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Environmental Law for the 21 st Century

E. Donald Elliott and Daniel C. Esty

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Daniel C. Esty

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ARTICLE

Environmental Law for the 21st Century

BY E. DONALD ELLIOTT† & DANIEL C. ESTY††

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Authors' Note on Method: One of the commenters on a preliminary draft of this article suggested that we have a love-hate relationship with law and economics. Perhaps a better metaphor would be that we are prodigal sons. We both studied under the great Guido Calabresi, one of the founders of Law and Economics. We revere him as a mentor, and we believe that we are applying and extending his work to our field. We both also learned a great deal from professors Bruce A. Ackerman and Susan Rose Ackerman, also our colleagues at Yale, who were among the first to apply law and economics thinking to Environmental Law.[1] Elliott was privileged to co-

† Florence Rogatz Visiting Professor (adjunct) of Law, Yale Law School; Distinguished Adjunct Professor, Antonin Scalia Law School, George Mason University.
†† Hillhouse Professor, Yale University.

1. *See generally* BRUCE A. ACKERMAN, SUSAN ROSE-ACKERMAN, JAMES W. SAWYER, JR., & DALE W. HENDERSON, THE UNCERTAIN SEARCH FOR ENVIRONMENTAL QUALITY (1974).

teach and write with Bruce early in his career and gratefully acknowledges his influence.[2] However, like prodigal sons, we both left our comfortable home at the Yale Law School and ventured out into Environmental Law as it actually exists in the real world, first at the Environmental Protection Agency (EPA) and then as advisers to both companies and environmental non-governmental organizations (NGOs).[3]

In this article, as well as its predecessor,[4] we have returned to our academic home to exploit our relatively unusual perspective as practitioners, as well as academics, to define what actually works best in environmental law and then to modify the prevailing paradigms of the United States' environmental laws, which are based on traditional law and economics.[5] In short, we try to make what works in practice also work in theory.

In that spirit, the title of our first article in this series, "The End Environmental Externalities Manifesto," has a double meaning. Yes, we find

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2. *See, e.g.*, Bruce A. Ackerman & Donald Elliott, Opinion, *Air Pollution 'Rights,'* N.Y. TIMES (Sept. 11, 1982), at 23, https://www.nytimes.com/1982/09/11/opinion/airpollution-rights.html [https://perma.cc/H6MG-UWWP].

3. At the EPA, Elliott served as Assistant Administrator and General Counsel, and Esty was Special Assistant to the Administrator, Deputy Chief of Staff, and then Deputy Assistant Administrator for Policy. After the EPA, Esty founded a corporate sustainability consulting firm and headed the Connecticut Department of Energy and Environmental Protection. Elliott went on to head the environmental practice groups at four AmLaw100 law firms while continuing to teach and write as a full time academic. On the NGO side, Esty has served on the boards of Resources for the Future, the Connecticut Fund for the Environment, and the Connecticut Chapter of the Nature Conservancy. Elliott served on the board at the Connecticut Fund for the Environment (now "Save the Sound"), the Environmental Law Institute, and as chair of the advisory board of NYU's Institute for Policy Integrity, which he helped found.

4. E. Donald Elliott & Daniel C. Esty, *The End Environmental Externalities Manifesto: A Rights-Based Foundation for Environmental Law*, 29 N.Y.U. ENV'T L.J. 505 (2021).

5. One of us has called this approach to learning the lessons from what works and trying to replicate successful models "domestic comparative law." E. Donald Elliott, *Rationing Analysis of Job Losses and Gains: An Exercise in Domestic Comparative Law*, *in* DOES REGULATION KILL JOBS? 256, 256 (Cary Coglianese et al. eds., 2013). This analytic approach adopts an iterative learning process, a method adapted from the common law, in which we apply existing paradigms as a first order approximation but then seek to modify them in the light of experience. *See* E. Donald Elliott, *Holmes and Evolution: Legal Process as Artificial Intelligence*, 13 J. LEGAL STUD. 113, 143 (1984). We also note that this approach of studying what works and trying to understand and replicate successes is the method used in business schools, perhaps reflecting the influence of W. Edwards Deming who believed in studying and propagating successes. *See* John Holusha, *W. Edwards Deming, Expert on Business Management, Dies at 93*, N.Y. TIMES (Dec. 21, 1993), https://www.nytimes.com/1993/12/21/obituaries/w-edwards-deming-expert-on-business-management-dies-at-93.html [https://perma.cc/HCA6-4K4L] (summarizing Deming's life and introducing his ideas). For more on Dr. Deming and his influential legacy, see RAFAEL AGUAYO, DR. DEMING: THE AMERICAN WHO TAUGHT THE JAPANESE ABOUT QUALITY (1990).

the traditional economic concept of externalities a useful way to identify environmental problems, but just as environmental law in practice seeks to eliminate externalities with technology where reasonably possible rather than merely to reflect them in the prices of goods and services, we also wish to end uninternalized externalities through a combination of technological controls and compensation. Where we part company with the traditional economic approach to externalities[6] is that we do not consider merely charging polluters or others harming the environment a price for the harm they cause to be an adequate remedy if it is reasonably possible to instead stop them from causing preventable diseases or eliminating other harms altogether. In that second sense, we wish to end externalities as the be-all and end-all concept for thinking about environmental law—or perhaps better said, we wish to supplement the concept of externalities with a prescription to take environmental protection to the next level and eliminate the harms to others including loss of ecosystem services where it is reasonably practical to do so.

We maintain that our caveat that reasonably preventable harm[7] to health and the environment must be abated to the extent practical rather than merely priced into the costs of goods and services, better describes the actual practices of environmental law than a theoretical law and economics construct that stops at internalizing externalities by reflecting them in prices. Those theories are pernicious because they translate in practice into policies that allow polluters to continue to harm the health of others in ways that could be prevented without unreasonable effort—leaving the victims

6. *See, e.g.*, OFF. OF MGMT. & BUDGET, OMB CIRCULAR A-4, REGULATORY ANALYSIS (2003) ("An externality occurs when one party's actions impose *uncompensated* benefits or costs on another party." (emphasis added)); U.S. ENV'T PROT. AGENCY, GUIDELINES FOR PREPARING ECONOMIC ANALYSES app. at A-4 (2010) ("*Externalities* occur when markets do not account for the effect of one individual's decisions on another individual's well-being."). *See generally* PAUL KRUGMAN & ROBIN WELLS, MICROECONOMICS, ch. 17 at 433–38 (2d ed. 2009). We are particularly grateful to our long-time friend and environmental law colleague Richard (Ricky) Revesz, Dean Emeritus of NYU Law School, now serving as the Administrator of the Office of Information and Regulatory Affairs in the Biden White House, for helping us to clarify how our views differ from those embodied in traditional law and economics.

7. We acknowledge that what is "reasonably preventable" as opposed to impractical or technologically or economically infeasible needs to be fleshed out through practical experience in a variety of situations. A good starting point is the ALARA concept, which is an acronym for "As Low As is Reasonably Achievable." *See* 10 C.F.R. § 20.1003 (2022) ("*ALARA* . . . means making every reasonable effort to maintain exposures to radiation as far below the dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.").

both damaged and uncompensated. In that sense, W. Kip Viscusi is correct in his article in this symposium which takes us to task for not having a balanced view.[8] We plead guilty to not thinking that the right to continue harming others is a "good" to be traded in the marketplace any more than the right to break into someone's home or to steal their car is a "good" that can be taken without consent.[9]

Some members of the law and economics movement have recognized this distinction for a long time. The difference between property rules, which give someone a right to something, and liability rules, which merely require financial compensation, but allow others to take the something away at will, is, for example, the theme of Calabresi's often cited 1972 article with Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*,[10] one of his greatest contributions. We acknowledge the influence of that seminal article in footnote two of our original article in this series.[11] However, prevailing theories of environmental law based on law and economics often do not even go so far as to give victims of pollution or other environmental harms the protection of a liability rule, as in practice it is exceedingly difficult to win compensation in court for a harm that is permitted to continue with regulatory approval.[12]

The traditional prescription of law and economics to internalize externalities merely by reflecting them in price is not an accurate description of how US environmental law actually works. Prior to the enactment of the Clean Air Act (CAA) in 1970, the Nixon administration

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8. W. Kip Viscusi, *A Balanced Prescription for More Effective Environmental Regulations,* 40 PACE ENV'T L. REV. 475 (2022).

9. David D. Doniger, *Federal Regulation of Vinyl Chloride: A Short Course in the Law and Policy of Toxic Substances Control*, 7 ECOLOGY L.Q. 497, 521 (1978) ("[R]egulatory decisions involve moral as well as economic values. We may begin with the observation that the sacrifice of an individual for the benefit of a group is acceptable if the benefit served is the group's survival or the fulfillment of some other basic need. The sacrifice is morally unacceptable, however, if it is for no more important benefit than the provision of the luxuries of our consuming society. That some must die so that all can eat is one thing; that some must die so that all can have see-through food packaging is another.").

10. Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral,* 85 HARV. L. REV. 1089 *passim* (1972).

11. Elliott & Esty, *supra* note 4, at 506 n.2.

12. *See generally* Alicia F. Curtis, *Proving Negligence in the Face of a Defendant's Compliance with Government Regulations or Industry Standards*, BERMAN & SIMMONS: L. ARTICLES, https://www.bermansimmons.com/law-articles/proving-negligence-face-defendants-compliance-government-regulations-or-industry/ [https://perma.cc/9PD2-FHVK] ("Jury research shows that jurors place significant weight on such evidence [of compliance with regulatory requirements].").

proposed a tax on sulfur oxides,[13] which would have been a step toward internalizing the costs by reflecting them in prices. Congress declined to enact the proposed tax and opted for technological controls instead.[14] Similarly, as we argue in the article that follows, recent trends since the mid-1980's have rejected the use of benefit-cost analysis to limit the extent of technological controls where reasonably preventable diseases and other harms to health are at issue. Examples are the 1990 amendments to the air toxics provisions of the CAA,[15] the Resource Conservation and Recovery Act amendments in 1984,[16] the Food Quality Protection Act in 1996,[17] and the 2016 Lautenberg Act amending Toxic Substance Control Act (TSCA).[18] All of these recent amendments squarely rejected the policy prescription that is smuggled into some definitions of externalities[19] that an externality is eliminated when the costs of harms to others are reflected in the price of goods and services. It is past time for academic theory in environmental law to catch up with actual practice, and that is what we try to describe in this article.

We began our journey to move the prevailing theory in environmental law beyond merely internalizing the costs of externalities in the prices of goods and services in a 1990 lecture by Elliott in which he questioned whether merely internalizing the cost of harms on an industry would actually change its behavior, as opposed to merely passing the costs on to consumers.[20] Our apostasy reached full flower in a chapter in our jointly authored summary of US environmental law entitled "OPA90: [W]hy economic incentives only work sometimes."[21] In that chapter, we reflect on

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13. E. W. Kenworthy, *Nixon to Seek Tax on Sulphur Oxides Emitted by Industry*, N.Y. TIMES (Feb. 9, 1972), https://www.nytimes.com/1972/02/09/archives/nixon-to-seek-tax-on-sulphur-oxides-emitted-by-industry-nixon-to.html [https://perma.cc/838A-5YBN].

14. *See* Dallas Burtraw, *Innovations Under the Tradable Sulphur Dioxide Emission Permits Program in the US Electricity Sector*, OECD WORKSHOP ON INNOVATION AND THE ENV'T 3–4 (2000), https://www.oecd.org/innovation/inno/2105265.pdf [https://perma.cc/7NX9-Q7CQ].

15. 42 U.S.C. § 7401–7671q (originally enacted as the Clean Air Act, 69 Stat. 322 (1963)).

16. 42 U.S.C. § 6901–6992 (originally enacted as Resource Conservation and Recovery Act of 1976, 90 Stat. 2795 (1976)).

17. Food Quality Protection Act of 1996, Pub. L. No. 104-170, 110 Stat. 1489 (codified as amended in scattered sections of 7 U.S.C.)).

18. Frank R. Lautenberg Chemical Safety for the 21st Century Act, Pub. L. No. 114-182, 130 Stat. 448 (amending Toxic Substances Control Act, 15 U.S.C. § 2601-2629 (1976)).

19. Elliot & Esty, *supra* note 4, at 526.

20. *See* E. Donald Elliott, *Re-Inventing Defenses/Enforcing Standards: The Next Stage of the Tort Revolution?*, 43 RUTGERS L. REV. 1069, 1071–72, 1075 (1991).

21. *See* E. Donald Elliott & Daniel C. Esty, *OPA90: Economic Incentives Only Work Sometimes*, *in* ADVANCED INTRODUCTION TO U.S. ENVIRONMENTAL LAW 128–37 (Edward Elgar Publ'g ed., 2021).

the puzzle of the Oil Pollution Act of 1990 (OPA90),[22] a statute that Elliott helped to write while at the EPA based on what he had learned from Calabresi and the Ackermans. OPA90 created multi-billion dollar economic incentives to prevent oil spills, as we explain in that chapter.[23] It was indeed successful at reducing the number of oil spills by 60 percent, but nonetheless, the *Deepwater Horizon* spill, the largest oil spill in American history, occurred for reasons that we try to unravel in that chapter.[24]

Nonetheless, we are both still true believers in benefit-cost analysis as a useful tool for policymakers.[25] However, we believe that a fine tuning of available technological controls to the exact point where costs match benefits is neither possible nor desirable.[26] Throughout our careers, we have been advocates for a hybrid approach of charging for licenses to pollute, as well as requiring technological controls to the extent reasonably practical. For example, we both contributed to the 1990 Acid Rain Trading program, one of the most successful pollution controls programs in US history.[27] However, it merely added charges on top of existing technological controls but did not purport to replace them.[28] We see the combination of the two as better than either approach alone,[29] and for this reason we do not see merely "internalizing" externalities in price as the ultimate goal of environmental law but rather a useful adjunct to technological controls and a second-best solution where it is not practical to eliminate the harm.

Finally, some of our critics questioned why we privilege environmental harms to health and ecosystems above the economic harms to workers in polluting industries that will result from imposing technological controls whose costs exceed their quantifiable benefits. The answer is straightforward. As we explain at length in our initial article,[30] we believe

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22. *Id.*

23. *Id.* at 131.

24. *Id.* at 132.

25. Elliott served as the liaison between the EPA and the Office of Information and Regulatory Affairs at OMB during his tenure at the EPA, and throughout his career, he has been an advocate for benefit-cost analysis and OIRA review. *See, e.g.*, E. Donald Elliott, *Only a Poor Workman Blames His Tools: On Uses and Abuses of Benefit-Cost Analysis in Regulatory Decision Making About the Environment*, 157 U. PA. L. REV. 178 (2008).

26. *See* Howard Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and "Fine Tuning" Regulatory Reforms*, 37 STAN. L. REV. 1267, 1271 (1985) (explaining that "fine-tuning," realistically, and in practice, would prove to be infeasible in addressing these important environmental concerns).

27. *See* E. Donald Elliott, *A Critical Assessment of the EPA's Air Program at Fifty and a Suggestion for How It Might Do Even Better*, 70 CASE W. RES. L. REV. 895, 901, 910 (2020).

28. *See id.* at 924.

29. *See, e.g.*, *id.* at 926.

30. Elliott & Esty, *supra* note 4, at 511.

that we all have a natural law right to bodily integrity and to certain eco-system services.[31] This natural law right to a healthy environment was recognized by Congressional statute in the 1970 National Environmental Policy Act (NEPA).[32] This same policy of protecting health and the environment has been repeatedly reiterated by Congress in subsequent environmental legislation that has repeatedly sought to protect health and the environment where reasonably achievable rather than to maximize aggregate social welfare measured in economic terms. That said, we do believe people and communities are free to trade modest risks to their health and environment for economic benefits, but only with informed consent. With this in mind, our proposed framework calls for risk disclosure as well as compensation and technological controls where practical.

I. OUR OBJECTIVE

Now is a propitious time to assess environmental law and to make course corrections. We are roughly 50 years into the modern environmental awakening that began around 1970.[33] Those five decades should be regarded as environmental law's experimental phase and it is time, perhaps past time, to evaluate what works and what does not and to advance a reform agenda that aims to refresh and modernize environmental law and regulation. Others share our sense of timing, and the American Law Institute, the Environmental Law Institute, the American University's Center for Environmental Policy, and researchers across the country[34] are all setting about the task of codifying the lessons learned into principles for the environmental law of the future.

The preceding experimental phase of environmental law, during its formative period, coincides with our careers. We bring to the task our perspectives as participants in government, advisers to NGOs and the

31. What human uses of eco-systems are protected and to what extent is a complex topic that we begin to address below.

32. Elliott & Esty, *supra* note 4, at 511.

33. Some might date the modern environmental movement from the publication of Rachael Carson's *Silent Spring* in 1963; others might point to the publication of Garret Hardin's *The Tragedy of the Commons* in 1968; and others to the signing into law of the Clean Air Act and the National Environmental Policy Act in the United States in 1970, but for our purposes these differences are irrelevant.

34. *See, e.g.*, J.B. Ruhl & James Salzman, *What Happens When the Green New Deal Meets the Old Green Laws?*, 44 VT. L. REV. 693 (2020); Robert V. Percival, *Regulatory Evolution and the Future of Environmental Policy*, 1997 U. CHI. LEGAL F. 159, 160; Benjamin Zycher, *Reforming U.S. Environmental Policy,* LAW & LIBERTY: LIBERTY FUND NETWORK (Oct. 1, 2018), https://lawliberty.org/forum/reforming-u-s-environmental-policy/ [https://perma.cc/2HBH-WF2S].

private sector, as well as academics. Each of us has written separately about some of the lessons to be learned from that experience.[35] Now, working together, and benefitting from the shared wisdom of many colleagues and friends who work in the field, we are trying to outline the principles that should guide the environmental law of the future, not only in the United States but around the world.

The prior article,[36] which is attached as an appendix for ease of reference, preliminarily outlined our shared vision for environmental law for the 21st century. It proposes to establish three new, more stringent legal duties of care for those releasing potentially harmful materials or otherwise harming the environment.[37] Some elements of this vision are already implicit in certain aspects of US and European Union environmental law, but we wish to clarify and extend that vision to aspects of environmental law to which our vision does not currently apply. That vision includes:

1. Establishing a new, more stringent legal duty of care for parties releasing harmful materials into the environment (i.e., pollution) to consult the available literature, and if necessary, sponsor original research, to assure the public that the releases are not harmful, and to make public the data upon which they rely for a reasonable assurance of no harm conclusion;
2. To the extent that data are not adequate to conclude that the releases will not be harmful, commercial enterprises, governments and all others that release materials into the environment should have a legal obligation to minimize the harm that they do to others to the extent reasonably practical, including from the psychological harm that results from exposure to uncertain risks that one might reasonably suspect might be harmful; and

35. *See, e.g.*, E. Donald Elliott, *Environmental Law Lessons from the U.S. Experience*, YOUTUBE (June 27, 2022) [hereinafter Elliot, *Environmental Law Lessons*], https://www.youtube.com/watch?v=nB3yl3B9FvA [https://perma.cc/3D7F-YAAC]; Elliott, *supra* note 27, at 896; E. Donald Elliott, *U.S. Environmental Law in Global Perspective: Five Do's and Five Don'ts from Our Experience*, 5 NAT'L TAIWAN U. L. REV. 145 (2010) [hereinafter Elliot, *Global Perspective*]; E. Donald Elliott, *Lessons From Implementing the 1990 CAA Amendments*, 40 ENV'T L. REP. 10592, 10592 (2010); Daniel C. Esty, *Mastering the Labyrinth of Sustainability: Toward a New Foundation for the Market Economy,* 4 LA REVUE EUROPÉENNE DU DROIT 119, 119–21 (2022); Daniel C. Esty, *Red Lights to Green Lights: From 20th Century Environmental Regulation to 21st Century Sustainability*, 47 ENV'T L. 1, 3–4 (2017); Daniel C. Esty, *Regulatory Transformation: Lessons from Connecticut's Department of Energy and Environmental Protection*, 76 PUB. ADMIN. REV. 403(2016); Daniel C. Esty, "*Red Lights to Green Lights: Toward an Innovation-Oriented Sustainability Strategy*," *in* A BETTER PLANET: 40 BIG IDEAS FOR A SUSTAINABLE FUTURE 87, 87–89 (Daniel C. Esty, ed.) (2019); David A. Lubin & Daniel C. Esty, *The Sustainability Imperative,* HARVARD BUS. REV., May 2010.

36. *See generally* Elliot & Esty, *supra* note 4.

37. See *infra* text accompanying note 65.

3. The obligation to pay financial compensation to those subject to residual risks after the application of the maximum technology reasonably practical if it turns out that the no harm conclusion was incorrect, or if some must suffer harm without their informed consent in the interest of benefitting others.

The purpose of this paper is to elaborate on the practical aspects of how such a system would operate, and to respond to concerns that have occurred to us or have been raised by others.

Many of the features describe below already exist to some extent in various systems of environmental law around the world, particularly in the United States and European Union, which we know best. For example, the environmental law that applies to workplaces in the United States embodies elements of all three key building blocks that we identify above.[38] That is as it should be, as we are not trying to invent a visionary scheme out of whole cloth but rather to learn the lessons of what works best and to replicate and extend successes while learning from shortcomings. The present work makes no claim to originality beyond trying to extract the successful features of environmental law and state them parsimoniously as a comprehensive system.

II. THE OBLIGATION TO INVESTIGATE BEFORE DISCHARGING

It is sometimes said that "a clean heart and an empty head" were historically a defense against legal liability at common law.[39] Regardless of whether that is actually true for particular bodies of law, one of the key purposes of environmental law was to reverse that presumption and to impose on the persons and entities that environmental law regulates an obligation to investigate the potentially harmful effects of materials that they release into the environment. For example, one of the key purposes of

38. *See* OSHA General Duty Clause, 29 U.S.C. § 654; *see also* Industrial Union Dept., AFL-CIO v. Am. Petroleum Inst., 448 U.S. 607, 662 (1980) (remanding the case because the newly introduced OSHA Benzene standard failed to provide sufficient evidence of a "significant" risk to health). This section also requires employers to compensate workers for workplace injuries that occurred despite efforts to prevent them under state or federal workers compensation laws and to disclose the science of the risks remaining under the Hazard Communication Standard. 29 C.F.R. § 1910.1200(h) (2022); *see also Hazard Communication,* OSHA, https://www.osha.gov/hazcom [https://perma.cc/395Q-CXJ3]. We do not mean to imply that these systems are perfect models, but [rather merely] that all three elements that we advocate for are present in some form in the law of the environment in the workplace.

39. Several federal courts have used the phrase "a clean heart and empty head." *See, e.g.*, Studiengesellschaft Kohle m.b.H. v. Dart Indus., Inc., 862 F.2d 1564, 1579 (Fed. Cir. 1988) (discussing patent law); Smith v. Ullman, 874 F. Supp. 979, 987 (D. Neb. 1994) (discussing prison violence); American Medical Sys., Inc. v. Medical Engineering Corp., 794 F. Supp. 1370, 1397 (E.D. Wis. 1992) (discussing patent law).

TSCA was to impose an obligation of those who manufacture, distribute, or import a chemical substance into the United States to ensure that it was safe and would not harm others.[40] Accordingly, the Senate Report accompanying the original version of TSCA passed in 1976 stated the aspiration to impose on manufacturers of chemicals a duty to test them for safety before putting them on the market:

> More than 200,000 infants are born with physical or mental damage each year, a staggering 7 percent of all births. . . . A total of 15 million Americans have birth defects serious enough to drastically affect their daily lives. . . . It is with alarm that our attention is drawn to some aspects of modern technology which work counter-productive to our aims. Each year billions of pounds of chemicals which are virtually untested and unregulated are produced in industrial processes and used in commercial products. Experience with vinylchloride has shown it to be a highly toxic substance which experimentally can cause cancer and birth defects; but this experience came only with its burden of proof on the public. *We look now to preventative testing of toxic substances in industrial production prior to manufacture or distribution as one critical means to reduce exogenous causes of birth defects*. In order to protect against these dangers, the proposed Toxic Substances Control Act would close a number of major regulatory gaps, for while certain statutes . . . may be used to protect health and the environment from chemical substances, none of these statutes *provides the means for discovering adverse effects on health and environment before manufacture of new chemical substances*. . . . *The most effective and efficient time to prevent unreasonable risks to public health or the environment is prior to first manufacture*.[41]

Unfortunately, however, in accordance with the prevailing popular understanding at the time,[42] Congress assumed incorrectly that existing and naturally-occurring substances were generally safe and focused its attention primarily on "new chemicals."[43] In addition, broad rights to challenge government regulation in court in the United States create a situation in which, as a practical matter, the government had to develop "extensive factual records" showing that substances are—or at very least might be—hazardous in order to regulate them.[44] One of us has condemned this high

40. *See* 15 U.S.C. §§ 2601–97.

41. S. REP. NO. 94-698, at 5 (1976) (emphasis added).

42. *See, e.g.*, RACHEL CARSON, SILENT SPRING (1962) (revealing misconceptions of the time).

43. *See* Ortwin Renn & E. Donald Elliott, *Precautionary Regulation of Chemicals in the US and EU, in* THE REALITY OF PRECAUTION: COMPARING RISK REGULATION IN THE UNITED STATES AND EUROPE 223, 230 (Jonathan B. Wiener et al. eds., 2011).

44. *See* Gail Charnley & E. Donald Elliott, *Risk Versus Precaution: Environmental Law and Public Health Protection*, 32 ENV'T. L. REP.10363, 10363 (2002).

burden of scientific research and justification on regulators as one of the five worst things about US environmental law.[45] In addition, the current law in the US regarding pre-manufacture testing creates perverse incentives for industry and other emitters *not* to find out whether substances are hazardous until years later when they are hit with toxic tort suits by exposed people.[46] As a practical matter, we allow human experimentation without informed consent by allowing polluters to expose people to potentially hazardous substances that have not been studied adequately.

By contrast, the EU pioneered the precautionary principle.[47] Many countries outside the EU have also adopted the precautionary principle. For example, in Peru, the precautionary principle is codified in the Statute of the National System of Environmental Management.[48] However, for practical reasons, these lofty goals are sometimes less than fully successful in practice.[49] Indeed, a few perceptive critics have argued that the precautionary principle has been transformed in some circumstances into a regulatory bias in favor of the status quo.[50]

A. Who should bear the obligation to test materials before releasing

45. Elliot, *Global Perspective*, *supra* note 35, at 160; *see also* Elliott, *Environmental Law Lessons*, *supra* note 35.

46. Traditional law and economics might predict that the incentives created by toxic tort liability would cause manufacturers to test materials before putting them on the market, but as we have discussed elsewhere, economic incentives only work sometimes largely because of the difficulties that human beings have in understanding complex systems and predicting the future. *See* ELLIOTT & ESTY, *supra* note 21.

47. *See generally Communication from the Commission on the Precautionary Principle*, COM (2000) 1 final (Feb. 2, 2000).

48. Ley Marco del Sistema National de Gestión Ambiental [LMSNGA], No. 28245, Congreso de la Republica [CR] 08-06-2004 (Peru). Under Title II, Article 5(k) the principles for environmental management are delineated as follows: Environmental management in the country is conducted in accordance to the following principles: . . . Application of precautionary criteria, when there are reasonable indicators of threats of serious or irreversible damages to the environment or to human health, the lack of full scientific certainty shall not be used as a reason for not adopting or postponing the adoption of effective and efficient measures to prevent that threat . . . . *Id.*

49. *See generally* CASS R. SUNSTEIN, LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE (2005).

50. *See generally* Jonathan B. Wiener, *Precaution in a Multi-Risk World*, *in* HUMAN & ECOLOGICAL RISK ASSESSMENT: THEORY & PRACTICE 1509, 1509–11 (Dennis J. Paustenbuach ed., 2009); Jonathan H. Adler, *The Problems with Precaution: A Principle Without Principle*, AM. ENTER. INST. (May 25, 2011), https://www.aei.org/articles/the-problems-with-precaution-a-principle-without-principle/ [https://perma.cc/J8LS- GHWL]. For a view more favorable to the precautionary principle, see Robert V. Percival, *Who's Afraid of the Precautionary Principle?*, 23 PACE ENV'T. L. REV. 21, 22 (2006).

them into the environment?

While not an easy question, we believe that, on balance, the obligation in the first instance should be on dischargers who are placing materials into our common environment. Admittedly, polluters have a conflict of interest in the sense that they often wish to dispose of waste materials cheaply by releasing them into the public's environment, and they often lack the scientific and technical expertise to determine whether this creates public health or ecological risks. In implementing a burden to test materials before releasing them, we anticipate that an industry would probably rely primarily on searching the existing scientific literature, as it usually does in doing due diligence before putting a new product on the market.[51] However, one of us has advocated that the government should specify criteria for such pre-market testing and due diligence, as it does for environmental due diligence before purchasing real properties.[52] Similarly, the EU Reach Program and the US EPA, under the pre-manufacture testing program under TSCA, already specifies a battery of tests and required information such as disposal practices and environmental fate and transport.[53] We argue, however, that the US approach is flawed insofar as these submissions only have to include information and studies that are already available.[54] As part of its more precautionary approach, the EU has recently proposed a regulation that would require product manufacturers to conduct a risk assessment that would include adverse environmental effects that might affect the user.[55]

Similarly, under the proposed system, if the existing research is inadequate, those who will profit from exposing the rest of us to uncontrolled materials released into the environment should fund the necessary research.[56] This obligation might well be undertaken through user groups as is generally the case under the REACH program rather than each

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51. *See* E. Donald Elliott & Gail Charnley Elliott, *Private Product-Risk Assessment and the Role of Government*, 23 JOHN LINER REV. 73, 73–74 (2009).

52. *See* 40 C.F.R. § 312.1(c)–(d) (2022).

53. *See Filing a Pre-Manufacture Notice with EPA,* EPA, https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/filing-pre-manufacture-notice-epa [https://perma.cc/EHJ7-H3VR].

54. *Id.*

55. Proposal for a Regulation of the European Parliament and of the Council on General Product Safety, Amending Regulation (EU) No 1025/2012 of the European Parliament and of the Council, and repealing Council Directive 87/357/EEC and Directive 2001/95/EC of the European Parliament and of the Council, COM (2021) 346 final (Dec. 21, 2022).

56. *See* Renn & Elliott, *supra* note 43. As a practical matter, under TSCA, the EPA often enters into an administrative consent decree that limits exposure while requiring further studies.

individual company doing the research on its own.[57] Similarly, under the HazCom rule for workplaces in the United States, and similar laws internationally, a variety of expert consulting businesses have cropped up, which provide standardized Safety Data Sheets for substances in common use.[58] These third parties not only have expertise and economies of scale in producing standard items as opposed to each employer doing this work itself, but they also have strong reputational interests not to cheat.[59] This is not to say that misstating the science will never occur. As the recent Volkswagen emissions scandal[60] or the sordid history of asbestos use without regard to known risks for the safety of workers[61] demonstrate, industries can ignore or understate the risks to the environment even when threatened with the risk of criminal penalties.

We are not advocating that private industry should be the only source of information about environmental risks. Government should continue to regulate, and universities, research centers, and NGOs should continue to test substances and seek to uncover new risks to health. But the sheer volume of new substances coming into commerce every year means that there is little alternative but to place the initial burden of determining that a substance is not harmful on the commercial enterprises that want to use it. Moreover, the composition of a substantial fraction of new chemical substances are claimed by the developers to be confidential business information.[62] Placing the burden on industry also comports with Calabresi's "cheapest cost avoider" principle that argues for assigning

57. Harvey Black, *Chemical Reaction: The U.S Response to REACH,* 116 ENV'T HEALTH PERSPECTIVES 125, 125 (2008).

58. *See, e.g.*, *The Safety Data Sheet (SDS) FAQ: Index,* SAFETY EMPORIUM (Oct. 28, 2021), http://www.ilpi.com/msds/faq/index.html [https://perma.cc/DXH6-EZUH].

59. S*ee generally* Reinier H. Kraakman, *Gatekeepers: The Anatomy of a Third-Party Enforcement Strategy*, 2 J.L. ECON. & ORG. 53, 53–56 (1986) (explaining the regulatory role of third-party gatekeepers, including those who must provide certifications).

60. *See* Office of Public Affairs, Department of Justice, *Volkswagen AG Agrees to Plead Guilty and Pay $4.3 Billion in Criminal and Civil Penalties; Six Volkswagen Executives and Employees are Indicted in Connection with Conspiracy to Cheat U.S. Emissions Tests,* JUSTICE NEWS (Jan. 11, 2017),
https://www.justice.gov/opa/pr/volkswagen-ag-agrees-plead-guilty-and-pay-43-billion-criminal-and-civil-penalties-six [https://perma.cc/YJ6U-FEQ3].

61. *See generally* PAUL BRODEUR, OUTRAGEOUS MISCONDUCT: THE ASBESTOS INDUSTRY ON TRIAL (1985).

62. *See Confidential Business Information Under TSCA: Statistics for the TSCA CBI Review Program*, EPA https://www.epa.gov/tsca-cbi/statistics-tsca-cbi-review-program [https://perma.cc/BM8D-7MW6].

responsibility to the party best positioned to minimize negative externalities cost-effectively.[63]

On balance, in the first instance the legal duty to consider potential adverse effects on health and the environment should fall on the entity that proposes to release it into the environment. This allocation of the burden to investigate and to eliminate or mitigate harm has now been reflected in EU law under a 2022 European Commission Directive on corporate sustainability due diligence, which requires companies to "identify and, where necessary, prevent, end or mitigate adverse impacts of their activities."[64] Several examples of successful US environmental programs, NEPA, the Toxic Release Inventory, and California's Proposition 65, similarly require potential polluters to investigate the volumes and anticipated effects of the pollution they are releasing or intend to release.[65] In our experience, both at the EPA and subsequently, we have witnessed many responsible companies taking seriously their moral obligation to protect the public and have seen CEOs express genuine surprise when informed of harmful effects of their releases.

One way to assess the value of a proposed legal duty is called "backcasting."[66] The idea is to test proposed policy changes by asking whether they might have prevented adverse events in the past.[67] Many of the environmental disasters of the past, such as the Kepone disaster in the James River in Virginia which essentially put the fishing industry of Virginia out of business,[68] might well have been avoided had companies been required to investigate the potential consequences of their releases of material to the environment in advance. A more challenging question is whether one of the primary shortcomings of US environmental law, its failure to address the risk of climate change in any substantial way to date, could have been avoided if dischargers of greenhouse gases had been required to disclose the existing science on climate change.

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63. *See* GUIDO CALABRESI, *The Fault System and General Deterrence*, *in* THE COST OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS 244, 250 (1970).

64. European Commission, Press Release, Just and Sustainable Economy: Commission Lays Down Rules for Companies to Respect Human Rights and Environment in Global Value Chains (Feb. 23, 2022).

65. For an evaluation of the successes and shortcomings of these information disclosure programs as a regulatory technique, see Elliott & Esty, *supra* note 4, at 511–12, 533.

66. *See* John B. Robinson, *Energy Backcasting: A Proposed Method of Policy Analysis,* 10 ENERGY POL'Y 337, 337 (1982).

67. *Id.*

68. Arthur M. Holst, *The Kepone Environmental Disaster*, ENCYC. VA. (Sept. 14, 2021), https://encyclopediavirginia.org/entries/kepone-chlordecone/ [https://perma.cc/329Z-FZ4G].

B. Should investigation and disclosure obligations be imposed by the SEC?

In recent years, significant attention has been focused on the Securities and Exchange Commission's (SEC) proposed rules for disclosing climate change risks to potential investors.[69] While we support these disclosure initiatives as far as they go, SEC reporting is not the ideal mechanism to investigate and disclose environmental harms to potential victims. The SEC's main concern and expertise is protecting investors against material risks to the enterprise from liability for environmental damage, not protecting the environment or informing those who may be harmed. While it is true that NEPA purported to make protecting the environment "to the fullest extent possible" part of the mission of every agency,[70] that mandate has largely been ignored—perhaps because that statutory provision was never picked up, elaborated on, or enforced by the courts as was the equally cryptic requirement for environmental impact statements.[71] We think that a better place to require additional investigation and disclosure to potential victims would be in the environmental permitting process.

III. THE OBLIGATION TO ELIMINATE POLLUTION TO THE EXTENT REASONABLY PRACTICAL

Environmental protection in the United States took a "wrong turn" in 1981 when the Reagan administration promulgated Executive Order 12291, which enshrined a "net social benefit" standard for approving all major new regulatory rules. [72] It is deceptively simple and seemingly intuitive that new governmental rules should do more good than harm,[73] and indeed this standard does make sense for many traditional forms of economic regulation, such as regulating prices, which are intended to improve economic efficiency. However, the net social benefit standard does not work well for those forms of regulation such as environmental law that are intended to prevent injuries to others. Everyone has a fundamental human right to bodily integrity and health. However, a net social benefit or Kaldor-

69. Laura Corb et al., *Understanding the SEC's Proposed Climate Risk Disclosure Rule,* McKinsey & Co. (June 3, 2022), https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/understanding-the-secs-proposed-climate-risk-disclosure-rule [https://perma.cc/L9XX-55F2].

70. *See* National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331–32.

71. *See* E. Donald Elliott & Daniel C. Esty, *NEPA and Information Disclosure: Techniques Copied Around the World*, *in* Advanced Introduction to U.S. Environmental Law 159–70 (2021).

72. Exec. Order No. 12,291, 3 C.F.R. § 127 (1981).

73. *See* Paul R. Noe & John D. Graham, *The Ascendancy of The Cost-Benefit State?*, 5 Admin. L. Rev. Accord 85, 91 (2020).

Hicks test for economic efficiency literally permits harm to others provided that the cost of eliminating the harm would be greater than the benefit of doing so to the injured parties—or said differently, if the winners win more than the losers lose. We call misusing the Kaldor-Hicks test to limit the extent of protection against environmental harms "the Kaldor-Hicks *fallacy*."[74]

The Kaldor-Hicks fallacy is not a theoretical problem, but an ongoing real-world issue. For example, Elliott remembers sitting in meetings at the EPA at which dozens of predicted deaths were discussed from pesticide use, but the EPA nonetheless approved or did not cancel the pesticide because it deemed the economic benefits from pesticide use to be greater than the painful early deaths from cancer. This reprehensible practice was halted by the 2016 amendments to TSCA which eliminated the EPA's consideration of "non-risk factors."[75] In fact the trend since the 1990's has been to eliminate statutory language that would allow non-health related benefits to be traded off against known benefits to health from lower standards. Similarly, the academic literature is clear that National Ambient Air Quality Standards are not set at a level that eliminates all harm from pollution, but rather where there are substantial benefits to health remaining available from regulation below the existing standards.[76]

IV. THE OBLIGATION TO COMPENSATE: A SECOND-BEST SOLUTION

Our initial article argued that environmental law should set an ultimate goal of zero harmful emissions,[77] a concept that is consistent with the aspiration for a gradual transition to a "circular economy" in which all waste materials are recycled or reused.[78] Admittedly, this standard might be hard to achieve with regard to some activities that have high value to society such as making steel or cement, or flying airplanes. In these cases where the benefit to society outweighs the harm to individual, but it is not currently practical to eliminate or minimize harm. Therefore, our earlier article

74. Elliott & Esty, *supra* note 4, at 514–17.

75. *See Our Updated Chemical Safety Law: The Lautenberg Act*, ENV'T DEF. FUND, https://www.edf.org/health/our-updated-chemical-safety-law-lautenberg-act [https://perma.cc/85YQ-3YR2].

76. *See* Kimberly M. Castle & Richard L. Revesz, *Environmental Standards, Thresholds, and the Next Battleground of Climate Change Regulations*, 103 MINN. L. REV. 1349, 1353–54 (2019).

77. Elliott & Esty, *supra* note 4, at 509.

78. *What is a Circular Economy?,* EPA (Sept. 29, 2022), https://www.epa.gov/recyclingstrategy/what-circular-economy [https://perma.cc/3R4V-EYHD].

proposed to create an obligation not only to minimize the harmful emissions, but also to pay fully for the injuries caused by residual pollution.[79] These harm charges should be paid out to those who bear the pollution effects where possible.[80]

Our prior article described in detail our rationale for including an obligation to compensate victims of environmental exposures,[81] and we will not repeat that discussion here. We do, however, add a few practical observations about how and why this might be done. While we recognize that compensation is not traditionally considered a role of environmental law but rather of state tort law, we do not consider that an insuperable impediment. A good model for compensation for environmental harms is the EU's 2004 environmental liability directive, which did not mandate the details of how member states would provide compensation for environmental harms, but rather mandated that member states must provide some effective systems of compensation.[82] Importantly, the rationale for the directive was not solely to compensate victims, but to prevent future harms by imposing costs on those responsible, a point made clear in its official title: "DIRECTIVE 2004/35/CE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 April 2004 on environmental liability with regard *to the prevention* and remedying of environmental damage."[83]

The philosophy of using the threat of liability to prevent damage is also specifically endorsed in the text: "The fundamental principle of this Directive [is to hold operators financially liable] . . . in order to induce operators to adopt measures and develop practices to minimi[z]e the risks of environmental damage so that their exposure to financial liabilities is reduced."[84] We applaud the Directive's focus on incentives and the value of spurring innovation to reduce emissions harms. Indeed, we would suggest that a central focus of the restructuring of environmental law that we seek to advance would be to pay more attention to the incentives that statutes and regulations create and the value of creating incentives to minimize harm and promote creativity in addressing persistent environmental challenges.

One of the central insights of the modern environmental awakening is that the giving away of free resources held in common results in their over-

79. Elliott & Esty, *supra* note 4, at 510, 529–31.
80. Elliott & Esty, *supra* note 4, at 518, 531.
81. Elliott & Esty, *supra* note 4, at *passim.*
82. Council Directive 2004/35, app. II 1.1.3, 2004, O.J. (L 143), 56, 72 (EC).
83. *Id*. at art. 1 (emphasis added).
84. *Id*.at cl. 2.

consumption.[85] Moreover, financial charges for harm caused by environmental releases serves as an important backstop to command-and-control regulation. As Elliott observed in a prior article:

> [T]he reason that we have done as well as we have in the United States [in keeping dangerous chemicals off the market], despite the problems that we have regulating effectively under TSCA, is because our regulatory system is backed up the threat of liability, or what Calabresi called "general deterrence" (threat of liability) as opposed to "specific deterrence" (administrative or legislative regulation).

Even if agencies are not able to regulate chemicals in the United States based on as low an evidentiary threshold as in Europe, there are very few chemicals that have come on to the market in the United States, but not in Europe, or are regulated in one but not the other. In practice, the degree of precaution tends to be similar, despite the rhetoric that Europe regulates on a more precautionary basis than the United States. In my opinion, that similarity in outcome despite differences in regulatory approach is largely because of the potent threat of liability as a backstop to government regulation in the United States.[86]

The general deterrence function is satisfied by imposing charges on the polluter, whether or not they are paid over as compensation to the victims.[87] However, our proposal aims to do more. In particular, while monetary payment can never fully compensate victims for pollution harms to their health, or the health of their loved ones, we believe that full and even generous compensation should be paid to the victims of harmful pollution. We see this as a matter of fundamental environmental justice. And we would argue that the law should err on the side of over-charging polluters for the harms that they do to others to make sure that the polluters have incentives to prevent harm to the maximum extent reasonably practical. Thus, for us, it is less important that the harm charges are exactly right, but more important that they do not understate the harm and thereby create perverse incentives for it to continue.[88]

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85. *See generally* Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243 (1968); *see also* Elliot, *Environmental Law Lessons*, *supra* note 35.

86. Elliot, *Global Perspective*, *supra* note 35, at 159–56.

87. *See* E. Donald Elliott, *Why Punitive Damages Don't Deter Corporate Misconduct Effectively*, 40 ALA. L. REV. 1053, 1054 n.5 (1989).

88. The then-head of the EPA Office of Research and Development, Paul Gilman, once stated at a public meeting that the purpose of risk assessment at the EPA was to make sure that the EPA never underestimated the potential for harm to the public. Paul Gilman, Off. of Rsch. And Dev., U.S. Env't. Prot. Agency, Floor Statement at the Society for Risk Analysis Annual Meeting, (December 7, 2009).

V. EVALUATING HARMS—RECASTING THE ROLE OF THE EPA?

Some of the most significant questions that emerged in response to our *End Environmental Externalities Manifesto* centered on who would determine the harm charges for residual emissions anticipated by our reform proposal—and on what basis. We are open to a discussion as to what entity—existing or to be established—is best positioned to undertake the process of setting the harm charges. One possibility is that the calibration of these charges and the invoicing of dischargers would fall primarily to the federal EPA and state environmental agencies with a supporting role to be played by other regulatory bodies such as OSHA, ATSDR, and the FDA, all of which have expertise in analyzing the human health effects of various pollution exposures. We recognize that this task will entail a degree of methodological complexity but we believe that the work required can be simplified to some extent by developing categorical estimates of the harm caused by each unit of a particular pollutant during risk assessments.

To the extent that some of the harm caused by emissions would affect ecological resources rather than human environmental public health, the expertise of natural resource management agencies such as the Department of the Interior's (DOI) Fish and Wildlife Service and the United States Department of Agriculture's Forest Service would need to be called upon. While we recognize that a strong case can be made for the intrinsic rights of nature,[89] we consider that issue to be beyond our scope in the current project. We focus our concept of harm charges for damages to nature on the loss of human use values and the estimated costs of restoration, as does the existing guidance on natural resources damages under the Comprehensive Environmental Response, Compensation, and Liability Act.[90] The regulations for assessing natural resource damages promulgated by the DOI and the National Oceanic and Atmospheric Administration, which have been tested by application to calculate natural resource damages in numerous cases, provide a good starting point.[91]

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89. *See, e.g.*, DOUGLAS A. KYSAR, REGULATING FROM NOWHERE: ENVIRONMENTAL LAW AND THE SEARCH FOR OBJECTIVITY 12, 19 (2010) (arguing in favor of ethical obligations to protect other species in environmental law); *see generally* CHRISTOPHER D. STONE, SHOULD TREES HAVE STANDING? LAW, MORALITY, AND THE ENVIRONMENT (3d ed. 2010); ALDO LEOPOLD, A SAND COUNTY ALMANAC: AND SKETCHES HERE AND THERE (1949).

90. *See Natural Resource Damages: A Primer,* EPA, https://www.epa.gov/superfund/natural-resource-damages-primer#nrdas [https://perma.cc/8NE2-YQK6].

91. 43 C.F.R. § 11.11 (2022); 15 C.F.R. § 990.10 (2022). Department of Commerce National Oceanic and Atmospheric Administration).

In his excellent contribution to this symposium, J.B. Ruhl suggests that our vision for the future of environmental law should incorporate "the default rule . . . that compensation is required for residual pollution that harms ecological resources used by other people and which thereby reduces the provision of ecosystem services."[92] In principle, we agree, and that is what we intended by our references to "use values" above. However, like J.B., we also recognize that this is a complicated field that is entangled with traditional property, takings, and nuisance law.[93] Therefore, a full elaboration must await another day of to what extent someone who had been receiving value from natural resources that belong to someone else is entitled to compensation if those eco-system services are halted. Perhaps in subsequent work we can unravel that muddle—hopefully with J.B.'s help!

To be in a position to calculate harm charges based on the best available data on the fate and transport of emissions, epidemiological and ecological effects, and risk assessments, EPA would need new capacities and likely additional staff with relevant expertise in environmental public health and the economics and valuation of various risks. This new EPA role might well require the Agency to redeploy significant resources from its existing engineering-oriented focus on "best available technologies for pollution control.

The harm charges assessed would, of course, build on the data provided by industry as part of their legal obligations under our proposed reframing of environmental law—so the private sector would also be playing a major role in executing the shift we propose. But the industry risk assessments would need to be cross-checked by EPA officials supported by other federal departments and perhaps peer reviewed for all of the reasons discussed above.

We would also note that industries facing substantial harm charges would almost certainly challenge the assessments being leveled, arguing that the underlying risk assessments and dollar valuations were misguided. We therefore recognize that the shift toward making polluters pay for the harm they cause will not be easy.

VI. THE ROAD FORWARD

"Rome was not built in a day," and we are not minimizing the difficulty of transitioning to the vision of the environmental law of the future that we

92. J.B. Ruhl, *The End Externalities Manifesto: Restatement, Loose Ends, and Unfinished Business,* 40 PACE ENV'T. L. REV. 510 (2022).

93. *Id.*; *see generally* J.B. Ruhl*, Making Nuisance Ecological,* 58 CASE W. RES. L. REV. 753 (2008).

propose. However, at the same time, when embarking on a journey, it is helpful to have a vision of one's destination in mind.[94] Just as the common law attempts to learn by abstracting principles from experience,[95] we propose that the experience of environmental law in countries around the world over the last fifty years leads logically to the principles that we suggest. If, however, we have gotten some of it wrong, we invite our friendly critics[96] to propose alternative principles for the environmental law of the 21st century.

94. Monika U. Ehrman, *Natural Resource Systems and the Evolution of Environmental Law*, 40 PACE ENV'T L. REV. 495 (2023).

95. E. Donald Elliott, *Holmes and Evolution: Legal Process as Artificial Intelligence*, 13 J. LEGAL STUD. 113, 130, 143 (1984).

96. *Cf.* Elliott, *supra* note 27, at 904–08 (describing friendly critics of the Clean Air Act, including the author, who applauds its progress but suggests how it might have done even better).

APPENDIX

E. Donald Elliott and Daniel C. Esty, *The End Environmental Externalities Manifesto: A Rights-Based Foundation for Environmental Law*, 29 NYU ENV'T L. J. 505 (2021).

THE END ENVIRONMENTAL EXTERNALITIES MANIFESTO: A RIGHTS-BASED FOUNDATION FOR ENVIRONMENTAL LAW

E. DONALD ELLIOTT[*] AND DANIEL C. ESTY[**†]

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[*] Professor (Adjunct) of Law, Yale Law School (retired) and Distinguished Adjunct Professor, Antonin Scalia Law School, George Mason University. Assistant Administrator and General Counsel, EPA (1989–91).

[**] Hillhouse Professor of Environmental Law and Policy, Yale University. Special Assistant to EPA Administrator William Reilly (1989–90); EPA Deputy Chief of Staff (1990–91); EPA Deputy Assistant Administrator for Policy (1991–93).

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INTRODUCTION

Both of us had the privilege of serving in government with Dick Stewart when he was the Assistant Attorney General for the Environment and Natural Resources Division of the U.S. Department of Justice, and we served at his client, the Environmental Protection Agency. Before that, we both knew and respected Dick's work as an academic and environmental policy thought leader. We regard him as a mentor, an inspiration, and a model for our own careers. He is also a good friend.

In this Article, we attempt to extend Dick's path-breaking work with Bruce Ackerman, who is also a mentor to both of us, on market-based solutions to environmental problems.[1] And like all of those who look at law through the prism of the incentives that it creates, we are further indebted to our teacher, Dean (now Judge) Guido Calabresi.[2] We had the challenge—and opportunity—to try to implement some of their ideas about the role of economic incentives in regulation when we served at EPA in the late 1980s and early 1990s, most notably when we participated in the drafting and early implementation of the Acid Rain Trading Program under the 1990 amendments to the Clean Air Act. This Article reflects some of what we learned from that experience and what we regard as its implications for the future of environmental law.

Developing cost-effective ways to reduce obvious pollution, as Dick Stewart and other intellectual leaders of his generation did, made great sense for the first fifty years of America's modern efforts to protect the environment. Their approach delivered the low-

[1] *See, e.g.*, Bruce A. Ackerman & Richard B. Stewart, Comment, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1334 (1985); Richard B. Stewart, *Economics, Environment, and the Limits of Legal Control*, 9 HARV. ENV'T L. REV. 1, 1–2 (1985).

[2] In particular, we acknowledge the influence of his seminal article: Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972). Our approach to internalizing environmental externalities, which some have called a "pliability rule," extends the Calabresi and Melamed framework. *See* Abraham Bell & Gideon Parchomovsky, *Pliability Rules*, 101 MICH. L. REV. 1, 5 (2002) (blending property and liability principles). As is described in more detail in the text that follows, we argue that people should have an entitlement—protected by a property rule—not to be adversely affected by pollution or other environmental externalities. In our framework, however, this property right is not absolute because compensation to internalize externalities would be paid where it is deemed not feasible to eliminate pollution harms.

hanging fruit, and environmental conditions across America are much better today as a result. We believe, however, that the challenge for the next generation is to extend their work by addressing the remaining environmental externalities that are neither obvious nor easy to address. To do so, we need to reframe environmental law and policy on an intellectual foundation of environmental rights rather than economic efficiency.

In Part I, we introduce our call for an *end to externalities* centered on a societal goal of eliminating pollution with an added requirement that emitters pay compensation for any residual emissions that remain after technologically feasible[3] pollution controls have been implemented. We also critique the existing American framework of environmental protection that builds on benefit-cost analysis grounded in the Kaldor-Hicks principle of economic efficiency, and we explain the logic for our alternative rights-based approach. In Part II, we develop the philosophical underpinnings for the *end to externalities* principle—highlighting the need to ground environmental law and policy on the economic theories of A.C. Pigou rather than Ronald Coase. In Part III, we spell out the three core elements of the *end to externalities* approach and address several fundamental implementation issues. In Part IV, we illustrate the way our revised approach to environmental law might work in practice, making clear that we don't expect an end to *all* emissions. Rather, we seek to drive emissions toward zero and impose *harm charges* on pollution that continues to be emitted because it is not feasible to eliminate it with current technology, thus internalizing the externalities imposed on others. In Part V, we offer concluding thoughts and an agenda for further work to restructure environmental law in line with our proposed *end to externalities* strategy.

I. MOVING FROM THE KALDOR-HICKS FALLACY TO AN END TO EXTERNALITIES

Our central idea is that for the next phase of the environmental law revolution, the goal of environmental protection efforts should

[3] As we discuss in more detail in below, we propose that *technological feasibility* be defined not simply as what is currently cost-effective, but rather with reference to technological possibilities that could be achieved with a commitment to zero emissions.

be to internalize *all* negative environmental externalities[4] —which for simplicity's sake we dub the *end to externalities* approach. Negative environmental externalities include, most prominently but not exclusively, pollution involving releases to the environment that expose other people or ecological resources used by people[5] to harm or the risk of harm.[6] There are also other types of environmental externalities that are outside the scope of this Article. One example would be the consumption of shared non-renewable resources, such as depleting groundwater so that it is no longer available for use by future generations.

Another example would be clear-cutting a rainforest that acts as a carbon sink and biodiversity reserve.[7] However, the climate change and biodiversity impacts from such timbering technically involve terminating positive externalities that benefitted others as well as the owners of the resource. As a general matter, we are inclined

[4] We are currently aware of two minor exceptions to this principle: (1) if harms are *de minimis*, and (2) if the harm is accompanied by a benefit to the persons suffering the harm, and they give their *informed consent* to accept the harm without compensation in order to obtain the benefit. Both exceptions are discussed in more detail below, *see infra* text accompanying note 65 (on *de minimis* harms) and text accompanying note 47 (informed consent). We further note that not every minor inconvenience that someone would prefer to avoid rises to the level of a "harm" that constitutes an externality that must be internalized. *See infra* text accompanying notes 78 and 82 (mere dislikes do not constitute harm). By the term "pollution" we mean emissions that cause harm.

[5] We recognize that our vision is anthropocentric. Others might go farther and claim nature itself has the right to be protected against harm from humans. *See, e.g.*, DOUGLAS A. KYSAR, REGULATING FROM NOWHERE: ENVIRONMENTAL LAW AND THE SEARCH FOR OBJECTIVITY 12, 19 (2010) (arguing in favor of ethical obligations to protect other species in environmental law); CHRISTOPHER D. STONE, SHOULD TREES HAVE STANDING? LAW, MORALITY, AND THE ENVIRONMENT (3rd ed. 2010); ALDO LEOPOLD, A SAND COUNTY ALMANAC: AND SKETCHES HERE AND THERE 21 (1949).

[6] For details of what constitutes a harm or risk of harm, *see* discussion *infra* Part III.A.

[7] To this list, we might also add the consumption or use of shared public resources such as water pumped for irrigation, timber cutting, livestock grazing, mining, or oil and gas extraction on government lands. While these impacts share with pollution the conceptual structure of private gain at public expense—and thus should be addressed with a similar pricing mechanism that requires the resource users to pay full market value for the timber, fossil fuels, or water they extract—we focus in this Article on pollution as the quintessential negative externality. *See, e.g.*, Tom Udall & Charles Grassley, Opinion, *Oil and Gas Companies Must Pay*, N.Y. TIMES, Dec. 5, 2020, at A23 (arguing for market pricing of all resource extraction on federal lands).

to believe that beneficiaries of such positive spillovers should fairly compensate land owners to the extent feasible, but such a principle raises a slew of practical problems that are outside the scope of this Article. Instead, we focus here on negative environmental externalities.

At least one U.S. environmental statute announces the ambitious goal of eliminating environmental externalities regarding water pollution. The Clean Water Act creates a "National Pollutant Discharge *Elimination* System"[8] and boldly envisions the day when none of the navigable surface waters of the United States will be used for waste disposal.[9] With some justification, that goal has been criticized as unrealistic.[10]

We agree with the Clean Water Act's aspirational goal, but we also recognize that practical constraints on the application of the principle of eliminating all pollution must be accepted due to the limits of technology and to political realities. In our view, therefore, environmental law should now seek to end all harmful emissions subject only to the two minor exceptions noted above[11]—and where that goal is not yet technologically feasible, to ensure as a second-best solution that the resulting harms are fully paid for by the polluter. We propose these goals as a matter of corrective justice, not economic efficiency, but we recognize that our zero-emissions goal must be tempered by practicality.

Our *end to externalities* framework therefore seeks to make zero harmful emissions the presumptive goal of environmental law and policy. But we recognize that, due to the current limits of technology, some polluting activities that provide significant benefits to society would be hard to continue without some residual pollution. For example, making cement or flying planes cannot currently be done in anything close to a cost-effective way with no emissions. In these cases, we propose that emissions be reduced to the greatest extent *technologically feasible,* which we define with reference not simply to existing *best available technology* but rather to what might

[8] 33 U.S.C. § 1342 (emphasis added).

[9] *See id.* § 1251(a)(1) ("[I]t is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985.").

[10] *See* BRUCE A. ACKERMAN ET AL., THE UNCERTAIN SEARCH FOR ENVIRONMENTAL QUALITY 319 (1974).

[11] That is, harms that are *de minimis* or to which informed consent has been given. *See supra* note 4.

be possible with an assiduous commitment to innovation.[12] On the one hand, this framing seeks to avoid society losing access to goods with significant benefits, such as cement or steel, from industries where achieving zero emissions might be extraordinarily costly or even impossible. On the other hand, we wish to avoid the inertia of the status quo or any assumption that things have to remain the way they are. In proposing that all residual pollution that remains after the application of technologically feasible pollution controls must bear a harm charge that compensates—as fully as is possible—those subject to the ongoing emissions, we aim to spur attention to the possibilities of breakthroughs that move us ever closer to the zero emissions goal. This obligation to pay *full compensation*[13] is intended to avoid companies simply paying for the harms they cause as a cost of doing business without trying seriously to reach the zero emissions goal.[14]

[12] *See* Daniel C. Esty, *Red Lights to Green Lights: Toward an Incentive-Oriented Sustainability Strategy, in* A BETTER PLANET: 40 BIG IDEAS FOR A SUSTAINABLE FUTURE 87, 88–89 (Daniel C. Esty ed., 2019) (arguing for making innovation a central focus of environmental law and policy). Reducing emissions to the extent feasible has been a stated national policy since the enactment of the 1990 Pollution Prevention Act. *See* 42 U.S.C § 13101(b) ("The Congress hereby declares it to be the national policy of the United States that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner."). However, that commitment is often not honored in practice. *See infra* text accompanying notes 30–39 (discussing the Kaldor-Hicks fallacy).

[13] We acknowledge that no monetary payment can fully compensate someone for injuries to his or her health, or the health of those they love. We use the term *full compensation* as a shorthand for a generous payment that is intended to be sufficient to eliminate the temptation for polluters to pay harm charges rather than reduce or eliminate pollution. We leave the details of exactly how such harm charges would be set and assessed for another day.

[14] We believe that this potential loophole, highlighted for us by Yale Law School Dean, Heather Gerken, can be closed and the incentive for innovation leading over time to zero harmful emissions maintained by a rigorous commitment to pricing the remaining externalities generously and ensuring that harm charges are paid and the victims of ongoing pollution compensated as fully as is possible. This proposal raises questions about what constitutes *full compensation,* issues we take up in a preliminary fashion in Part III, *infra*.

A. *The Natural Law Right to a Healthy Environment*

We believe that everyone living in a community has a legal right, recognized both as a matter of natural right and positive law, to be free from avoidable interferences with their bodily integrity and that this in turn implies that they have a right to a healthy environment. And we believe that the concept of a "community" is elastic enough to include future generations. In advancing a rights-based foundation for the next stage of environmental law, we build on the common law doctrine that natural resources are held as a public trust for the benefit of the nation as a whole.[15] We further note that the first modern environmental statute in the United States, the National Environmental Policy Act (NEPA),[16] enacted as national policy that: "The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment."[17] We believe that the use of the word *recognizes* was significant. By recognizing rather than declaring this right, Congress acknowledged a pre-existing natural law right for all Americans to be free from unhealthy environmental conditions created by others without their consent. We describe the philosophical underpinnings of this natural law right below in Part II.B.

Elsewhere, we have noted that these statements of national policy in NEPA "[t]oday … have little or no effect … probably because a strong enforcement mechanism did not back them up." [18] Perhaps this outcome reflects the political reality that limited the reach of the first generation and even the second generation of modern American environmental law through the early twenty-first century.[19] The fact

[15] *See generally* Gerald Torres, *Who Owns the Sky?*, 19 PACE ENV'T L. REV. 515 (2001); Joseph L. Sax, *The Public Trust Doctrine in Natural Resources Law: Effective Judicial Intervention,* 68 MICH. L. REV. 471 (1970).

[16] *See* National Environmental Policy Act, 42 U.S.C. §§ 4321–4370 (2012). Although its official title is the National Environmental Policy Act of *1969*, it was not actually signed into law by President Nixon until January 1, 1970.

[17] 42 U.S.C. § 4331(c).

[18] E. DONALD ELLIOTT & DANIEL C. ESTY, ADVANCED INTRODUCTION TO U.S. ENVIRONMENTAL LAW (forthcoming 2021).

[19] The principal drafter of the Clean Water Act's aspirational goal of eliminating water pollution, the late Leon Billings, confided in one of the authors that setting this as a long term goal was as much as he thought he could get politically. *See* EBAN S. GOODSTEIN & STEPHEN POLASKY, ECONOMICS AND THE ENVIRONMENT 223–35 (8th ed. 2017) (spelling out the political clout of industry).

that environmental rights were *recognized* but not fully secured has resulted in measurable but incomplete progress[20] toward the national goal declared in NEPA of ensuring every American a healthful environment. We believe that it is now time to extend the work of environmental law pioneers such as Dick Stewart by taking on the remaining job of eliminating or internalizing *all* environmental externalities that cause harm to others. We acknowledge that this reframing of the foundations of environmental law will not be easy and that concessions to practicality and feasibility will need to be made.[21] But we think such tradeoffs will be required today to a much lesser extent than in decades past due to technological and scientific advances.[22] We recognize, furthermore, that the rights we seek to vindicate are not absolute. If, for example, our duly-constituted law-making institutions decide to set aside some portion of the waters of the United States for use as sewers, that policy decision should be accepted as within their purview. But we would insist that policy-makers charge all polluters or natural resource users—including governments—fees to compensate the public for the fair value of their use of resources in common ownership.[23]

We see the ambitious goal of ending or internalizing externalities as consistent with evolving societal mores and continuing public

[20] *See* E. Donald Elliott, *A Critical Assessment of the EPA's Air Program at Fifty and a Suggestion for How It Might Do Even Better*, 70 CASE W. RSRV. L. REV. 895, 926–27 (2020) (describing measurable but incomplete progress in eliminating air pollution).

[21] Our call for an end to externalities with an eye toward the practical realities of environmental regulation reflects one of Dick Stewart's signal contributions to environmental law: his unrelenting focus on the tradeoffs and hard choices required and the need for regulatory interventions to be judged by their actual results. *See* David Schoenbrod, *Richard Stewart's Perennial Question: 'How's This Going to Work'*, 29 N.Y.U. ENV'T L.J. 403 (2021); Richard B. Stewart, *Regulation, Innovation, and Administrative Law: A Conceptual Framework*, 69 CALIF. L. REV. 1256, 1260 (1981).

[22] *See* Daniel C. Esty, *Red Lights to Green Lights: From 20th Century Environmental Regulation to 21st Century Sustainability*, 47 ENV'T L. 1, 43–58 (resetting the environmental possibility frontier).

[23] See Bruce A. Ackerman & E. Donald Elliott, Air Pollution "Rights," N.Y. Times, Sept. 11, 1982, at 23 ("The E.P.A. should, instead, sell polluters the right to dirty the air for a fixed period—just as the Government now auctions off oil and gas leases to the highest bidders. If polluters were forced to pay, they would clean up to avoid the cost—and breathers, not industry, would profit. The public would not stand for a multi-billion dollar give-away of public lands or water to industry. Why should the air be different?").

concern about environmental degradation.[24] Evidence of the emerging public belief in the importance of environmental rights and a principle of no negative externalities can be found in many places, both in the United States and around the world. Opinion surveys show Americans across party lines and other divides want stronger environmental protection.[25] And more than one hundred nations have elaborated environmental rights in their constitutions.[26] Perhaps even more notably, business leaders have increasingly come to accept the need for companies to address their negative effects on society and not simply to seek to optimize profits. For example, the Business Roundtable, representing several hundred CEOs of America's leading companies, recently updated its vision of corporate purpose, declaring that the era of *shareholder primacy* had ended and that corporations must take up a broader mission of *shareholder responsibility* that extends a duty of care to the enterprises' workers, customers, suppliers, communities, and society in general.[27] Some companies, such as Interface Carpet, have gone even further and expressly adopted a "zero negative impact" on society goal—which parallels our proposed *end to externalities* principle.[28] And more

[24] *See e.g.*, Cary Funk & Brian Kennedy, *How Americans See Climate Change and the Environment in 7 Charts*, PEW RSCH. CTR. (Apr. 21, 2020), https://www.pewresearch.org/fact-tank/2020/04/21/how-americans-see-climate-change-and-the-environment-in-7-charts/ ("Compared with a decade ago, more Americans say protecting the environment and dealing with global climate change should be top priorities for the president and Congress.").

[25] *See, e.g.*, Alec Tyson & Brian Kennedy, *Two-Thirds of Americans Think Government Should Do More on Climate,* PEW RSCH. CTR. (June 23, 2020), https://www.pewresearch.org/science/2020/06/23/two-thirds-of-americans-think-government-should-do-more-on-climate/; James F. Smith, *Poll finds strong bipartisan support for rights, and concern that rights are under threat,* HARV. KENNEDY SCH. (Sept. 14, 2020), https://www.hks.harvard.edu/faculty-research/policy-topics/human-rights/poll-finds-strong-bipartisan-support-rights-and-concern.

[26] *See What Are Environmental Rights?*, U.N. ENV'T PROGRAMME, https://www.unenvironment.org/explore-topics/environmental-rights-and-governance/what-we-do/advancing-environmental-rights/what (last visited Mar. 20, 2021).

[27] *See Business Roundtable Redefines the Purpose of a Corporation to Promote 'An Economy That Serves All Americans'*, BUS. ROUNDTABLE (Aug. 19, 2019), https://www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans.

[28] *See* INTERFACE, LESSONS FOR THE FUTURE: THE INTERFACE GUIDE TO CHANGING YOUR BUSINESS TO CHANGE THE WORLD (2020), https://interfaceinc.scene7.com/is/content/InterfaceInc/Interface/EMEA/ WebsiteContentAssets/Documents/25th%20anniversary%20report/English/wc_eu-

than one thousand companies—including Amazon, Apple, Ford, McDonalds, Microsoft, and even major energy sector companies such as BP, Shell, and Total—have made commitments to net-zero greenhouse gas emissions by 2050.[29]

B. *The Kaldor-Hicks Fallacy*

Policy decisions to tolerate certain levels of pollution are not the main reasons why we as a country have, to date, been unable to eliminate all harmful environmental externalities and have come instead to accept significant levels of ongoing emissions.[30] We believe the primary culprit has been the emergence of a dominant vision of environmental policy based on benefit-cost analysis rather than the right to a healthy environment.[31] This alternative vision limits our

lessonsforthefuture-en.pdf?utm_source=interface&utm_medium=pdf&utm_campaign=sustainability-en_gb-organic&utm_content=sustainability-report. *See also* Sarah Peyok, *How Interface is Transforming Manufacturing with its Net Zero Emissions Strategy,* TRIPLE PUNDIT (Nov. 18, 2019), https://www.triplepundit.com/story/2019/how-interface-transforming-manufacturing-its-net-zero-emissions-strategy/85641.

[29] *See Commitments to Net Zero Double in Less Than a Year*, U.N. CLIMATE FRAMEWORK CONVENTION ON CLIMATE CHANGE (Sept. 21, 2020), https://unfccc.int/news/commitments-to-net-zero-double-in-less-than-a-year; Tom Murray, *Apple, Ford, McDonald's and Microsoft Among this Summer's Climate Leaders*, ENV'T DEF. FUND (Aug. 10, 2020), https://www.edf.org/blog/2020/08/10/apple-ford-mcdonalds-and-microsoft-among-summers-climate-leaders.

[30] For example, about one-fourth of the U.S. population—roughly 82 million people—live in areas that violate one or more of EPA's national ambient air quality standards (NAAQS). *See Air Quality – National Summary*, EPA, https://www.epa.gov/air-trends/air-quality-national-summary (last visited Mar. 21, 2021). However, scientific evidence is increasingly showing significant harm to health for some sensitive populations such as the elderly even in areas that meet the NAAQS. *See* Qian Di et al., *Air Pollution and Mortality in the Medicare Population*, 376 NEW ENG. J. MED. 2513, 2513–22 (2017).

[31] *See* Michigan v. EPA, 576 U.S. 743, 749–50 (2015); Paul R. Noe & John D. Graham, *The Ascendancy of the Cost-Benefit State?* 5 ADMIN. L. REV. ACCORD 85, 87 (2020); CASS R. SUNSTEIN, THE COST-BENEFIT STATE: THE FUTURE OF REGULATORY PROTECTION at ix (2002) (noting that "government regulation is increasingly assessed by asking whether the benefits of regulation justify the costs of regulation."); *see also* James Goodwin & Amy Sinden, *Progressive Regulatory Reform Recommendations for the Biden-Harris Administration*, REGUL. REV. (Dec. 21, 2020), https://www.theregreview.org/2020/12/21/goodwin-sinden-progressive-regulatory-reform-recommendations-biden-harris-administration/ (outlining recommendations for administrative reform that include "realigning cost-benefit analysis to make it more consistent with social justice, equity, and other progressive principles").

environmental aspirations by holding that government should only regulate if it is prepared to prove that a regulatory measure is scientifically justified and would produce *net benefits to society*.[32]

This prevailing benefit-cost framework settles for the Kaldor-Hicks criterion of economic efficiency as opposed to the more demanding goal of Pareto superiority. The Kaldor-Hicks principle holds that a change of policy is desirable if the winners benefit enough that they *could* compensate the losers, even if they do not actually pay compensation. In contrast, Pareto superiority describes a situation where one is made better off without making any others worse off.[33] And for our purposes, the "others" who should not be made worse off include members of future generations. The Kaldor-Hicks approach, which allows some to be made worse off if others benefit more, became national policy through the *net social benefit* standard for new rules under the Reagan administration's Executive Order 12,291.[34] That executive order created review of proposed major rules by the Office of Information and Regulatory Affairs (OIRA) and embedded benefit-cost analysis and risk assessment in the regulatory process, and subsequent interpretations have embedded risk assessment in order to quantify the benefit side of the benefit-cost comparison. These concepts still dominate most of the thinking in environmental policy today despite changes in language in subsequent executive orders.[35] However, we maintain that the

[32] *See, e.g.*, Exec. Order No. 12,291, 3 C.F.R. § 127 (1981).

[33] For a short explanation, see *Kaldor-Hicks Efficiency*, OXFORD REFERENCE, https://www.oxfordreference.com/view/10.1093/oi/authority.20110803100028833 (last visited March 10, 2021); *see also* Stephanie H. Jones, Note, *Greater than the Sum of its Parts: The Integration of Environmental Justice Advocacy and Economic Policy Analysis*, 26 N.Y.U. ENV'T L.J. 402, 419 (2018) (defining the Kaldor-Hicks criterion) (citing NICHOLAS A. ASHFORD & CHARLES C. CALDART, ENVIRONMENTAL LAW, POLICY, AND ECONOMICS 162 (2008) ("If the net effects of a government policy are positive, then those who gain as a result of the policy could, in theory, pay off those who lose and still have some benefits left over for themselves. Potentially, no one loses and at least some gain."). Problematically, this framework accepts that the winners gain enough such that they *could* pay off the losers—not that they actually do so.

[34] *See* Exec. Order No. 12,291, 3 C.F.R. § 127 (1981).

[35] *Compare* Exec. Order No. 12,291, 3 C.F.R. § 127 (1981), *with* Exec. Order No. 12,866, 58 Fed. Reg. 51,735 (1993), *and* Exec. Order No. 13,563, 76 Fed. Reg. 3,821 (2011). Both President Clinton's and President Obama's subsequent executive orders reiterate and build on Exec. Order 12,291 to require the use of cost-benefit analysis to justify administrative regulatory action. *See* Noe & Graham, *supra* note 31, at 91–92. *See generally* SUNSTEIN, *supra* note 31.

benefit-cost state is merely a transitional stage in the development of environmental law, not its final culmination.[36]

Under today's prevailing framework, a polluter sending emissions up a smokestack may make others worse off as long as the polluting enterprise gains more than the breathers are hurt. For example, the revenue an enterprise receives in addition to employment and other community-wide benefits may be seen as sufficient to justify modest harms to the health of the workers and neighbors. This outcome passes the Kaldor-Hicks and net-benefits tests but would not be Pareto superior because some are made worse off. Under our *end to externalities* principle, the polluting facility would be required to either stop the emissions or compensate fully the affected workers and neighbors.

While benefit-cost analysis may be useful in setting priorities and for choosing among alternative remedies,[37] in our view, it is a mistake to use benefit-cost analysis to limit our national commitment to internalizing environmental externalities. The problem is not merely measurement, which is a critique of benefit-cost analysis that some academics make and which we later discuss.[38] Rather, our *primary* concern is the more fundamental one—that using benefit-cost comparisons to allow harm to health to continue or increase presumes that harming the health of others is permissible as long as the benefits from doing so are greater than the harms. We do not agree, for example, that a polluting chemical plant should be allowed to adversely affect the health of its neighbors merely because the cost to the company of eliminating its discharges might outweigh the measurable benefits from eliminating the discharges to those who live near the facility. The reigning social net-benefit regulatory criterion with which we disagree—because it allows

[36] *Contra* FRANCIS FUKUYAMA, THE END OF HISTORY AND THE LAST MAN (1992) (arguing that liberal democracy and free markets are not merely a particular stage in history, but the end of history in the sense of being the final end-point of mankind's ideological evolution).

[37] *See* E. Donald Elliott, *Only a Poor Workman Blames His Tools: On Uses and Abuses of Benefit-Cost Analysis in Regulatory Decision Making About the Environment*, 157 U. PA. L. REV. 178, 182 (2009), http://ssrn.com/abstract=1712326.

[38] *See, e.g.*, FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING (2004).

significant emissions that harm others to go uninternalized—we call the *Kaldor-Hicks Fallacy*.[39]

C. *Compensation Alternative to Internalize Externalities*

While our *end to externalities* principle is indeed a proposal to shift the basic paradigm underlying environmental law away from the Kaldor-Hicks Fallacy, our approach should not be seen as a total break with the past. Indeed, Congress has sometimes articulated principles similar to ours but only in limited areas and not on a consistent or coherent basis. For example, the 1990 amendments to the air toxics provisions of the Clean Air Act specifically prohibited benefit-cost analysis and required sources of hazardous air pollutants to install maximum-achievable control technology to protect health regardless of whether it was cost-justified.[40]

We do, however, go farther than Congress did in that we believe that the law should require *actual compensation* to those injured by the residual risks that remain after the application of whatever level of pollution control technologies are deemed economically feasible.[41] While environmental lawyers often talk about the *polluter-pays principle*,[42] the actual regulatory practice, at least in the United States, has gradually devolved into a polluter does *not* pay principle—with significant residual emissions literally "permitted" under government regulation.[43]

As we indicated above, our main objection to the prevailing Kaldor-Hicks standard is that it merely requires that the beneficiaries of a government decision *could* pay compensation, not that they actually do so. We also worry that many of the benefits of pollution reductions in improving health and welfare of citizens and ecosystems may not be fully counted in benefit-cost analysis because they

[39] To be clear, we do not argue with Kaldor-Hicks as a way to assess economic efficiency. We maintain, however, that maximizing economic efficiency is not the right way to frame environmental law nor is it sufficient to vindicate environmental rights as we discuss below.

[40] *See* 42 U.S.C. § 7412.

[41] *Cf.* Boomer v. Atl. Cement Co., 257 N.E.2d 870 (N.Y. 1970) (allowing polluting plant to continue to operate upon condition of paying compensation in private nuisance case).

[42] *See generally What is the Polluter Pays Principle?,* GRANTHAM RSCH. INST. ON CLIMATE CHANGE AND THE ENV'T (2018), https://www.lse.ac.uk/granthaminstitute/explainers/what-is-the-polluter-pays-principle/.

[43] *See supra* text accompanying notes 32–36.

are diffuse and difficult to measure.[44] On the other hand, pollution control costs are often concentrated on industries that are very well positioned to calculate the economic burden they face from abatement rules and to ensure that regulators and elected officials appreciate these costs and related economic consequences such as diminished competitiveness, lower economic growth, and job losses. Thus, we think the obligation to measure harms and pay compensation may, in fact, reveal more circumstances in which the polluting enterprise does not meet even the net social benefit test, much less our more demanding standard.

Under our proposed new legal framework, a factory that is harming its neighbors, even if it is producing net social benefits, would be obligated to reduce or eliminate its emissions to the fullest extent possible and pay compensation to the victims for any harm that remains. We see the additional compensation obligation as essential to internalize the externality, create proper incentives for pollution control innovation, and compensate victims for the violation of their right to a healthy environment.

We note that our proposed approach parallels the compromise that society has reached in allowing workers to engage in hazardous activities if their companies produce net social benefits, but requiring their employers to reduce the risks as much as is feasible and to pay compensation to workers for the harms that do occur[45] as well as to disclose the nature and extent of the health hazards.[46] Unlike the general population, however, workers consent to their exposures, although their consent may be tainted by their need for a job. We think that the general population should be entitled to at least the same combination of feasible controls, disclosure, informed consent,[47] and no-fault compensation that we offer to workers through

[44] *See generally* Al McGartland et al., *Estimating the Health Benefits of Environmental Regulations*, 357 SCI. 457 (2017) (addressing the scientific uncertainties involved with quantifying the benefit of pollutant regulation).

[45] *See generally* Indus. Union Dep't, AFL-CIO v. Am. Petrol. Inst., 448 U.S. 607, 639–59 (1980) (construing OSHA to apply only "significant" risks to health because the Court will not presume Congress intended to protect workers by putting their employers out of business).

[46] *See* OSHA Standard 1910.1200 - Hazard Communication, 77 Fed. Reg. 17,574, 17,574–17,896 (Mar. 26, 2012), https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1200.

[47] In some circumstances, those harmed by activity also benefit from it and thus give their informed consent to accept the harm in order to obtain the benefit.

the workers' compensation and Occupational Safety and Health Act (OSHA) systems.

D. *Advancing Environmental Justice*

Because the hidden costs of pollution tend to fall more heavily on minority and low-income communities,[48] an important side benefit of our *end to externalities* principle would be a major boost to the environmental justice agenda.[49] Indeed, we believe that our proposed requirement for *actual payments to victims* would do more to advance environmental justice than all of the existing declarations, executive orders, and other policy mechanisms that merely require consideration of disproportionate impacts on people of color or other disadvantaged communities.[50]

If it is not practical to identify specific people who are exposed to environmental risks, then compensation should be paid to their communities or through appropriate "supplemental environmental projects."[51] For broad-based harms that cannot be traced to specific communities, the compensation should be paid to the government

Examples include: (1) employment in an industry such as construction in which risks of harm are inevitable with current and foreseeable technology or (2) electricity generation in which consumers obtain the benefit of lower utility rates but at the cost of exposure to low levels of pollution. We acknowledge that whether government should override personal choices to accept harms to health in order to obtain benefits is a complicated problem that raises issues beyond the scope of this Article. *See generally* Cass R. Sunstein, *The Storrs Lectures: Behavioral Economics and Paternalism*, 122 YALE L.J. 1826 (2013).

[48] *See Environment and Health Risks: A Review of the Influence and Effects of Social Inequalities*, WHO REG'L OFF. FOR EUR. (2010), https://www.euro.who.int/__data/assets/pdf_file/0003/78069/E93670.pdf?ua=1; Marco Martuzzi et al., *Inequalities, Inequities, Environmental Justice in Waste Management and Health*, 20 EUR. J. OF PUB. HEALTH 21, 21–26 (2010), https://doi.org/10.1093/eurpub/ckp216.

[49] *See generally* Ian Preston et al., *Climate Change and Social Justice: An Evidence Review,* JOSEPH ROWNTREE FOUND. (2014), https://www.jrf.org.uk/sites/-default/files/jrf/migrated/files/climate-change-social-justice-full.pdf; Paul Mohai et al., *Environmental Justice*, 34 ANN. REV. ENV'T & RES. 405 (2009).

[50] *See generally* Exec. Order No. 12,898, 59 Fed. Reg. 7629 (1994); COUNCIL ON ENV'T QUALITY (CEQ), ENVIRONMENTAL JUSTICE: GUIDANCE UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT 10 (1997) (instructing agencies to consider environmental justice at various stages of NEPA analysis).

[51] For an explanation of "supplemental environmental projects," which are a common feature of environmental enforcement settlements, see *Supplemental Environmental Projects (SEPs),* EPA, (Sept. 8, 2020), https://www.epa.gov/enforcement/supplemental-environmental-projects-seps.

entity that most closely tracks the geographic scope of the emissions,[52] which might be a state, tribe, or the federal government—with compensation for harms that are global in scope retained by the national government unless it has agreed to some other payment structure.[53] For current activities that may harm future generations, user fees can be paid into a trust that is set aside to respond to the problem in the future.[54] Something similar is currently done under a few environmental laws, primarily those that require the operator of a mine or other extractive activity to accumulate funds or post financial assurance during its operating life to pay for end-of-life expenses such as land restoration.[55]

Charging polluters user fees makes sense not only as a matter of compensatory justice, but also to create incentives to develop better production processes as well as better pollution controls in the future.[56] We believe that EPA has existing authority to charge user fees for pollution under the 1952 Independent Offices Appropriations Act,[57] as many other government agencies already do to the

[52] This proposal builds on Butler and Macey's famous "matching principle" for addressing externalities. *See* Henry N. Butler & Jonathan R. Macey, *Externalities and the Matching Principle: The Case for Reallocating Environmental Regulatory Authority,* 14 YALE L. & POL'Y REV. 23 (1996).

[53] One could imagine a future moment where nations might agree that compensation for residual greenhouse gas emissions should be paid into the Green Climate Fund or the Global Environment Facility (GEF). Such an outcome would follow Butler and Macey's matching principle and would be consistent with calls for "climate justice." *Id.* However, in view of current realities of national sovereignty, such a payment structure would only make sense as part of the give-and-take of ongoing climate negotiations.

[54] For a further discussion of charging "user fees" for the use of resources such as air or water that are held in trust for the public as a whole for waste disposal, see generally E. Donald Elliott, Comment, *EPA's Existing Authority to Impose a Carbon "Tax"*, 49 ENV'T L. REP. 10,919 (2019); Hugh D. Spitzer, *Taxes vs. Fees: A Curious Confusion*, 38 GONZAGA L. REV. 335, 345–47 (2002–03).

[55] For example, the Surface Mining Control and Reclamation Act (SMCRA) of 1977 created the Abandoned Mine Land (AML) Reclamation Program. Coal companies currently operating strip mines pay into a fund to support future abandoned mine reclamation. *See* 30 U.S.C. §1231 (2006).

[56] *See generally* Elliott, *supra* note 20; Esty, *supra* note 22, at 24–26 (2017).

[57] *See* 31 U.S.C. § 9701; *see also* OFF. OF MGMT. & BUDGET, OMB Circular No. A-25 Revised (July 8, 1993), https://obamawhitehouse.archives.gov/omb/circulars_a025/ (stating policy of the United States "to… *promote efficient allocation of the Nation's resources* …" by charging the "market price" when a "service (or *privilege*) provides special benefits to an identifiable recipient beyond those that accrue to the general public." (emphasis added)).

tune of over $64 billion a year for access to resources they control.[58] However, at present, the funds raised under that federal law are paid either to the agency to defer its costs or to the U.S. Treasury and do not directly compensate those harmed.

The harms from pollution are not only physical; they are also psychological due to the fear engendered when people and their children are exposed to substances involuntarily and worry about how this exposure may harm their health. To internalize this portion of the externality, when significant releases to the environment occur but it is not yet clear whether they are harmful, polluters should be required to disclose not only the extent of the releases, but also their basis for concluding that the releases will not harm others. In some cases, a review of the existing scientific literature may be sufficient to come to a *no harm* conclusion.[59] But if such a review cannot provide the necessary foundation for a *no harm* judgment, then we believe that the polluter should have a legal obligation to hire competent independent experts to conduct original research into whether their pollution will harm others before releasing it into the environment.[60] This is similar to the existing system of *hazard communication* which requires employers to provide objective information about the extent of risks to which their employees are exposed on the job.[61]

Compensating victims for the harms of residual pollution that remains after the application of technologically feasible controls

[58] *See* Elliott, *supra* note 54. The U.S. Government Accountability Office (GAO) found that 23 federal agencies collected nearly $64 billion in fiscal year 2010 from over 3,600 user fees. *See* GAO, 2012 ANNUAL REPORT: OPPORTUNITIES TO REDUCE DUPLICATION, OVERLAP AND FRAGMENTATION, ACHIEVE SAVINGS, AND ENHANCE REVENUE 278 (2012).

[59] *See* E. Donald Elliott & Gail Charnley Elliott, *Private Product-Risk Assessment and the Role of Government*, 23 JOHN LINER REV. 73 (2009) (describing reliance on existing scientific literature by companies doing due diligence before introducing a new product).

[60] Such an obligation would reverse the burden of proof to demonstrate emissions safety, putting that burden on the enterprise involved rather than the government. In doing so, it follows the models of California's Proposition 65 regarding toxic risks and the European Union's REACH Directive. *See* Carl Cranor, *Information Generation and Use Under Proposition 65: Model Provisions for Other Postmarket Laws?,* 83 IND. L.J. 609, 613 (2008); Ellen K. Silbergeld et al., *Regulating Chemicals: Law, Science, and the Unbearable Burdens of Regulation,* 36 ANN. REV. PUB. HEALTH 175, 185 (2015).

[61] *See* OSHA, *supra* note 46.

could be accomplished through the existing tort system. However, to reduce transaction costs, disclosure and compensation could be also required through an expansion of the existing permitting process to include no-fault compensation payments for psychological and physical harms from the level of pollution that a permit allows to continue.

We note, moreover, that one reason that proposals to track emissions, charge for harms, and pay compensation to victims were not considered as parts of America's modern framework of environmental law in the 1970s and 1980s can be traced to the perceived need to pursue strategies that were easier to manage administratively.[62] But today's information technologies, big data analytics, and communications links make the challenge of charging for harms more manageable and likely to be lower in cost than in the 1970s.[63] In brief, these new tools make it easier to vindicate environmental rights and to meet the rising demand for more rigorous approaches to environmental justice.

II. PHILOSOPHICAL BASIS FOR THE GOAL OF ELIMINATING HARM

A. *Why Internalize Externalities?*

Our central thesis that environmental law should strive to eliminate all negative environmental externalities harkens back to British economist Arthur Cecil Pigou. In his 1920 book *The Economics of Welfare*, Pigou argued that the mere existence of negative externalities offers a valid reason for regulation and should be so recognized in law.[64] We agree with Pigou that the goal of environmental law should be to internalize negative externalities—at least if they are beyond *de minimis* discharges[65] or are not authorized by

[62] *See* Daniel C. Esty, *Environmental Protection in the Information Age*, 79 N.Y.U. L. REV. 115, 140–48 (2004); *see also* Esty, *supra* note 22, at 43–51; Gregg P. Macey, *The Architecture of Ignorance*, 2013 UTAH L. REV. 1627, 1627–31 (2013).

[63] *See* Esty (*Information Age*), *supra* note 62, at 156–61.

[64] *See, e.g.*, A. C. PIGOU, THE ECONOMICS OF WELFARE 172–85 (4th ed. 1920).

[65] An example of a *de minimis* discharge is one that does not exceed the assimilative capacity of the environment and thus may result in no harm. *See* Stephen J. Randtke, *Assimilative Capacity*, ENCYCLOPEDIA.COM (2019) https://www.encyclopedia.com/environment/encyclopedias-almanacs-transcripts-and-maps/assimilative-capacity. However, how to allocate the limited assimilative capacity of environmental resources among competing users raises difficult issues of equity that

informed consent. Thus, we argue here for an end to externalities through the imposition of *harm charges* and information disclosure of any externality that is allowed to continue due to practical considerations.[66]

In our view, environmental law—at least in the academy—took a wrong turn by carrying the lessons of Ronald Coase too far and turning its back on Pigou. Coase's work has been over-simplified in the so-called "Coase Theorem" that suggests, in the absence of transaction costs, regardless of whether or not ranchers were liable when their cattle destroyed farmers' crops, the same level of fencing to keep cows out of the cornfield next door would be built.[67] Importantly, in Coase's example, both parties have equally valid interests and the *harm* that results is merely the fact that their interests conflict. In addition, Coase was discussing an imaginary world without transaction costs and devoted to economic efficiency, not justice. In the real world,[68] some harms are not caused equally by both sides in any sense that the law should care about. Is your broken jaw really jointly *caused* by the presence of your jaw at a particular

are beyond the scope of the current paper. *See* Robert U. Ayres & Allen V. Kneese, *Production, Consumption, and Externalities*, 59 AM. ECON. REV. 282, 295 (1969) ("[U]nder conditions of intensive economic and population development the environmental media which can receive and assimilate residual wastes are not free goods but natural resources of great value with respect to which voluntary exchange cannot operate because of their common property characteristics.").

[66] *See* Esty, *supra* note 22, at 24–25 (arguing for an end to externalities as a foundational principle for environmental regulation); *see also* Elliott, *supra* note 20 (suggesting EPA charge user fees for air pollution that it allows to continue to create incentives for further reductions); Erin Adele Scharff, *Green Fees: The Challenge of Pricing Externalities Under State Law*, 97 NEB. L. REV. 168 (2018) (discussing similar issues under state law).

[67] *See* Ronald Coase, *The Problem of Social Cost*, 3 J. L. & ECON. 1, 3–6, 10 (1960); *see also* Robert C. Ellickson, *The Case for Coase and Against "Coaseanism"*, 99 YALE L.J. 611, 611 (1989) ("Coase's name is consistently attached to propositions he has explicitly repudiated."). We do not denigrate Coase's important work in pointing out the importance of transaction costs; however, we note that at the end of his famous essay, he ultimately endorses a position similar to ours that rights should be allocated based on "aesthetics and morals." Coase, *supra* note 67, at 43 ("As Frank H. Knight has so often emphasized, problems of welfare economics must ultimately dissolve into a study of aesthetics and morals.").

[68] The best empirical evidence is that people do not actually behave as predicted by the Coase Theorem, but rather resort to shared notions of the duties of neighbors not to injure one another. *See* ROBERT C. ELLICKSON, ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES 4 (1994).

place and time at the moment that my fist comes smashing into it? Perhaps in some metaphysical sense, but that does not stop the law from prosecuting assaults. Similarly, the innate human need to breathe healthy air is not a joint "cause" of air pollution in the same way that a factory using our common air resource for waste disposal is.[69] For all of these reasons, Coase's insight, valid as it is within limits, does not mean that environmental law should give up on trying to internalize environmental externalities to the maximum extent feasible.

B. *Toward a Rights-Based Framework of Environmental Law*

For the reasons outlined above, we believe that members of a community owe one another a moral duty not to injure each other, regardless of whether abating a particular injury is economically efficient. The natural law duty for polluters not to injure others creates a correlative right for breathers to be free from harmful pollution.[70] As a second-best solution, if abating harmful pollution is infeasible and not merely inefficient, natural law calls for polluters to compensate breathers for their injuries and ameliorate their fears—and thereby internalize externalities as fully as is possible with money.[71] However, U.S. environmental law in practice today subsidizes pollution by under-internalizing the harms of pollution that it deems economically inefficient to abate. This efficiency limitation shapes pollution control in a manner similar to the way that the nineteenth century law of industrial accidents, which was designed to be "employer-friendly" and created numerous defenses against liability,[72]

[69] If it is more efficient for what environmental law sometimes calls "receptors" (people) rather than polluters to abate a harm, polluters can pay them to do so. For example, at Superfund sites where it is too expensive to clean up the groundwater to drinking water quality, it is common for polluters to pay for alternative water supplies. But this does not mean that the result is "the same" regardless of to whom the law assigns legal rights. The "wealth position" (who pays for the efficient solution) is different depending upon whom the positive law recognizes as the rights holder. In addition, monetary compensation rarely if ever makes someone whole for harm to their health, but it is the best that we can do.

[70] *See generally* Wesley Hohfeld, *Some Fundamental Legal Conceptions As Applied In Judicial Reasoning*, 23 YALE L.J. 16, 28–59 (1913) (describing reciprocal relationship of rights and duties).

[71] *See* discussion *supra* note 13.

[72] One example is the now-abrogated "fellow servant rule," which exonerated the employer from paying compensation if another employee caused the injury.

subsidized industrial development by giving factory owners broad defenses to avoid paying the costs of workplace injuries.[73] Over time, workers gained greater protection, and compensation for industrial accidents became the norm. We think it is now time for pollution victims to be accorded similar protection, disclosure, and compensation.

III. IMPLEMENTING THE END TO EXTERNALITIES PRINCIPLE

A. *Identifying Negative Environmental Externalities*

Before we can try to end—or more accurately, *internalize*—negative externalities, we must, of course, be able to recognize and define them. This task proves to be more difficult than it might appear. A surprising degree of confusion emerges from the scholarly literature about exactly what constitutes a negative externality. Most definitions merely consist of a handwave in the direction of imposing "costs" on a third party, and then give pollution as an example. The *Encyclopedia Britannica*, for example, states that:

> A negative externality exists when the production or consumption of a product results in a cost to a third party. Air and noise pollution are commonly cited examples of negative externalities. When negative externalities are present, private markets will overproduce because the costs of production for the firm are understated and profits are overstated.[74]

Similarly, *The Law Dictionary* tells us that a negative externality "[o]ccurs when a product or decision exceeds the society's private cost" and goes on to note that such circumstances represent a

See, e.g., *Fellow Servant Rule*, USLEGAL, https://definitions.uslegal.com/f/fellow-servant-rule/ (last visited Mar. 11, 2021).

[73] *See, e.g.*, Charles O. Gregory, *Trespass to Negligence to Absolute Liability*, 37 VA. L. REV. 359, 368 (1951) ("Judicial subsidies . . . to youthful enterprise removed pressure from the pocket-books of investors and gave incipient industry a chance to experiment on low-cost operations without the risk of losing its reserve in actions by injured employees. Such a policy no doubt seems ruthless; but in a small way it probably helped to establish industry…."); LAWRENCE M. FRIEDMAN, A HISTORY OF AMERICAN LAW 413–17 (1973) (discussing development of nineteenth-century American tort doctrine as guarding industry against damages claims). *See generally* MORTON J. HORWITZ, THE TRANSFORMATION OF AMERICAN LAW, 1780-1860, at 67–108 (1977) (discussing the "burden" on development imposed by damages judgments and development of legal doctirnes to subsidize economic development).

[74] Rebecca Summary & Eleanor G. Henry, *Private Good,* ENCYC. BRITANNICA (Dec. 5, 2013), https://www.britannica.com/topic/private-good#ref1189688.

"market failure."[75] In a recent article that seeks to give more depth to the issue of externalities, economist Bryan Caplan contends that they can be defined as anything that someone would pay to avoid:

> Research and development is a standard example of a positive externality, air pollution of a negative externality. Ultimately, however, the distinction is semantic. It is equivalent to say "clean air has positive externalities and so clean air is underproduced" or "dirty air has negative externalities and so dirty air is overproduced."
>
> Economists measure externalities the same way they measure everything else: according to human beings' willingness to pay. If one thousand people would pay ten dollars each for cleaner air, there is a ten-thousand-dollar externality of pollution. If no one *minds* dirty air, conversely, no externality exists. If someone likes dirty air, this unusual person's willingness to pay for smog must be subtracted from the rest of the population's willingness to pay to curtail it.[76]

But as "clean air"—whatever that means—is not a commodity traded in markets, how are we to know how much people would be willing to pay for it? Is it really true, moreover, that people ought to have to *pay* to breathe clean air? Or rather, aren't some claims to use the air for certain purposes, such as breathing, more deserving of protection by the law than others, such as using the air for waste disposal? Other areas of law, such as riparian rights for allocating water, traditionally give preference to uses for domestic consumption that are necessary for human self-preservation.[77] And is it really true that whatever people "mind" and would prefer to avoid is an externality? The late President George Herbert Walker Bush

[75] *What is NEGATIVE EXTERNALITY?*, LAW DICTIONARY, https://thelawdictionary.org/negative-externality/ (last visited Mar. 11, 2021).

[76] Bryan Caplan, *Externalities*, LIBR. OF ECON. & LIBERTY, https://www.econlib.org/library/Enc/Externalities.html (last visited Mar. 11, 2021).

[77] *See* Jarret C. Oeltjen & Loyd K. Fischer, *Allocation of Rights to Water: Preferences, Priorities, and the Role of the Market*, 57 NEB. L. REV. 245, 249 (1978) ("The fundamental preferential use developed through the riparian doctrine is classified as 'natural,' 'ordinary,' or 'domestic.' This classification of uses reflects a right of self-preservation and creates in the riparian owner a preference to supply the needs of himself, his family, and his livestock for such purposes as drinking, cooking, and cleansing.").

famously expressed dislike for broccoli.[78] Does that make broccoli farmers guilty of creating an "externality" that the law should address?

The concept of internalizing externalities is actually a very old principle in the common law, the antecedents of which can be traced back at least to the 1610 decision in *Aldred's Case*, a matter rediscovered and popularized by Dick Stewart's 1978 environmental casebook with Jim Krier.[79] In that case, a court held that the neighbor of an English pig farmer whose animals were causing a stench that spilled onto his neighbor's property had a cause of action as a result of the negative externality.[80]

The libertarian tradition goes back farther than Pigou, albeit in different language.

Another Stewart, one who misspelled his middle name—John Stuart Mill—called this the "harm principle" and made it the cornerstone of his philosophy that everyone has the liberty to do what they will if, but only if, their actions do not harm others.[81] John Stuart Mill distinguished between what he called "harms" and "mere offenses." Not everything that others do not like is a "harm" that the state may rightly prohibit in his philosophical system. "To constitute a harm, an action must be injurious or set back important interests of particular people, interests in which they have rights."[82] This seminal idea has also been elaborated more recently in the ethical theories of philosopher William David Ross: that everyone has a *prima facie* duty not to harm others.[83] We argue that this ethical duty

[78] *See, e.g.*, Erica Chayes Wida, *President George H.W. Bush Never Liked Broccoli — and People Still Love Him for It,* TODAY (Dec. 3, 2018), https://www.today.com/food/president-george-h-w-bush-celebrated-never-liking-broccoli-t144284.

[79] *See generally* RICHARD B. STEWART & JAMES E. KRIER, ENVIRONMENTAL LAW AND POLICY: READINGS, MATERIALS AND NOTES 117–19 (1978).

[80] *See* Aldred's Case (1610) 77 Eng. Rep. 816 (K.B.).

[81] *See, e.g.*, David Brink, *Mill's Moral and Political Philosophy*, STAN. ENCYC. OF PHIL. at 3.5 (Aug. 21, 2018), https://plato.stanford.edu/entries/mill-moral-political/.

[82] *Id.* at 3.6.

[83] *See, e.g.*, Anthony Skelton, *William David Ross*, STAN. ENCYC. OF PHIL. at 4.1 (June 19, 2012), https://plato.stanford.edu/entries/william-david-ross/; Jan Garrett, *A Simple and Usable (Although Incomplete) Ethical Theory Based on the Ethics of W. D. Ross*, W. KY. U. (last revised Aug. 10, 2004), http://people.wku.edu/jan.garrett/ethics/rossethc.htm.

not to harm others has important implications for environmental law, as we will try to elaborate.

The primary harm of concern in the field of environmental pollution is that pollution impinges upon every person's fundamental human right to bodily integrity and to a healthy environment that does not harm his or her health.[84] But pollution also produces other cognizable harms, such as degrading visibility, adversely affecting ecosystems, threatening the viability of endangered species, and contributing to climate change. Many of these effects also affect non-human species, which may or may not be seen as also possessing natural law rights against harm. In addition, we face further difficulties in defining externalities by reference to environmental rights that have been infringed because many of these rights are held in common by large numbers of people.

Whether some kinds of pollution are or are not actually creating an identifiable harm is furthermore often unclear as a matter of science.[85] As a result, one of the key issues to be decided in any system of environmental law is who bears what we call the *uncertainty risk*.[86] Notably, should we allow one party—usually, but not always, industry—to continue activities that may be harming others merely because "full scientific certainty"[87] that the behavior is indeed

[84] Note that, since the 1970s, a growing number of national constitutions (although not the U.S. one) recognize a right to a healthy environment in one form or another. *See, e.g.*, DAVID R. BOYD, DAVID SUZUKI FOUND., THE STATUS OF CONSTITUTIONAL PROTECTION FOR THE ENVIRONMENT IN OTHER NATIONS 6 (2013), https://davidsuzuki.org/wp-content/uploads/2013/11/status-constitutional-protection-environment-other-nations.pdf.

[85] *See* Albert C. Lin, *Technology Assessment 2.0: Revamping Our Approach to Emerging Technologies*, 76 BROOK. L. REV. 1309, 1324 (2011) (detailing the level of uncertainty involved in hazard risk assessments, especially with regard to hazards whose risks involve "unknown unknowns" given technological shortcomings).

[86] *See* Alyson C. Flournoy, *Legislating Inaction: Asking the Wrong Questions in Protective Environmental Decisionmaking*, 15 HARV. ENV'T L. REV. 327, 366 (1991) (highlighting how absent concrete demonstration of high risk of harm, classical environmental regulations do not regulate potentially harmful conduct).

[87] *Communication from the Commission on the Precautionary Principle*, at 10, COM (2000) 1 final (Feb. 2, 2000), https://op.europa.eu/en/publication-detail/-/publication/21676661-a79f-4153-b984-aeb28f07c80a/language-en (explaining that under the European Union's "precautionary principle," the absence of full scientific certainty should not preclude regulation); *see* Robert V. Percival, *Who's Afraid of the Precautionary Principle?*, 23 PACE ENV'T L. REV. 21, 25 (2006).

harmful is not yet available? Such circumstances take us to the domain of the (in)famous and much-debated precautionary principle.[88]

We take the strong view that imposition of a credible *risk of a risk* without someone's informed consent, not merely provable *actual* injury, should be cognizable as a harm that environmental law should address to the extent practical.[89] The difficulty comes in deciding what rebuts the presumption that environmental externalities should be eliminated or internalized and how much weight to give to practicality. How much evidence is necessary and who has a burden to compile it? How much expense may be imposed by the state to obviate what may or may not turn out to be an actual harm to others? We acknowledge those issues but are not yet prepared to answer those questions, and we leave them for another day.

B. *Further Implementation Issues*

Our *end to externalities* framework raises a number of difficult implementation issues. We try to approach these issues pragmatically by learning from what has and has not worked in the history of environmental law. We do not take the view that *precaution* should always be adopted by government policy.[90] Rather, there should be a rebuttable presumption that government will require the internalization of externalities—eliminating harm to others—to the maximum extent practical and paying full compensation for any

[88] *See, e.g.*, Joined Cases T-74, T-76, T-83, T-84, T-85, T-132, T-137 & T-141/00, Artegodan GmbH and Others v. Comm'n of the European Communities, 2002 E.C.R. II-5016 (holding that in the European Union, the precautionary principle requires that "where there is uncertainty as to the existence or extent of risks . . . the institutions may take precautionary measures without having to wait until the reality and seriousness of those risks become fully apparent."); *see also* U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, ¶15, U.N. Doc. A/CONF.151/26 (Vol.I) (June 14, 1992) ("Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.").

[89] *See* Albert C. Lin, *The Unifying Role of Harm in Environmental Law*, 2006 WIS. L. REV. 897, 911 (2006) ("Yet even in risk-based regulation, the law has generally required an affirmative showing that harm is likely before intervening."). Courts have begun to recognize risk of harm as a cognizable injury conferring constitutional standing to sue. *See, e.g.*, Massachusetts v. EPA, 549 U.S. 497 (2007); Nat. Res. Def. Council v. EPA, 464 F.3d 1, 7 (D.C. Cir. 2006); Strubel v. Comenity Bank, 842 F.3d 181, 191 (2d Cir. 2016).

[90] *But see* sources cited *infra* note 91 for arguments in favor of erring on the side of precaution.

residual harms. As noted above, this principle should additionally permit *risk compensation charges* to be imposed on conduct that *may* credibly be harming others even though there is not yet full scientific certainty that it is actually doing so.[91]

1. What Degree of Pollution Control Should Be Required?

In view of our starting point that governments have a presumptive obligation to restrict conduct that imposes cognizable harm on others without their consent, we would generalize the application of the operative standard under one of our nation's most recent environmental statutes, the Food Quality Protection Act, which declares that members of a community are entitled to reasonable assurance of no harm from the actions of others in applying pesticides to their crops.[92] We believe persons subject to exposure to substances released into the environment by others in whatever form are entitled to that same level of protection: reasonable assurance of no harm.

In determining what degree of pollution control should be mandated in this regard requires assessments of technological feasibility, innovation possibility, and economic practicality. We envision that the existing EPA would be well positioned to develop such *feasibility standards* building on its current engineering and industrial technology capabilities. We believe, furthermore, that the regulated community would be strongly incentivized to collaborate with this exercise in standard setting, knowing that any amount of pollution left unabated will bear an unavoidable harm charge.

2. How Are Harm Charges and Compensation Calculated?

The second element of our proposed structure would require polluters to pay fully for any residual emissions that cannot feasibly

[91] On compensation for involuntary exposure to risk, *see generally* E. Donald Elliott, *The Future of Toxic Torts: Of Chemophobia, Risk as a Compensable Injury and Hybrid Compensation Systems*, 25 HOUS. L. REV. 781 (July, 1988); Clifford Fisher, *The Role of Causation in Science as Law and Proposed Changes in the Current Common Law Toxic Tort System*, 9 BUFF. ENV'T L.J. 35 (2001) (exploring potential compensation mechanisms and tradeoffs for victims involuntarily exposed to potentially harmful toxics); Albert C. Lin, *Beyond Tort: Compensating Victims of Environmental Toxic Injury*, 78 S. CALIF. L. REV. 1439 (2005) (examining the weaknesses of the existing toxic torts framework of compensating victims).

[92] *See* 7 U.S.C. § 136 (2018) (implementing a safety standard for tolerance of pesticide chemical residue).

be abated. As noted earlier, this commitment to *full compensation* is essential to spur pollution control innovation, ensure that companies take seriously their obligation to eliminate harmful emissions to the greatest extent *feasible*,[93] and meet the demands of environmental justice.

We note that setting the level of harm—or risk—charges and identifying those who should be compensated would require a new emphasis at EPA on both understanding the fate and transport of emissions and on evaluating the epidemiological and ecological harms they create. We anticipate that this new regulatory focus would require a shift in the human resource capabilities of the Agency toward more refined exposure assessment, increased epidemiological and ecological analysis, as well as risk assessment and benefit-cost analytics.

3. Who Receives the Required Compensation?

The duty to pay compensation for environmental harms or risks raises another question: who should receive the charges levied? Current practice typically has fees paid going to the government whose legal framework imposes the charge. For example, the emissions allowance fees paid under the Regional Greenhouse Gas Initiative (RGGI) go to the compact of Northeastern states that make up the RGGI region and are then redistributed to the individual states. For broad-based harms, such as acid rain or climate change, it perhaps makes sense for the funds to go to the governments on behalf of the affected public.

But we argue that if specific *victims* can be identified—especially for localized harms such as the air pollution from an incinerator—the compensatory charges should be paid by the beneficiaries to those bearing the burden of the pollution.[94] This principle also

[93] We believe that informed consent by pollution victims and affirmative assent to compensation rather than further emissions reduction represents the best test of *full* internalization of the remaining pollution externality. But to avoid the well-documented risk of holdouts, we acknowledge that government calculation of the appropriate harm charge may be necessary. We remain open to the possibility that such a structure may not deliver the full compensation that we intend—and the system proposed will need to be further refined.

[94] Whether victims may collect both for the exposure to risk, and again if they actually suffer a disease resulting from the risk, is an issue to be decided under state law, but in some instances, states might decide to allow an offset against a damage verdict for the risk charges previously paid.

applies to future generations when we can reasonably anticipate that they may be adversely affected by today's pollution or other environmental externalities. While the details of how to pay out such compensation will require a methodological discussion beyond the scope of the present Article, as we noted earlier, a rule to "compensate victims if they can be identified"—either in person or by category—would go a considerable distance toward operationalizing *environmental justice* as a central principle of twenty-first century environmental law.

IV. OUR PRINCIPLES ILLUSTRATED

Experience under America's environmental laws illustrate how the general principles outlined above should work in practice. As we have suggested elsewhere,[95] the drafters of our environmental laws in the 1970s recognized that they did not know exactly what would be the best approach to regulate environmental pollution. They therefore created a toolbox of legal authorities and approaches and left it to implementation and experimentation to work out which approaches worked best. Now, fifty years into modern national environmental law in the United States, it is time to reflect on this experience and ask what has worked well and what has not,[96] an exercise that one of us has called "domestic comparative law."[97]

One of the basic lessons to be learned is that drafters of environmental laws should pay greater attention to the *incentives* they create.[98] Many U.S. environmental statutes have been interpreted to put the burden of proof on the government to show that a practice is causing harm or, in other circumstances, that the benefits of regulation exceed the costs or at least that the proposed rules would be

[95] *See* ELLIOTT & ESTY, *supra* note 18.

[96] *See* Esty, *supra* note 22, at 1–31.

[97] E. Donald Elliott, *Rationing Analysis of Job Losses and Gains: An Exercise in Domestic Comparative Law, in* DOES REGULATION KILL JOBS? 256 (Cary Coglianese & Adam Finkel eds., 2013). For prior examples of trying to draw lessons from experience under various environmental laws, see also Elliott, *supra* note 20; E. Donald Elliott, *U.S. Environmental Law in Global Perspective: Five Do's and Five Don'ts from Our Experience*, 2010 NAT'L TAIWAN U. L. REV. 144 (2010); E. Donald Elliott, *Lessons From Implementing the 1990 CAA Amendments*, 40 ENV'T L. REP. 10592 (2010).

[98] *See* Esty, *supra* note 12, at 88. This is also a recurrent theme in our jointly-authored forthcoming summary of U.S. environmental law. ELLIOTT & ESTY, *supra* note 18.

cost-effective. This structure of regulation, however, encourages those who wish to avoid the costs of regulation to create *paralysis by analysis*, studying a problem to death as a way of avoiding or at least postponing regulation. This problem has been brilliantly addressed by David Roe, the principal drafter of California's Proposition 65, in an article that has not received sufficient attention.[99] We anticipate that our *end to externalities* approach with its insistence on fully compensatory harm charges for residual emissions would provide similar incentives to clarify the facts and innovate to reduce pollution.

We note further that in some countries litigation has emerged as a primary tool for pollution control and the internalization of environmental externalities. In the United States, however, while environmental advocacy groups have recently ramped up the use of lawsuits to hold polluters responsible for monetary damages for the harms their emissions cause or governments responsible for failure to regulate, such efforts have found only limited success—making our alternative strategy for harm charges all the more important.[100]

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[99] *See* David Roe, *Barking Up the Right Tree: Recent Progress in Focusing the Toxics Issue*, 13 COLUM. J. ENV'T L. 275 (1988) (an economic incentive analysis of Proposition 65 by its author which claims that it is successful because it removes incentives for industry to delay regulation).

[100] For example, the Earth Island Institute recently filed suit seeking compensatory damages as well as the costs of clean-up against ten major users of disposable plastics that litter beaches. *See* Complaint, Earth Island Inst. v. Crystal Geyster Water Co., No. 20CIV01213 (Cal. Super. Ct. 2020), https://www.earthisland.org/images/uploads/suits/2020-02-26_Earth_Island_Complaint_FILED.PDF. But in a number of climate change cases, courts have denied plaintiffs the right to proceed. *See, e.g.*, Native Village of Kivalina v. ExxonMobil Corp., 696 F.3d 849, 858 (9th Cir. 2012); Juliana v. United States, 947 F.3d 1159 (9th Cir. 2020). In other nations, however, courts have moved more aggressively to hold polluters and governments accountable for harms including greenhouse gas emissions. Courts in France, Ecuador, Colombia, Pakistan, Britain, Nigeria, and the Philippines have issued decisions in recent years holding parties accountable for violating environmental rights. *See* Daniel C. Esty, *Toward a Sustainable Future: Environmental Jurisprudence from France's Constitutional Council Breaks New Ground*, *in* FRENCH CONSTITUTIONAL COUNCIL: ANNUAL REPORT 2020 106, 106–07 (2020); *e.g.*, Conseil d'Etat (CE) [highest administrative court] Nov. 19, 2020, No. 427301 (Fr.), https://www.conseil-etat.fr/actualites/actualites/emissions-de-gaz-a-effet-de-serre-le-gouvernement-doit-justifier-sous-3-mois-que-la-trajectoire-de-reduction-a-horizon-2030-pourra-etre-respectee; Corte Suprema de Justicia [C.S.J.] [Supreme Court] febrero 12, 2018, Sentencia 4360-2018 (Colom.); Corte Constitutional [C.C.] noviembre 10, 2016, T-622/16, Expediente T-5.016.242 (Colom.); Leghari v. Fed'n of Pakistan, (2015) W.P. No.25501 (HC Lahore) (Pak.); Complaint, Mbabazi and Others v. The Attorney General and

This brief Article is not the place to outline comprehensively the changes to existing law and regulatory policies needed to implement our vision of an environmental law dedicated to internalizing externalities, but in the paragraphs that follow we illustrate briefly each of the three governing principles we highlighted at the outset of Part III.

(1) Regulate to Eliminate or Reduce Harmful Pollution to the Extent Technically Feasible and Economically Practical. We believe that the existing system of "command and control" regulation in which government imposes mandatory pollution reduction obligations should be supplemented with a new principle that *no harmful emissions* should be the goal and that all residual pollution harms, after what is technologically feasible has been abated, be subject to a compensation obligation as discussed in the next section.

(2) Impose Emissions Charges to Compensate Victims of Residual Risks Remaining After the Application of Feasible Technology and to Create Incentives to Develop Better Pollution Controls. For the reasons described above, we believe that harm charges should be imposed on a routine basis to compensate victims for the harms to others that regulators determine cannot feasibly be eliminated.

A good example of why this is necessary is provided by the wealthy municipalities in Connecticut and New York that periodically discharge untreated sewage from their antiquated sewer systems into Long Island Sound. These releases result in beach closings and other damages to natural resources, and possibly risks to human health.[101] But the municipalities currently bear little cost for the harm they cause and thus have insufficient incentives to upgrade their underperforming sewer systems that are the root cause of the problem.

Congress legislated what could have been the beginning of harm charges for residual pollution in Section 185 of the Clean Air

National Environmental Management Authority, Civil Suit No. 283 of 2012 (Uganda).

[101] *See* Ben Lambert, *Mill River Sewage Spill Spurs Closures of East Haven, Branford Beaches*, NEW HAVEN REG. (July 9, 2020), https://www.nhregister.com/metro/article/East-Haven-prohibits-swimming-at-beaches-after-15393912.php.

Act Amendments of 1990.[102] That section, which is still on the books, provides for emission fees on major sources of air pollution located in severely polluted areas that are violating the national air quality standards. To the present day, however, EPA has declined to implement it.[103] In fairness, much of the pollution in the areas with the most severe air quality problems, such as the Northeast, comes in from out of state, so imposing charges on local industry would not put pressure on those responsible.[104] While providing a mechanism for harm charges, Section 185 was mistaken in focusing on major sources *located in* non-attainment areas rather than on the out-of-state sources that were actually causing most of the problem.[105] But the idea of charging polluters for their remaining emissions after pollution controls have been put in place would create incentives for continuous improvement and innovation.

(3) Disclose Emissions Volumes and Risk for Significant Discharges to the Environment Not Currently Known to be Harmful. A recurrent lesson in environmental law is that pollution thought not to be harmful at one point in time, sometimes later turns out to be

[102] *See* 42 U.S.C. § 7511(d).

[103] Fourteen years after its enactment, EPA purported to "waive" the fee requirement for emissions charges in severely polluted non-attainment areas, *see* Final Rule to Implement the 8-Hpur Ozone National Ambient Air Quality Standard, 69 Fed. Reg. 23,951, 23,974–76, 23,984–85 (Apr. 30, 2004) (to be codified at 40 C.F.R. pts. 50, 51 & 58), but it was sued and ordered to comply with the law in S. Coast Air Quality Mgmt. Dist. v. EPA, 472 F.3d 882, 903 (D.C. Cir. 2006). Since that time, EPA has begrudgingly applied the law, while still trying to give states as much flexibility as it can to disregard that part of the law through "an equivalent alternative program," such as requiring more low emission vehicles (LEVs) rather than imposing emission charges. *See* OFF. OF AIR QUALITY PLANNING AND STANDARDS, EPA, MEMORANDUM: GUIDANCE ON DEVELOPING FEE PROGRAMS REQUIRED BY CAA § 185 FOR THE 1-HOUR OZONE NAAQS at 2–3 (Jan. 5, 2010), https://www.epa.gov/sites/production/files/2015-09/documents/1hour_ozone_nonattainment_guidance.pdf.

[104] *See* Sarah E. Light, *Precautionary Federalism and the Sharing Economy,* 66 EMORY L.J. 333, 353 (2017) (exploring that market failures that surface when "decentralized actors set environmental standards" resulting in out of state pollution); *see also* Butler & Macey, *supra* note 52, at 56.

[105] *See* David Schoenbrod, *The Clean Air Act Is in No Shape to Be Celebrated*, HUFFINGTON POST (May 25, 2011), https://www.huffingtonpost.com/david-schoenbrod/the-clean-air-act-is-in-n_b_704631.html ("Congress assumed . . . that each state's pollution came almost entirely from smokestacks within that state and, on that basis, required each state to adopt a formal plan to cut pollution. Experience has shown, however, that much pollution comes from other states and even other nations.").

more harmful than originally recognized.[106] A good example is lead, which was used in the past as a gasoline additive to increase octane and prevent engine knocking. At the time lead in gasoline became an issue in the 1970s, lead was generally thought to be harmful only in high concentrations.[107] But as larger epidemiological studies have been conducted, lead levels considered safe have decreased significantly.[108] In other circumstances, preliminary warning signs, such as "subclinical effects"—changes to bodily functions that are not in and of themselves harmful, or that fall short of disease—or data from animal tests at high doses may or may not turn out to be harbingers of more serious problems.[109]

In these situations, the U.S. legal system generally finds it difficult to regulate pollution. The issue is not so much the terms of substantive environmental statutes, which are often precautionary in their stated goals, but rather the background norms of judicial review. Historically, Americans are suspicious of governmental action and as a result, we have generally placed a burden on the government to show that there is a reasonable basis for its actions in court.[110] For example, the 1976 Toxic Substances Control Act

[106] *See, e.g.*, Sanne H. Knudsen, *The Long-Term Tort: In Search of a New Causation Framework for Natural Resource Damages*, 108 NW. U. L. REV. 475 (2014) (exploring legal causation frameworks for long-term or latent ecological hams).

[107] *See* Ethyl Corp. v. EPA, 541 F.2d 1 (D.C. Cir. 1976) (en banc), *cert. denied*, 426 U.S. 941 (1976). For a history of EPA's twenty-five year long effort to get the lead out of gasoline, see Elliot, *supra* note 20, at 911–19.

[108] *See* NAT'L TOXICOLOGY PROGRAM, DEP'T OF HEALTH AND HUM. SERVS., NTP MONOGRAPH: HEALTH EFFECTS OF LOW-LEVEL LEAD xiii (2012) https://ntp.niehs.nih.gov/ntp/ohat/lead/final/monographhealtheffectslowlevel-lead_newissn_508.pdf (detailing the evidentiary support for adverse health effects in both children and adults at blood lead levels below 10 μg/dL [micrograms per deciliter], and, for some effects, below 5 μg/dL).

[109] *See, e.g.*, George D. Thurston et al., *A Joint ERS/ATS Policy Statement: What Constitutes an Adverse Health Effect of Air Pollution? An Analytical Framework*, EUR. RESPIRATORY J., 13 (2017), https://erj.ersjournals.com/content/erj/49/1/1600419.full.pdf ("Alternatively, adverse CNS health effects from air pollution may be secondary to systemic impacts mediated by other body systems. Subclinical and clinical cardiovascular and metabolic disease are established risk factors for cognitive decline and dementia, and it is likely that at least part of the observed impact of air pollutants on cognitive disease risk occurs as a result of air pollution-induced ischaemic effects.") (citations omitted).

[110] *See generally* Gail Charnley & E. Donald Elliott, *Risk Versus Precaution: Environmental Law and Public Health Protection*, 32 ENV'T L. REP. 10363, 10363 (2002) ("The precautionary principle is based on the idea that it is better to be safe

aspired to place the burden of proof on manufacturers of new chemical substances to show that they were safe before they were distributed in commerce and released into the environment.[111] Nevertheless, the courts held that the burden lies with EPA to show a need for testing before approving a new chemical.[112] As a result, according to a 2003 study, 67 percent of applications for approval of new chemicals included no test data and 85 percent included no health data, but about 90 percent of such applications to distribute new chemicals in commerce were approved.[113]

Our solution to this problem is mandatory disclosure. If too little scientific evidence is available to justify regulation, at a minimum, those who are releasing significant amounts of substances beyond their property's boundaries should be required to disclose publicly: (1) the volume of the releases, and (2) what scientific research leads them to believe that the releases will not be harmful to others. The underpinnings of such a rule have been demonstrated in practice since the 1980s when California adopted Proposition 65,

than sorry; that is, precaution reflects the need to take action in the face of potentially serious risks without awaiting the results of scientific research that establishes cause-and-effect relationships with full scientific certainty. In contrast, U.S. law reflects a traditional suspicion of government regulation, requiring extensive actual records proving 'significant risks' to justify regulation aimed at protecting public health from environmental contaminants. This fundamental norm of the U.S. legal culture, sometimes called the 'principal of legality,' makes precautionary environmental health regulation difficult because government must assemble a factual record to support its actions." (citations omitted)).

[111] *See generally* Ortwin Renn & E. Donald Elliott, *Chemicals in* THE REALITY OF PRECAUTION: COMPARING RISK REGULATION IN THE UNITED STATES AND EUROPE, 223, 223–56 (Jonathan B.Wiener et al. eds., 2011) (quoting "[i]t is the policy of the United States that . . . adequate data should be developed with respect to the effect of chemical substances and mixtures on health and the environment and that the development of such data should be the responsibility of those who manufacture and those who process such chemical substances and mixtures" (15 U.S.C. § 2601(b)(1))).

[112] *See, e.g.*, Chem. Mfrs. Ass'n v. EPA, 859 F.2d 977, 986 (D.C. Cir. 1988) (finding that "Congress obviously intended section 4 [of TSCA] to empower EPA to issue a test rule [to require testing of a chemical substance] only after it had found a solid 'basis for concern' by accumulating enough information to demonstrate a more-than-theoretical basis for suspecting that an 'unreasonable risk' was involved in the use of the chemical.").

[113] *See* Renn & Elliott, *supra* note 111, at 231 (*citing* BATELLE, OVERVIEW: OFFICE OF POLLUTION PREVENTION AND TOXICS PROGRAMS 8 (Dec. 24, 2003), http://chemicalspolicy.org/downloads/TSCA10112-24-03.pdf). For a description of the techniques EPA uses to review the safety of new chemicals in lieu of testing, see *id*.

which required those putting into the marketplace products that contain chemicals causing a risk of carcinogenicity or reproductive harm to disclose these potential harms.[114]

More generally, since the 1960 *Restatement of Torts*, manufacturers have had an obligation to test their products to confirm that they are safe before releasing them to the public.[115] In practice, this often consists primarily of conducting a review of the existing scientific literature.[116] We believe that polluters should have a comparable legal obligation to conduct reasonable testing and literature review to verify that the materials that they release into the environment will not harm others. It is arguable that they already do have such an obligation under the *Restatement of Torts* cited above because the pollution that accompanies the manufacture of a useful product or service is a by-product of its production. In any event, for the same policy reasons that the producer of a product has an obligation to assure that it is safe before putting the product into the marketplace, the producer of pollution should be obligated to do the same.

Some of the quiet successes of environmental law—the Toxics Release Inventory[117] and discharge monitoring reports under the Clean Water Act[118]—already rely on disclosure obligations, which

[114] For an assessment of the successes achieved by this approach, see David Roe, *Little Labs Lost: An Invisible Success Story*, 15 GREEN BAG 2D 275, 275–90 (2012); *see also* Clifford Rechtschaffen, *How to Reduce Lead Exposures with One Simple Statute: The Experience of Proposition 65*, 29 ENV'T L. REP. 10581 (Oct. 1999) (contrasting reductions in lead exposure at the federal level with more substantial reductions in California).

[115] *See* RESTATEMENT (THIRD) OF TORTS: PRODS. LIAB. § 2 cmt. m. (AM. LAW INST. 1998) ("[A] seller bears responsibility to perform reasonable testing prior to marketing a product . . . [and] is charged with knowledge of what reasonable testing would review. If testing is not undertaken, or is performed in an inadequate manner, and this failure results in a defect that causes harm, the seller is subject to liability."); *see* Ryan Sila, *Incentivising Phamaceutical Testing in an Age of Off-Label Promotion*, 93 N.Y.U. L. REV. 941, 964 (2018) for a discussion of the manufacturer's duty to test pharmaceuticals.

[116] *See generally* Elliott & Elliott, *supra* note 59, at 75–80.

[117] *See Toxics Release Inventory (TRI) Program*, EPA, https://www.epa.gov/toxics-release-inventory-tri-program (last visited Mar. 21, 2021).

[118] *See DMR - Discharge Monitoring Reports*, VELOCITY EHS, https://www.ehs.com/ehs-tasks/discharge-monitoring/#:~:text=Discharge%20Monitoring%20Reports%20are%20reports,Elimination%20System%20(NPDES)%20regulations (last visited Mar. 21, 2021).

not only inform the government and the public but also put pressure on polluters to reduce their discharges to the extent feasible.[119] The key weakness in these existing environmental disclosure programs is that they only apply to substances that are already known to be hazardous.[120] We believe that similar disclosure obligations should be extended to substances that are released in significant quantities to the environment even if they are not yet regulated or known to be hazardous. Admittedly, what is *significant* can vary and may be contentious. So as the EU's REACH program[121] to test chemicals provided, we propose that disclosure be phased in starting with substances known to be toxic or produced in large volumes and gradually encompassing lower trigger thresholds.[122] The weight of material produced is not an ideal proxy for potential risks of chemical exposure, but it is a good place to start as a matter of administrative practicality when we do not yet know whether a substance is or is not toxic and, as better techniques for prioritizing chemicals for

[119] *See* Daniel C. Esty & Quentin Karpilow, *Harnessing Investor Interest in Sustainability: The Next Frontier in Environmental Information Regulation*, 36 YALE J. REGUL. 2 (2019) (arguing for expanded environmental disclosure); *see also* David W. Case, *The Law and Economics of Environmental Information as Regulation*, 31 ENV'T L. REV. 10,773, 10,773 (2001) ("[I]nformation disclosure has emerged as a key component of strategies to promote more effective, less costly alternatives to command-and-control regulation.").

[120] *See* David J. Abell, *Emergency Planning and Community Right to Know: The Toxics Release Inventory*, 47 S.M.U. L. REV. 581, 595 (1994) ("The effectiveness of the [Emergency Planning and Community Right-to-Know Act's Toxic Release Inventory] is limited by the short list of chemicals defined as toxic.").

[121] For a summary, *see generally* EUR. COMM'N, REACH IN BRIEF (October 2007), http://ec.europa.eu/environment/chemicals/reach/pdf/2007_02_reach_in_brief.pdf.

[122] *See generally Do I reach the one tonne a year threshold?*, EUR. CHEMS. AGENCY, https://echa.europa.eu/support/registration/your-registration-obligations/do-i-reach-the-one-tonne-a-year-threshold (last visited Mar. 21, 2021). At a November 14, 2019 Conference—"Toward 21st Century Environmental Protection: Policies, Technologies, and Institutions"—co-hosted by the Yale Center for Environmental Law and Policy and the American University's Center for Environmental Policy, former DuPont chief sustainability officer and acting EPA Administrator, Linda Fisher, objected to an earlier version of our proposal by noting that industry can detect releases as low at one part per trillion. We agree that disclosure should focus first on exposure at a scale where harm from the emissions seems more likely.

review are developed, they can gradually be integrated into the system.[123]

Similarly, disclosure of release volumes and summaries of data showing that the material is or is not harmful to others might further be required by the Securities and Exchange Commission (SEC) as part of corporate annual financial reporting.[124] We recognize that the SEC conceives of its primary role as protecting investors, although we note that, in fact, the 1969 National Environmental Policy Act contains a *super-mandate* that makes protecting the environment part of the mission of every agency of the federal government.[125] In any event, in light of some companies paying hundreds of millions of dollars to settle cases for disposal of substances that they maintain they thought were not hazardous,[126] disclosure of large releases and the science relating to their propensity to harm others can arguably be justified under the SEC's usual tests for what information should be disclosed.[127] However, a specific interpretation issued by the SEC or the accounting profession regarding disclosure requirments for releases of potentially harmful substances into the environment would be helpful; it would speed compliance rather than leaving clarification of the issue to litigation. Such disclosures can be

[123] For an example of more advanced scientific methods of estimating and prioritizing chemical risks, see *Toxicity Estimation Software Tool (TEST)*, EPA, https://www.epa.gov/chemical-research/toxicity-estimation-software-tool-test (last updated Jan. 27, 2001). *See also* COMM. ON TOXICITY TESTING AND ASSESSMENT OF ENV'T AGENTS, NAT. RSCH. COUNCIL, TOXICITY TESTING IN THE TWENTY-FIRST CENTURY: A VISION AND A STRATEGY (2007). For a brief accessible summary, see NAT'L ACAD. OF SCIS., TOXICITY TESTING IN THE 21ST CENTURY: A VISION AND A STRATEGY; REPORT IN BRIEF (2007), https://www.nap.edu/resource/11970/Toxicity_Testing_final.pdf ("The report envisions a new toxicity-testing system that relies mainly on understanding "toxicity pathways"—the cellular response pathways that can result in adverse health effects when sufficiently perturbed. Such a system would evaluate biologically significant alterations without relying on studies of whole animals.").

[124] *See* Esty & Karpilow, *supra* note 119, at 678–79 (making the case for expanded SEC reporting obligations related to environmental issues); *see also* Exec. Order No. 14,030, 86 Fed. Reg. 27,967 (2021).

[125] *See* 42 USC § 4331 (2018).

[126] *See, e.g.*, Marc S. Reisch, *3M to pay $850 million to settle fluorosurfactants lawsuit*, 96 CHEM. & ENG'G NEWS 9 (Feb. 21, 2018), https://cen.acs.org/articles/96/i9/3M-pay-850-million-settle.html.

[127] For a good summary of the SEC's current disclosure rules in the context of climate change, see Roshaan Wasim, *Corporate (Non)Disclosure of Climate Change Information*, 119 COLUM. L. REV. 1311, 1322–32 (2019).

helpful not only to potential investors but also to alert government agencies and independent scientific researchers that significant populations are being exposed to pollutants with only a weak scientific basis to conclude that they are not hazardous, thus spurring additional research.

CONCLUSION

We think it is time to undergird environmental law with a new foundation in environmental rights, and thus with a principle that all negative externalities should be eliminated or reduced to the extent feasible subject only to the two narrow exceptions we have noted above—with any remaining pollution being paid for through a structure of compensatory harm charges. We believe the philosophical logic for such a principle comports with modern public sentiment and the emerging consensus that a fundamental human right to a healthy environment exists and should be recognized and protected to the maximum extent possible. Our no-externalities principle is consistent with changing attitudes in the corporate world where *shareholder primacy*, the belief that the mission of a corporation is to deliver maximum returns to its owners,[128] has given way to a new spirit of *stakeholder responsibility.* Some observers have even called for a reimagined capitalism.[129] Our proposal builds on and extends these changing societal norms.[130]

We leave the precise contours of how environmental regulation would need to be recast to advance an *end to externalities* principle to another day. We recognize that significant issues related to tracking emissions, identifying those affected by pollution, valuing impacts, calculating harm charges, assessing risks based on potential future harms, and determining who should receive compensation need to be worked out. But we think the time is right to extend the

[128] *See, e.g.*, BUS. ROUNDTABLE, *supra* note 27.

[129] REBECCA HENDERSON, REIMAGINING CAPITALISM IN A WORLD ON FIRE (2020); GUS SPETH, THE BRIDGE AT THE END OF THE WORLD: CAPITALISM, THE ENVIRONMENT, AND CROSSING FROM CRISIS TO SUSTAINABILITY (2008).

[130] *See id.*; Daniel C. Esty, *Creating Investment-Grade Corporate Sustainability Metrics*, *in* VALUES AT WORK: SUSTAINABLE INVESTING AND ESG METRICS (Daniel C. Esty & Todd Cort eds., 2020) (arguing "that business models which depend on externalizing costs onto society—whether in the form of pollution or inadequate wages that leave workers dependent on social safety nets—will be ever more difficult to sustain in the years ahead").

work of Dick Stewart and his generation and begin the shift beyond government-defined command and control mandates and technology-based standards based on benefit-cost analysis to a more just system of environmental law and policy dedicated to internalizing all environmental externalities.