during this time to respond to changing societal needs and new information about the impacts of federal regulation. This Essay will discuss the two broad categories into which regulatory goals of agencies fall: acceptable risk goals and pollution reduction goals. Each of these broad categories, in turn, contains subcategories. Environmental legislation often contains a mix of these goals, and only by examining the complex interaction among them, can the statutory language that specifies the implementation details correctly be understood. Current suggestions for reform would implement a single, simplistic cost-benefit analysis. The present, complex regulatory system allows regulations to meet varying goals, and Congress should be wary of attempts to impose perfection through unidimensional approaches to setting environmental policy.

INTRODUCTION

In the thirty-plus years since environmentalism first exploded onto the American political agenda, Congress has enacted and revised dozens of statutes that directly or indirectly attempt to protect the environment. Many of these laws are regulatory in nature; they are designed to change private conduct in ways that will help preserve and protect human health and the environment. Such laws invariably delegate the details of implementation to a regulatory agency that is

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empowered to set standards, write regulations, and issue permits, all of which are designed to protect the environment to some degree.\(^3\)

An article of faith in the policy sciences is that one of the first steps in designing a governmental program is to articulate the goals that are to be achieved.\(^4\) Yet, in the legislative frenzy that usually precedes the enactment of major environmental legislation, few of the active participants dwell on the immediate goals of particular protective programs, and the resulting statutes are often filled with hortatory and sometimes contradictory phrases that offer little guidance to the implementing agency.\(^5\) Hence, it is often difficult in retrospect to tell whether the agency has successfully implemented a particular statutory provision or whether a particular legislative approach to pollution control has worked. Disputes over whether a program has been successful often mask disputes over what the program’s goals should have been in the first place.

At first glance, a study of the goals of environmental statutes might appear superfluous. The goal of all environmental statutes is, of course, to protect and enhance the human environment. While this is undoubtedly true, a goal so broadly stated is essentially meaningless, because it begs the question of how much protection is enough. Since environmental protection always requires some effort, how much effort shall we expend? How much is too much? How much degradation shall we tolerate before concluding that the environment is no longer protected? How much cleanup is required until the environment has been enhanced?

If we are to understand the goals of environmental legislation, we must forego generalities and tighten the analysis to focus on the immediate regulatory goals of particular programs created by the environmental laws, and on how those immediate goals interrelate within the overall statutory fabric. Viewed at this less abstract level, it becomes apparent that the immediate regulatory goals of most environmental pro-

\(^3\) See, e.g., 40 C.F.R. pts. 122–124 (2004) (outlining the regulatory provisions to be implemented under the National Pollutant Discharge Elimination System (NPDES) Program under the CWA); 40 C.F.R. pt. 50 (2004) (detailing the regulatory requirements involving NAAQS under the CAA).


\(^5\) See, e.g., Natural Res. Def. Council v. Train, 545 F.2d 320, 325–25 (2d Cir. 1976) (involving a dispute over whether a vague provision of the CAA granted EPA discretion to list certain substances as criteria pollutants).
grams fall into two broad categories—acceptable risk goals and pollution reduction goals. Each of these categories, in turn, contains subcategories. Moreover, the statutes frequently provide for overlapping programs in which one goal dominates up to a point, and then the other takes over. Only by studying the complex interaction among different statutory goals can we truly understand and interpret the statutory language that specifies the implementation details. The failure to engage in this detailed analysis can lead to faulty statutory interpretation and embarrassing mis-citation of existing legal authorities.

An understanding of how the immediate statutory goals of environmental legislation interrelate is also essential to the recurring political debates over the future of environmental legislation. While retrospective reevaluation of governmental programs is always in order in an open democratic society, some criticisms of existing environmental laws have betrayed little appreciation for the sophistication with which the current edifice was constructed. Moreover, the unidimensional solutions at the top of some reformers' agendas appear in the real world of environmental regulation to represent little more than political sloganeering. Before we toss out thirty years' worth of statutory evolution in the name of common sense, we ought at least attempt to appreciate the common sense of the current statutory regime. In particular, Congress and the Administration should not lightly replace the existing

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6 See, e.g., CAA, 42 U.S.C. §§ 7401–7671 (generally mandating a harm-based approach to regulating air pollution by setting maximum allowable levels of certain pollutants in the air based on human health and environmental quality considerations).

7 See, e.g., CWA, 33 U.S.C. §§ 1251–1387 (establishing a regime under which pollution discharges into the nation's navigable waterways are regulated via source specific, technology-based effluent standards).

8 See, e.g., 33 U.S.C. § 1313(d) (mandating that states switch to a harm-based, rather than a technology-based, approach to regulating pollution when the former does not result in fishable and swimmable waterways).


10 See, e.g., ROBERT W. CRANDAL ET AL., AM. ENTER. INST. FOR PUB. POLICY RESEARCH & THE BROOKINGS INST., AN AGENDA FOR FEDERAL REGULATORY REFORM 3–6, 12–16 (1997) (maintaining that federal regulation "urgently needs repair" and even advocating eight particular reforms based upon a simplistic, four-page analysis of the existing regulatory system).

11 See, e.g., FRED L. SMITH, THE COMPETITIVE ENTER. INST., ECO-SOCIALISM: THREAT TO LIBERTY AROUND THE WORLD 1–3 (2004) (maintaining that "[t]he Greens of today pose a threat to liberty as great as the Reds of yesterday"). Competitive Enterprise Institute President Fred Smith argues against both "command-and-control" regulation and "market-based regulation" and in favor of greater protections for private property rights. Id.
complex web of environmental law with a single, simplistic cost-benefit mandate.

I. ACCEPTABLE RISK GOALS

The goal of many environmental programs is to reduce human and environmental exposure to environmental contaminants to a level that poses acceptable risks to health and the environment. Underlying this goal is the presumption that the implementing agency is capable of measuring or predicting the extent of human or environmental exposure to the contaminant at issue, assessing the risks posed by that level and alternative exposure levels, and determining a level of risk that is acceptable for those entities exposed to the contaminants. The immediate regulatory goal is to ensure that potentially exposed humans or environmental entities are not exposed to levels of the contaminant that pose unacceptable risks. Acceptable risk goals can be divided into three categories, depending upon how the agency goes about determining the acceptability of the risk: zero risk/preservationist goals; significant risk/protective goals; and reasonable risk/balancing goals.

A. Zero Risk/Preservationist

The goal of absolute preservation admits of no man-made departures from natural or background levels of environmental quality. Although natural risks may be unavoidable, risks of human origin are intolerable. For consumer products and industrial residuals, the zero risk goal is roughly the equivalent of wilderness preservation. Perhaps the best known example of a statute with a zero risk goal is the Delaney Clause of the Food, Drug and Cosmetic Act, which provides that

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12 See, e.g., 42 U.S.C. § 7401 (establishing harm-based ambient standards for air pollution that seek to limit human health and environmental injuries to acceptable levels).
13 See 40 C.F.R. § 50.2 (2004) (defining NAAQS under the CAA as “levels of air quality which the Administrator [of EPA] judges are necessary, with an adequate margin of safety, to protect the public health”).
14 See id.
16 See, e.g., 42 U.S.C. § 7409(b)(1) (regulating air pollutants at levels below those posing a risk to human health and the environment).
17 See, e.g., Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. § 136(i) (2000) (mandating that EPA approve the use of a pesticide only if it determines that the proper use of the chemical will not pose the risk of causing “unreasonable adverse effects on the environment”).
no substance that has been shown to cause cancer in laboratory animals may be deliberately added to food that is marketed in interstate commerce.\(^{18}\)

Statutory provisions aimed at achieving a zero risk goal are often attacked as impractical.\(^{19}\) For example, Justice Stephen Breyer has argued that society should not expend disproportionate resources trying to reduce or eliminate "the last 10 percent" of the risks posed by environmental contaminants.\(^{20}\) Although their defenders frequently invoke rights-oriented arguments to counter the critics' concerns for economic efficiency, zero risk goals are occasionally based upon a legislative judgment that the benefits of a particular activity are so trivial that they can justify the imposition of no additional risks on society. For example, supporters of the Delaney clause in the context of color additives suggest that the desire of a food processor to hide the real color of its product from the consuming public cannot justify any additional cancer risks.\(^{21}\)

**B. Significant Risk/Protective**

Several provisions in the environmental statutes require the implementing agency to set standards at a level that will protect the public health or the environment, sometimes with a margin of safety thrown in for good measure. For example, the Clean Air Amendments of 1970 required the Environmental Protection Agency (EPA) to set National Primary Ambient Air Quality Standards for certain ubiquitous pollutants at a level sufficient to protect the public health with an "adequate margin of safety."\(^{22}\)

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\(^{18}\) See 21 U.S.C. § 348(c)(3)(A)–(B) (2003). The original Endangered Species Act adopted an absolutist position with respect to the preservation of endangered species. See 87 Stat. 884, 16 U.S.C. § 1531 (1976); Tenn. Valley Auth. v. Hill, 437 U.S. 153, 172–74 (1978) (recognizing that "[i]t may seem curious to some that the survival of a relatively small number of three-inch fish among all the countless millions of species extant would require the permanent halting of a virtually completed dam for which Congress has expended more than $100 million," but nevertheless interpreting the statute to "require precisely that result").


\(^{22}\) 42 U.S.C. § 7409(b)(1).
Although such programs might appear at first glance to be aimed at advancing zero risk/preservationist goals, an important Supreme Court precedent involving the Occupational Safety and Health Act of 1970 suggests otherwise. In *Industrial Union Department, AFL-CIO v. American Petroleum Institute (Benzene)*, the Supreme Court reviewed a challenge to the Occupational Safety and Health Administration's (OSHA) standard for protecting workers from benzene.\(^23\) OSHA took the position that the phrase "reasonably necessary or appropriate to provide safe or healthful employment and places of employment" in the definition of "occupational safety or health standard" required the agency to set the standard at a level that allowed zero risk, unless attaining that level was not feasible.\(^24\) For substances like carcinogens, for which a "no-effect" level could not be determined, OSHA resolved to set health standards at the lowest "feasible" level.\(^25\) The Supreme Court, however, held that the word "safe" did not mean "risk-free."\(^26\) According to the Court, the statute was not designed to require employers to provide absolutely risk-free workplaces whenever it is technologically feasible to do so, so long as the cost is not great enough to destroy an entire industry.\(^27\) Instead, the statute "was intended to require the elimination, as far as feasible, of significant risks of harm."\(^28\)

More than two decades after the Supreme Court’s decision, it is fair to conclude that statutes that require the implementing agency to set a standard at the level that protects the public health do not adopt a zero risk/preservationist goal. Instead, the goal of such statutes is to protect the relevant beneficiaries from "significant" risks. The *Benzene* plurality opinion strongly suggested that applying this significant risk test to environmental standard setting is a two-step process. First, the agency must assess the risks posed by status quo exposures and alternative exposure levels.\(^29\) For some kinds of risks, *e.g.*, the risks posed by carcinogenic substances, elaborate quantitative risk assessment models are available for performing this first step.\(^30\) Since risk assessment is still more of an art than a science, however, the competing

\(^{23}\) 448 U.S. 607, 611 (1980).


\(^{25}\) See Indus. Union Dep't, 448 U.S. at 624 n.19.

\(^{26}\) See id. at 639–41.

\(^{27}\) Id. at 641.

\(^{28}\) Id.

\(^{29}\) See id. at 614–15.

\(^{30}\) See id. at 635–36.
models often yield widely divergent predictions. Moreover, quantitative models only exist for a few kinds of environmental risks. Risk assessment is therefore often a very imprecise business, and risk projections are invariably characterized by a high degree of uncertainty.

The second step is the policy-dominated determination of whether a given level of risk is "significant." This typically involves a host of incommensurable considerations, including: (1) the "robustness" of the data and the uncertainties in the risk predictions; (2) the size of the exposed populations; (3) the intensity of the exposures to particular individuals; (4) the nature of the harm potentially induced by the exposure; (5) the duration of the exposure; (6) the value of the resources at risk; (7) the degree to which the exposure is voluntary; (8) the extent to which society tolerates similar risks in other contexts; and (9) distributional considerations. The complexity of these considerations and the uniqueness of most environmental insults makes it very difficult to reduce the significance determination to a single generic exercise. Nevertheless, in a relentlessly reductionist pursuit of consistency, some risk assessment advocates have insisted upon tying the significance determination to a single level of predicted risk, such as a one-in-one-million risk of death to the maximally exposed individual.

Whatever the difficulties in applying the significance concept to health and environmental risks, it seems reasonably clear that the significant risk/protective goal does not involve a balancing of health and environmental risks against costs and other inconveniences entailed in reducing the risks. In American Textile Manufacturers Institute v. Donovan, a follow-up case to the Benzene case, the textile industry argued that in deciding whether an occupational health standard was "reasonably necessary and appropriate" to providing a safe workplace, OSHA was obliged to balance the costs of alternative approaches to cleaning up the workplace against the resulting risk reduction benefits. The Court held that so long as the risks being addressed


32 See David A. Wirth & Ellen K. Silberfeld, Risky Reform, 95 Colum. L. Rev. 1857, 1864–65 (1995) (noting "the lack of sophisticated methods to evaluate noncancer risks" and the fact that "there are no formal methods to allow us to compare, for instance, risks of benzene with those of lead").

33 See Indus. Union Dep't, 448 U.S. at 642–56.

34 See id.


were significant, the agency could require employers to implement feasible risk reduction technologies, even if it could not demonstrate that the value of death and disease prevented was equal to the cost of implementing those technologies.\textsuperscript{37} Similarly, the Court has held that an ambient air quality standard under the Clean Air Act must be set at a level that protects the public health without regard to the cost of achieving that level.\textsuperscript{38}

C. Reasonable Risk/Balancing

The utilitarian goal for health and environmental regulation is a world in which humans may freely disrupt the environment up to the point at which the pain caused by the risks that their activities pose to humans and environmental entities just equals the pleasure derived from the activities that generate those risks. Phrased somewhat differently, pollution should be allowed up to the point at which the cost of pollution controls exceeds the benefits. The fundamental premise underlying the cost-benefit balancing goal is that society is willing to accept reasonable risks.\textsuperscript{39} As with the significant risk/margin of safety approach to determining acceptable risk, cost-benefit balancing relies heavily upon quantitative risk assessment techniques.\textsuperscript{40} The latter approach varies from the former in that it also calls for quantification of the costs of reducing risks and for comparing those costs to the monetized benefit of the reduced risks.\textsuperscript{41} The costs in turn depend upon the existence and expense of pollution control technologies and process technologies designed to reduce pollution.\textsuperscript{42}

In addition to all of the practical impediments and uncertainties entailed in risk assessment, an agency attempting to achieve a reasonable risk/balancing goal encounters similar difficulties in estimating the direct and indirect costs of taking the actions necessary to reduce health or environmental risks.\textsuperscript{43} Since it is often very hard for agencies to predict how regulators will react to effluent or emissions limi-

\textsuperscript{37} See id. at 535–36.
\textsuperscript{40} See id.
\textsuperscript{43} See McGarity, Reinventing Rationality, supra note 41, at 136–37 nn.88–91.
tations, they must rely on the regulated companies themselves for the information underlying cost estimates, and the companies have every incentive to err on the high side.\textsuperscript{44}

Having produced a quantitative risk assessment and a dollar estimate of the costs of alternative risk reduction possibilities, the agency must still reduce the two estimates to a common metric. This heavily value-laden exercise is perhaps the most serious impediment to achieving the balancing goal. Proponents of cost-benefit analysis have not produced a technique for quantifying noncommodity values that has commanded any agreement outside of a small group of specialists in regulatory analysis.\textsuperscript{45} As a result, agencies attempting to achieve the reasonable risk/balancing goal typically forego the quantitative approach in favor of a qualitative and highly subjective consideration of the pros and cons of various regulatory options.\textsuperscript{46}

Cost-benefit balancing is a frequently encountered goal in statutes that call for case-by-case licensing of particular products or activities. The Federal Insecticide, Fungicide and Rodenticide Act allows EPA to register pesticides that will not cause "unreasonable adverse effects on the environment" and requires EPA to cancel the registrations of pesticides later found to cause unreasonable adverse effects.\textsuperscript{47} The term "unreasonable adverse effects on the environment" is defined to mean "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide."\textsuperscript{48} Similarly, the Toxic Substances Control Act empowers EPA to take one of several enumerated regulatory actions with respect to any chemical substance that presents an "unreasonable risk of injury to health or the environment."\textsuperscript{49} The Court of Appeals for the Fifth Circuit has held that this language requires EPA to balance the costs and benefits of several regulatory alternatives prior to taking regu-

\textsuperscript{44} See McGarity & Ruttenberg, \textit{supra} note 42, at 2005–07.
\textsuperscript{45} See \textit{McGarity et al.}, \textit{supra} note 41, at 163–89.
\textsuperscript{47} 7 U.S.C. § 136a(d) (1) (C) (2000).
\textsuperscript{48} Id. § 136(bb).
\textsuperscript{49} 15 U.S.C. § 2605 (a).
EPA decisionmaking in both contexts has been notoriously complex and time-consuming. Pesticide cancellations require many years of data gathering, analysis, and hearings, and the prospect of similarly complex proceedings under TSCA in light of the Fifth Circuit opinion has caused EPA to abandon virtually all attempts to reduce the risks posed by existing chemicals under that statute.

II. POLLUTION REDUCTION GOALS

At the dawn of the modern environmental era, during the late 1960s, advocates of environmental protection legislation debated the relative merits of national media quality standards versus national emissions standards. The proponents of media quality standards offered legislation requiring EPA to prescribe concentrations of ubiquitous pollutants in receiving media capable of meeting acceptable risk goals. The advocates of national emissions standards had something very different in mind. Rather than focusing on the health and environmental effects of various pollutants in the receiving media, the agency would focus, on an industry-by-industry basis, upon the pollution control technologies and manufacturing process changes that could reduce the discharge of pollutants. Industry-wide limitations would be set on the basis of what companies in each industry were capable of achieving, whether or not the air or water into which they discharged “needed” such limitations in order to attain an acceptable level of environmental quality. The goal was simply to ensure that all sources in the polluting industries made an adequate effort to reduce pollution. As the primary environmental statutes have evolved over the last twenty-five years, the pollution reduction goal has assumed an increasingly prominent role.

The Federal Water Pollution Control Act Amendments of 1972 adopted a pollution reduction goal for both new and existing dis-
chargers of water pollutants. The amendments required new sources to install the “best available demonstrated control technology,” and that existing sources install the “best practicable control technology currently available” by 1977 and “best available technology economically achievable” by 1983.\(^{56}\) In the Clean Water Act of 1977, Congress extended the deadlines and refocused the program to give greater prominence to toxic discharges.\(^{57}\) Congress amended the statute once again in 1987 to extend the deadlines still further and to address non-industrial sources more comprehensively.\(^{58}\) Nevertheless, the technology-based standards that originated in 1972 still form the bedrock of the Clean Water Act’s regulatory regime.\(^{59}\)

While the Clean Air Amendments of 1970 aimed primarily at achieving the significant risk/protectionist goal of attaining the national ambient air quality standards (NAAQS), by 1977 it was becoming apparent that the exclusive focus on media quality was not working.\(^{60}\) Although retaining the acceptable risk goals underlying the NAAQS, Congress launched several new programs aimed at achieving pollution reduction goals. New major stationary sources in nonattainment areas had to install technology capable of achieving the “lowest achievable emissions rate”; existing stationary sources in those areas had to install “reasonably available control technology”; and major emitting facilities in attainment areas had to install the “best available” control technology.\(^{61}\) Further amendments in 1990 retained an air quality-based regime based on the NAAQS, but added a host of new requirements aimed at achieving pollution reduction goals.\(^{62}\)

In the 1970s, Congress could adopt relatively ambitious pollution reduction goals on the confident assumption that pollution was so severe that the expense of installing EPA-prescribed technology was nearly always justified by the resulting health and environmental gains. Pollution control advocates in Congress no doubt also recognized that technology-based standards aimed at attaining pollution reduction


\(^{62}\) See infra notes 70-73, 88-91, 123-126 and accompanying text (describing these new programs).
goals require less analysis and reliance on speculative dispersion and dose-response models than media quality-based standards aimed at achieving acceptable risk goals. An agency pursuing a pollution reduction goal must shoulder the considerable burden of categorizing the relevant industries, identifying model technologies, and preparing economic and financial analyses, but it does not have to attempt to monitor existing ambient media quality, assess health and environmental risks, calculate the proper pollution reduction load, and allocate that load among the existing sources of the relevant pollutants.

Administrative efficiency, however, was not the only reason for adopting a pollution reduction goal. The gradual move toward technology-based standards also reflected a lack of congressional faith in EPA and state agencies to determine the level of pollution that reflects an acceptable risk goal and to ensure that discharges do not result in ambient concentrations that exceed those levels. In addition, Congress was unwilling to allow dischargers of pollutants to use the assimilative capacity of the natural environment without first making some effort to reduce their emissions at the source. Finally, in the case of non-threshold pollutants, Congress may have decided that since any discharge subjects humans and the environment to some degree of risk, sources of those pollutants should do something to reduce those discharges, whether or not they contributed to a significant risk of disease or environmental damage.

A. Best Efforts

When Congress wants EPA to require sources to adopt the very best pollution reduction technologies and process changes, it uses superlatives in identifying the required level of technological achievement and it minimizes the extent to which the agency may consider cost. The Clean Water Act of 1977 requires direct dischargers of toxic pollutants to meet effluent limitations based upon the "best available technology economically achievable." This standard may be based upon the single best performing plant in an industrial subcategory. Indeed, it is not necessary that EPA be able to point to any existing

63 33 U.S.C. § 1311(b)(2)(A). The "best available technology" requirement also applies to dischargers of so-called "grey area" pollutants that have not been listed as toxic pollutants, but are not among the conventional pollutants that ordinary sewage treatment plants are capable of treating. See id. § 1311(b)(2)(F).

source that meets the requirements for all of the pollutants discharged by plants in the subcategory, so long as a single plant can be identified that can meet the limitation for each of the pollutants. In other words, the agency can to some extent engage in a leap of faith. Cost considerations play a role in prescribing effluent limitations based on best available technology, but they do not play a dominant role.

After the Clean Air Act Amendments of 1977, new and modified major emitting facilities in "clean air" areas must install "the best available control technology." New and modified major stationary sources in "nonattainment" areas must attain the "lowest achievable emission rate," a term that is defined to mean "the most stringent emission limitation" contained in any state implementation plan (SIP) for the relevant class or category or the "most stringent emission limitation which is achieved in practice by such class or category, whichever is more stringent."

The Clean Air Act Amendments of 1990 added many more pollution reduction requirements aimed at achieving a "best efforts" goal. The amendments completely overhauled EPA's approach to writing national emission standards for hazardous air pollutants (NESHAPs). The standards for major sources must require "the maximum degree of reduction in emissions of the hazardous air pollutants . . . achievable" (MACT), taking into account costs and non-air quality health and environmental impacts and energy requirements. For new sources, MACT cannot be less stringent than "the emission control that is achieved in practice by the best controlled similar source." For existing sources,

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65 See id.
66 See Tanners' Council, Inc. v. Train, 540 F.2d 1188, 1195 (4th Cir. 1976) (EPA "may look to the best performer in the industry and even assess technologies that have not been applied as long as the record demonstrates that there is a reasonable basis to believe that the technology will be available [by the deadline]."). The courts, however, have been unwilling to allow EPA to engage in very large leaps of faith. See Am. Petroleum Inst. v. Envtl. Prot. Agency, 540 F.2d 1023, 1038-39 (10th Cir. 1976) ("Even if the 1983 flow reductions are unattainable by existing refineries, it does not follow that new plants could not be designed so as to incorporate the means of attaining the lower flow rates.").
70 The statute contains a very long list of hazardous air pollutants for which EPA must write NESHAPs once it has identified classes and categories of sources of those pollutants. See 42 U.S.C. § 7412(b).
71 Id. § 7412(d) (2).
72 Id. § 7412(d) (3).
MACT must be no less stringent than the average emission limitation achieved by the best performing twelve percent of the existing sources or, for categories with fewer than thirty sources, the average emission limitation achieved by the best performing five sources.\textsuperscript{73}

B. Reasonable Efforts

Congress occasionally has been willing to settle for something less than best efforts in order to get things moving in the right direction. The Federal Water Pollution Control Act Amendments of 1972 called for two rounds of technology innovation corresponding to the five-year permit cycle. While the second round called for “best available” technology, the first round only required the installation of “best practicable” technology (BPT).\textsuperscript{74} In establishing BPT, EPA was required to consider “the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application.”\textsuperscript{75} While this operation clearly involves some kind of balancing, EPA has steadfastly maintained that it does not require a detailed quantification of the costs and environmental benefits of alternative pollution reduction technologies. Rather, EPA simply assumes that a pound of pollutant removed from any company’s effluent stream is beneficial, whether or not it has any measurable positive impact on humans or the organisms living in the receiving stream. Reasonableness is determined by cross-industry comparisons of the cost of removing a pound of the same pollutant and sometimes by searching for the “knee of the cost curve.”\textsuperscript{76} In effect, EPA concludes that the cost of installing a technology is reasonable if the cost-per-pound of removing a given pollutant with that technology is not too different from the cost-per-pound of removing the same pollutant in an industry for which the agency has already promulgated a standard.\textsuperscript{77}

\textsuperscript{73}Id. § 7412(d) (3) (A)–(B).
\textsuperscript{75} 33 U.S.C. § 1314(b)(1)(B).
\textsuperscript{76} See Chem. Mfrs. Ass’n v. Envtl. Prot. Agency, 870 F.2d 177, 204–06 (5th Cir. 1989), modified 885 F.2d 253 (5th Cir. 1989). The knee of the cost curve is the point at which the cost-per-pound of removing additional amounts of a pollutant from the effluent stream escalates dramatically. EPA has taken the position that the knee of the curve inquiry is not required in establishing “best practicable technology,” but may be required for establishing “best conventional control technology,” which represents a slightly more stringent level of pollution reduction for conventional pollutants. See id. at 205.
The Clean Air Act Amendments of 1977 required states containing nonattainment areas to amend their SIPs to require for the implementation of "reasonably available control measures," including "reasonably available control technology" (RACT) for stationary sources.\(^78\) EPA has consistently taken the position that RACT "is the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility."\(^79\) The Agency has promulgated "control techniques guidelines" for numerous polluting industries to assist the states in this regard.\(^80\) As with BPT in the water context, the goal is not to require the top-of-the-line technology; rather, the goal is to ensure that reasonable steps are taken to reduce the existing pollution load.

C. Waste Minimiz.ation/Source Reduction

In recent years, regulatory attention has shifted from an almost exclusive focus on what can be done at the end of the pipe to what can be done throughout the manufacturing process to reduce discharges of pollutants into the environment. The goal of the Pollution Prevention Act of 1990, for example, is "source reduction," which is defined as any practice that either reduces the amount of a pollutant released into the environment or reduces the hazards to public health of such pollutants prior to recycling, treatment, or disposal. The term includes "equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control."\(^81\) The statute does not, however, empower EPA to impose any direct regulatory requirements except for an annual toxic chemical source reduction and recycling report.\(^82\)

Section 211 of the Clean Air Act empowers EPA to regulate fuels and fuel additives.\(^83\) Among other things, section 211 allows EPA to register fuel and fuel additives, require manufacturers to conduct health and environmental testing on such fuels or additives, and write

\(^78\) See 42 U.S.C. § 7502(c)(1).

\(^79\) See Michigan v. Thomas, 805 F.2d 176, 180 (6th Cir. 1986) (quoting ENVTL. PROT. AGENCY, GUIDANCE FOR DETERMINING ACCEPTABILITY OF SIP REGULATIONS IN NONAT­ TAINMENT AREAS (1976)).

\(^80\) See, e.g., 40 C.F.R. § 52.123 (2004).


\(^82\) See 42 U.S.C. § 13106(a).

\(^83\) Id. § 7545.
regulations to “control or prohibit” the manufacture and sale of a fuel additive if “any emission product of such fuel or fuel additive causes, or contributes, to air pollution which may reasonably be anticipated to endanger the public health or welfare.”\textsuperscript{84} Throughout the 1970s and 1980s EPA exercised this power—in a rather incremental and halting fashion—to phase the fuel additive tetraethyl lead out of gasoline.\textsuperscript{85} The result was a dramatic drop in ambient levels of lead in urban areas and a corresponding drop in blood lead levels in urban residents.\textsuperscript{86} Airborne lead is no longer the major pollution problem that it once was, because EPA very directly eliminated the largest source of lead air pollution in the United States.

The 1990 Amendments tackled the almost intractable problem of acid rain directly, by requiring EPA to establish a system of emissions limitations and marketable permits in sulfur dioxide emissions that will reduce the overall amount of sulfur dioxide emitted by power plants in the Midwest by ten million tons from 1980 levels.\textsuperscript{87} The reduction in overall emissions is to come in two phases. Phase I, which began in 1995, brought about a 3.5 million ton reduction in sulfur dioxide emissions by controlling the largest and dirtiest coal-fired power plants.\textsuperscript{88} Phase II had to bring about a reduction of 10 million tons below 1980 levels by subjecting all utility sulfur dioxide emissions to an annual cap of 8.9 million tons per year.\textsuperscript{89} This highly complicated statutory scheme is primarily aimed at achieving a pollution reduction goal of eliminating 10 million tons of sulfur dioxide emissions per year.\textsuperscript{90}

The Resource Conservation and Recovery Act also requires every generator of hazardous wastes to certify that it has a program in place “to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practica-

\textsuperscript{84} Id. § 7545(c) (1).
\textsuperscript{86} See McGARTY, REINVENTING RATIONALITY, supra note 41, at 29–44.
\textsuperscript{87} See 42 U.S.C. § 7651(b).
\textsuperscript{88} Id. § 7651c.
\textsuperscript{89} Id. §§ 7651c–d. During Phase II, EPA must allocate marketable pollution allowances to all fossil fuel fired utility units, with most units receiving allowances that would require emissions reductions (including further reductions for Phase I units). Id. § 7651d. The statute establishes sulfur dioxide “allowances” for eight major categories of plants based upon type of fuel and historical emissions rate; some units even receive greater allowances than their historical emissions. Id. § 7651c, tbl. A. An “allowance” is a permission to emit one ton of sulfur dioxide. Id. § 7651a(3).
\textsuperscript{90} See id. §§ 7561a–o.
ble." 91 This requirement, however, does not require waste reduction; sources are free to limit themselves to reducing toxicity. 92 Moreover, the requirement says virtually nothing about the content of the waste minimization program. 93 A generator could achieve volume reductions by treating existing wastes, rather than changing manufacturing processes to reduce the quantity of waste generated. 94

III. MIXED STRATEGIES

The legislature need not limit itself to a single goal, even with respect to a single regulatory program. Congress has frequently demanded that EPA pursue both acceptable risk and pollution reduction goals simultaneously. 95 Pursuing a mixed strategy can, of course, introduce unanticipated complexities into the agency's implementation efforts, and it can on rare occasions result in conflicts between goals.

A. More Stringent Standard Prevails

Perhaps the simplest mixed strategy is one in which Congress requires the agency to establish standards aimed at meeting both pollution reduction and acceptable risk goals, and further provides that the more stringent standard must be achieved. For example, the Clean Water Act requires EPA to promulgate industry-wide standards for direct dischargers of toxic pollutants, requiring the installation of the best available control technology. 96 Effluent limitations based upon these standards must be met regardless of the quality of the receiving waters. 97 But if the effluent reductions that the technology-based standards require do not result in water quality that protects the public health with an ample margin of safety—an acceptable risk goal—then EPA must promulgate standards requiring still further reductions in discharges, including plant closures. 98 In addition, if the source is discharging into a stream segment for which state-promulgated water quality standards have not been achieved, meeting the technology-based effluent limitations will not be sufficient. 99 A source's permit

91 Id. § 6922(b).
92 See id.
93 See 42 U.S.C. § 6922(b).
94 See id.
96 See discussion supra notes 56–59 and accompanying text.
98 See id.
99 Id.
must require it to meet any more stringent requirement necessary to achieve the state water quality standard.\textsuperscript{100} Moreover, no permit may be issued to a new source, even if it meets the technology-based requirements for its industrial category, if its discharge will cause or contribute to a violation of state water quality standards.\textsuperscript{101}

Congress has adopted a similar mixed strategy under the Clean Air Act for major stationary sources in “nonattainment” areas. As we have seen, new and modified major stationary sources in a nonattainment area must achieve the “lowest achievable emissions rate,” and existing sources must install “reasonably available control technology.” Even definitive proof that the area will attain the ambient air quality standards by the deadline does not relieve stationary sources of their pollution reduction obligations. At the same time, the state implementation plans must provide for the attainment of the national ambient air quality standards by the statutory deadlines, quite apart from the requirements on stationary sources. If installing the required technologies will not bring about sufficient reductions to meet the standards, then even more stringent requirements will be necessary.\textsuperscript{102}

The Clean Air Act Amendments of 1977 created a zoning scheme in which all areas meeting the national ambient air quality standards must be divided into three classes. The statute assigns to each class an increment, which consists of an additional concentration above the baseline concentration to which air quality for the relevant pollutant may be allowed to deteriorate in areas assigned to that class. The baseline concentration for an area is determined as of the time of the first application for a permit under the program for that area.\textsuperscript{103} Once increments have been assigned to an area, the state implementation plan must ensure that the increments are never exceeded.\textsuperscript{104} Unlike the NAAQS, the increments are not designed to protect public health or welfare. Indeed, the actual air quality allowable in a clean air area is not even determined until the application for the first permit for a major emitting facility. Air quality in a clean air area can permissibly be allowed to deteriorate to the concentrations specified in the NAAQS through the addition of facilities that are not major emitting facilities.

\textsuperscript{100} Id. § 1311 (b) (1) (C).
\textsuperscript{101} 40 C.F.R. § 122.4(i) (2004).
\textsuperscript{102} See discussion supra Part II.A and accompanying notes.
\textsuperscript{103} 42 U.S.C. §§ 7472-7473. The concentration can never be allowed to exceed the NAAQS. Id. § 7473(b) (4).
\textsuperscript{104} Id. § 7471. The state may, with certain limitations and subject to certain procedures, reclassify an area to one in which a greater increment is allowed. See id. § 7474.
Thus, the requirement that the states protect the increments is more clearly aimed at impeding the deterioration of air quality down to the level at which health or welfare may be at risk. The legislative goal thus lies somewhere between zero risk/preservationist and significant risk/protective, depending upon the timing of the first permit application and on how the state classifies the area.105

Superimposed upon the classification scheme for clean air areas is the previously discussed general requirement that all new and modified major emitting facilities install the "best available control technology."106 If previously permitted sources have already consumed the increment for an area, a new major facility cannot be constructed and an existing major facility cannot be modified to increase emissions, even if it is willing to install the best available technology.107 Conversely, a new or modified major emitting facility must install the best available technology, even if something less would still protect the relevant increment. For any given major emitting facility, the more stringent of the acceptable risk and pollution reduction goals prevails.108

When the standard aimed at pollution reduction goals prevails under this mixed strategy, sources often complain that the result is inefficient. They are being asked to make expenditures to reduce pollution even though some degree of contamination is not unaccept­able. The government is requiring “technology for technology’s sake.” Yet the most stringent mixed strategy can be a necessary hedge against the huge uncertainties that becloud the process of setting acceptable risk standards. The future may reveal that the acceptable risk standards did not in fact reach acceptable risk goals, but by this time the technologies will have already been foregone and damage will have resulted. In the case of nonthreshold pollutants, a plausible case can also be made for the proposition that no additional risk is acceptable as long as available technology can reduce that risk still further. It is, in other words, appropriate for society to insist that companies use their best efforts to reduce risks, even though the monies expended do not comport with the economist's cost-benefit calculus.

When the standard aimed at acceptable risk goals prevails, the agency may have to face the difficult question of how to push beyond

105 See discussion supra Part II.A. and accompanying notes.
106 See discussion supra Part II.A. and accompanying notes.
107 See Ala. Power Co. v. Envtl. Prot. Agency, 636 F.2d 323 (D.C. Cir. 1979) (rejecting the argument that the permit process for major emitting facilities was the exclusive vehicle for protecting the prevention of significant deterioration increments).
108 See discussion supra Part II.A. and accompanying notes
what is technologically feasible. One possible answer is that one or more of the existing sources will have to stop discharging altogether. Politically accountable agencies like EPA, however, are extremely reluctant to close down facilities to which the operators have devoted their best pollution control efforts. In cases in which an existing source is doing the best that it can, the agency frequently enters into an agreement with the source that places it on a compliance schedule calling for greater reductions at some time in the future. When no technological solution looms on the horizon, the agency may allow the source to continue discharging, but require it to engage in a research and development program aimed at coming up with additional pollution reduction. Although acceptable risk goals often trump pollution reduction goals in theory, they seldom do so in the real world in which plant shutdowns mean job loss and economic dislocation.

B. Technology Focus with a Risk-Based Concession

Congress has occasionally provided that the agency need not require sources to comply with technology-based limitations if greater discharges do not threaten the attainment of acceptable risk goals. The Occupational Safety and Health Act, as interpreted by the Supreme Court in the Benzene case, is an example of acceptable risk goals trumping pollution reduction goals in cases in which the latter goals would require more stringent standards. As we have seen, the Court held that OSHA was powerless to require economically and technologically feasible health technologies to workplaces in which worker exposure to chemicals did not pose a “significant risk” to the workers.

The 1990 amendments to the Clean Air Act require EPA to establish NESHAPs for stationary sources reflecting the maximum achievable control technology (MACT) for emitters of hazardous air pollutants, a standard which rather clearly represents a best efforts goal. In the case of carcinogens, these standards must be met even if compliance reduces the risks to exposed individuals to extremely low levels. The statute allows the agency to consider established health thresholds for pollutants for which such thresholds have been established, along

109 When the pollution reduction goal is only “reasonable efforts,” the agency may not have to face this dilemma if “best efforts” are capable of reaching acceptable risk goals.
110 See Kennecott Copper Corp. v. Train, 526 F.2d 1149, 1159–60 (9th Cir. 1975) (copper smelter required to engage in research and development program aimed at achieving continuous controls on sulfur dioxide).
111 See supra notes 23–28 and accompanying text.
112 See supra notes 70–73 and accompanying text.
with an ample margin of safety. This suggests—but only very vaguely—that Congress may have adopted a mixed strategy with respect to sources that emit threshold pollutants. Maximum achievable technology may not be required if something less will ensure human exposures below the threshold level plus an ample margin of safety.

EPA may delete a category of sources of one or more hazardous pollutants from the list of categories, and thereby avoid the maximum achievable control technology requirement for that category, if certain risk-based conditions are met for all sources in the category. In the case of threshold pollutants, EPA must find that emissions from no source in the category will exceed “a level which is adequate to protect public health with an ample margin of safety and no adverse environmental effect will result.” In the case of nonthreshold pollutants, EPA must find that no source in the category emits hazardous pollutants “in quantities which may cause a lifetime risk of cancer greater than one in one million to the individual in the population who is most exposed to emissions from the source.” Thus, for such categories subject to deletion from the list, Congress has articulated a mixed strategy that is technology-based with a risk concession.

The 1984 Amendments to the Resource Conservation and Recovery Act provide for a phased prohibition of all land disposal of untreated hazardous wastes, except for some kinds of deep well injection, unless EPA expressly determines that one or more methods of land disposal is sufficient to protect human health and the environment for as long as the wastes remain hazardous. EPA may not, however, determine that a method of land disposal is protective of human health unless an interested person demonstrates “to a reasonable degree of certainty that there will be no migration of hazardous constituents from the disposal unit or injection zone for as long as the wastes remain hazardous.” Hazardous wastes can be disposed of in land disposal facilities if they are treated in accordance with EPA’s treatment regulations. The treatment standards must reflect “those levels or methods of treatment, if any, which substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous

114 Id. § 7412(c)(9)(B)(ii).
115 Id. § 7412(c)(9)(B)(i).
116 Id. § 6924(g)(5).
117 Id. § 6924(d)(1).
118 See id. § 6924(a).
constituents from the waste so that short-term and long-term threats to human health and the environment are minimized.”119

The Amendments precipitated a great debate over whether the above-quoted language allowed EPA to write feasibility-based treatment standards without a risk-based concession. The Court of Appeals for the D.C. Circuit resolved this debate in 1989 when it held that EPA could lawfully require the application of “best demonstrated available technology” (BDAT) without a risk-based cap.120 The same court later rejected an industry contention that EPA was required to engage in comparative risk analysis—comparing the risks to human health and the environment of treatment of a waste by a particular BDAT with those inherent in land disposal of the same waste—in setting treatment standards.121 Thus, the “land ban” program does not impose a risk-based concession to EPA’s feasibility-based approach.

C. Risk Focus with a Feasibility-Based Concession

Congress sometimes tells an agency to pursue acceptable risk goals only up to the point at which that becomes infeasible. For example, the Occupational Safety and Health Act empowers OSHA to set occupational health standards at the level “which most adequately assures, to the extent feasible, . . . that no employee will suffer material impairment of health or functional capacity . . . .”122 As we have seen, the Court held in the Benzene case that in promulgating occupational safety standards, OSHA may only address significant risks.123 In cases in which it is not feasible to reduce employee exposure to levels that no longer pose significant risks, the statute appears to demand that the standard be set at the feasible level, even if that leaves employees exposed to significant risks. The theory may be that it is better to leave employees exposed to significant risks than to regulate them out of their jobs.

119 42 U.S.C. § 6924(m)(1).
120 Hazardous Waste Treatment Council v. Envtl. Prot. Agency, 886 F.2d 355, 364–65 (D.C. Cir. 1989). Since EPA had not adequately explained why it took that approach, the standard was remanded. Id. at 364–71. The court was afraid that EPA had simply kowtowed to some influential congresspersons. Id. at 365.
123 See discussion supra Part I.B. and accompanying notes.
IV. Cost-Benefit “Supermandates”

The foregoing description of the existing environmental statutes reveals a rich array of regulatory approaches aimed at achieving a variety of goals. Although Congress has sometimes expressed a preference for balancing the costs of pollution reduction against the resulting benefits, it has more often relegated cost to one of many considerations, and it has rarely required the agency to quantify and monetize the benefits of pollution control requirements. The sponsors of several bills in the 104th Congress, however, attempted to bring about a dramatic change to the existing law by imposing a uniform cost-benefit balancing goal on all environmental regulation. An example is House Bill 1022, the Risk Assessment and Cost-Benefit Act of 1995, which in turn was an essential component of the regulatory proposals of the Republican party’s Contract with America: it would have required federal agencies involved in health, safety, and environmental regulation to prepare detailed risk assessments and cost-benefit analyses to accompany “major” rules through the internal agency decision making process and to become a part of the record on judicial review. Although agencies have, pursuant to executive order, been preparing similar analyses for rules having an impact of at least $100 million on the economy, the executive orders have always been carefully drafted to prevent the agencies from relying upon, or even considering, such analyses when precluded by statute.

In a major departure from past administrative practice, however, House Bill 1022 provided: “[n]otwithstanding any other provision of federal law, the decision criteria of subsection (a) shall supplement and, to the extent there is a conflict, supersede the decision criteria for rulemaking otherwise applicable under the statute pursuant to which the rule is promulgated.” The foregoing analysis of the goals of the existing environmental statutes should reveal how this apparently innocuous “supermandate” provision would in fact have radically re-oriented all of the statutes administered by federal agencies charged with protecting public health, safety, and the environment.

124 See, e.g., 42 U.S.C. § 300g-1(b)(6). This 1996 addition to the Safe Drinking Water Act permits EPA to promulgate a “maximum containment level” at a level “that maximizes health risk reduction benefits at a cost that is justified by the benefits.” Id.
127 H.R. 9, 104th Cong. § 422(b) (1995).
A cost-benefit supermandate would have the effect of imposing a reasonable risk or reasonable efforts concession on all other health, safety, and environmental programs. This could have the advantage of encouraging more efficient regulation. Critics of the existing regulatory programs have often bemoaned their potential to waste scarce resources. Forcing agencies to pursue zero risk/preservationist goals sends them off in pursuit of what Justice Breyer has characterized as "the last 10 percent" of risk reduction, an exercise that, according to the critics, rarely represents an efficient use of resources. Even eliminating "significant" risks can be inefficient, if the costs of reducing those risks are greater than the benefits. Similarly, an agency in pursuit of a best efforts goal will, according to the critics, usually reach the point at which the benefits of more stringent pollution reduction technologies are not justified by the costs before they reach the top-of-the-line technology.

A cost-benefit supermandate, however, has several important drawbacks. It would as a practical matter embroil every health, safety, and environmental rulemaking initiative in endless debates about the costs of the relevant pollution reduction technologies, the probable pollutant levels in the receiving media, the effect of the pollutants on exposed humans and other environmental entities, and the value of the human lives or environmental entities at stake. The impossibility of reducing the host of uncertainties and imponderables involved in such reductionist efforts is precisely what has dissuaded Congress in most instances from prescribing reasonable risk and reasonable efforts goals in the environmental statutes.

Moreover, this highly analytical exercise will, as a practical matter, be carried out by experts with training in cost analysis, risk assessment, toxicology, etc. Although most of the important issues that must be resolved in applying cost-benefit analysis to health and environmental

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131 See McGarity, Reinventing Rationality, supra note 41, at 111–64.

132 See Thomas O. McGarity, Professor Sunstein’s Fuzzy Math, 90 Geo L.J. 2341, 2369 (2002) (criticizing Professor Sunstein’s enthusiasm for cost-benefit analyses undertaken by experts, “many of whom have devoted their careers to criticizing health, safety, and environmental regulation”).
regulation are in fact science/policy questions for which science does not provide answers, the process of applying the cost-benefit decisional criteria to regulatory alternatives in inherently opaque to public scrutiny. Cost-benefit analysis often deals the affected public out of the decisionmaking process for no good reason.

Finally, even assuming that a cost-benefit supermandate would lead to more efficient regulation, it is unclear why economic efficiency should be elevated to the status of meta-value to the exclusion of other important societal goals. Applying a cost-benefit measure to all health, safety and environmental standards would have important distributional impacts that would on at least some occasions outweigh efficiency considerations. In addition, since much environmental damage is effectively beyond the reach of the tort system, pollution will still produce winners and losers. A just society can rationally demand that the winners do the best that they can in advance to reduce the risk to the losers, whether or not that level of effort meets the economist’s cost-benefit test. Similarly, society can rationally conclude that the winners not expose the losers to significant risks, or any risks at all, even though the winners can make a good case for the proposition that their gains would exceed the losers’ losses.

CONCLUSION

Public policy toward environmental pollution at the federal level has evolved throughout the last thirty years to meet society’s changing needs and in response to new information about the impacts of federal legislation. It has not followed a single path; nor has it pursued a single goal. The richly diverse collection of federal statutes through which EPA implements environmental policy reflects this history. Sometimes EPA regu-


137 See discussion supra Part I.C. and accompanying notes.
lations must meet pollution reduction goals; sometimes they must meet acceptable risk goals; and sometimes they must pursue mixed goals. This should come as no surprise in a diverse society like the United States. The resulting regulatory regime is by no means perfect, but Congress should be wary of simplistic attempts to impose perfection through unidimensional approaches to setting environmental policy.