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The Law and Economics of Environmental Information as Regulation

by David W. Case

I. Introduction

Since 1970, "command-and-control" has been the predominate form of regulation used to implement environmental protection policy in the United States.[1] This regulatory model is credited with significant successes in achieving improved environmental performance by industry during this period.[2] Nonetheless, many environmental stakeholders believe that traditional regulatory approaches have reached a point of significantly diminishing returns. For significant additional progress in environmental protection to be obtained, traditional approaches should be reexamined and new approaches considered.[3] Thus, substantial public and private sector effort and resources have been invested over the past several years in developing alternative policy tools to supplement or, where appropriate, replace traditional regulation.[4] The goal is to seek more flexible and effective methods of obtaining greater environmental protection at lower cost to government and the regulated community alike.[5]

During this period, information disclosure has emerged as a key component of strategies to promote more effective, less costly alternatives to command-and-control regulation. A number of consensus-building forums, expert panels, and policy reports argue that public distribution of information can serve as an effective policy tool for driving improvements in environmental performance.[6] Indeed, in recent

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1. *See* Eric W. Orts, *Reflexive Environmental Law*, 89 NW. U. L. REV. 1227, 1235 (1995). The phrase "command-and-control" has seemingly taken on a life of its own in the environmental literature. Despite its widespread use, however, there is significant disagreement regarding a precise definition for the phrase. Prof. Clifford Russell observes that the phrase "command-and-control" is sometimes taken to include *any* regulatory option that cannot be specifically categorized as an "economic incentive" or "market-based instrument." CLIFFORD S. RUSSELL, APPLYING ECONOMICS TO THE ENVIRONMENT 190-91 (2001) (noting that "any label that is this inclusive is unlikely to be useful"). Such impreciseness aside, the phrase is also often used as a pejorative shorthand or catch-phrase "for any and all criticisms of environmental regulation." Kathryn Harrison, *Talking With the Donkey: Cooperative Approaches to Environmental Protection*, 2 J. INDUS. ECOLOGY 51, 53 (1999). *See also* RUSSELL, *supra*, at 191 (observing the "connotational baggage carried by 'command-and-control,' for the phrase harks back to descriptions of the centrally planned economics of Eastern Europe and the Soviet Union"—thus allowing proponents of alternative instruments to begin arguments about the best choice of policy instruments "with the outcome prefigured if not absolutely set in stone").

   Among those more precise and less pejorative in describing this approach to environmental regulation, "command-and-control" is defined as a top-down, hierarchical form of regulation that seeks to control pollution either by establishing performance standards for polluters, enforced through a permitting system, or by establishing uniform technology-based controls for certain types of polluting activity. Orts, *supra*, at 1235; *accord* Robert W. Hahn & Robert N. Stavins, *Incentive-Based Environmental Regulation: A New Era From an Old Idea?*, 18 ECOLOGY L.Q. 1, 5-6 (1991). In contrast, it has also been argued that these forms are distinct and that only those regulations that specify a particular technique or method of compliance, rather than specifying a level of performance, are true command-and-control regulations. *See* David M. Driesen, *Is Emissions Trading an Economic Incentive Program?: Replacing the Command and Control/Economic Incentive Dichotomy*, 55 WASH. & LEE L. REV. 289, 297-98 (1998).

2. *See* Daniel C. Esty & Marian R. Chertow, *Thinking Ecologically: An Introduction*, *in* THINKING ECOLOGICALLY: THE NEXT GENERATION OF ENVIRONMENTAL POLICY 1, 6 (Marian R. Chertow & Daniel C. Esty eds., 1997).

3. *See, e.g.*, *id.* at 1-14 & n.6; Debra S. Knopman, *Easier to Be Green: The Second Generation of Environmental Action*, *in* BUILDING THE BRIDGE: 10 BIG IDEAS TO TRANSFORM AMERICA 163, 164 (Will Marshall ed., 1997). However, significant disagreement exists on the issue of the continuing value and efficacy of command-and-control regulation as the primary approach to environmental protection policy. *See, e.g.*, Daniel H. Cole & Peter Z. Grossman, *When Is Command-and-Control Efficient?: Institutions, Technology, and the Comparative Efficiency of Alternative Regulatory Regimes for Environmental Protection*, 1999 WIS. L. REV. 887 (arguing that command-and-control regulations are nominally efficient, produce social benefits in excess of their costs, and are more efficient than alternative "economic" approaches to regulation); Robert V. Percival, *Regulatory Evolution and the Future of Environmental Policy*, 1997 U. CHI. LEGAL F. 159 ("when viewed from an evolutionary perspective, the current regulatory infrastructure is neither as irrational nor as inefficient as its critics have claimed"). For a discussion of the intense criticism of the command-and-control structure of American environmental regulation, see David W. Case, *The EPA's Environmental Stewardship Initiative: Attempting to Revitalize a Floundering Regulatory Reform Agenda*, 50 EMORY L.J. 1, 26-32 (2001).

4. *See, e.g.*, Case, *supra* note 3, at 40-46, 59-87.

5. *See, e.g.*, U.S. EPA, INNOVATION AT THE ENVIRONMENTAL PROTECTION AGENCY: A DECADE OF PROGRESS (2000) (EPA 100-R-00-020) (describing "innovative" environmental policy tools and strategies developed during the 1990s intended to supplement regulatory programs and lead "to real environmental improvements and real reductions in costs").

6. *See, e.g.*, Mark D. Abkowitz et al., *Environmental Information Disclosure and Stakeholder Involvement: Searching for Common Ground*, 6 CORP. ENVTL. STRATEGY J. 415 (1999) (describing national summit hosted by Vanderbilt Center for Environmental Management Studies (VCEMS) on the use of disclosure of environmental information as a policy tool); ENTERPRISE FOR THE ENV'T, THE ENVIRONMENTAL PROTECTION SYSTEM IN TRANSITION: TOWARD A MORE DESIRABLE FUTURE 23 (1998) ("Information disclosure is viewed as an essential element of the improved environmental protection system because it provides incentives for continuous improvement in environmental performance that are not provided by more traditional regulatory approaches."); JULIE HARLAN, ENVIRONMENTAL POLICIES IN THE NEW MILLENNIUM: INCEN-

years, the U.S. Environmental Protection Agency (EPA) has established expanded public environmental information disclosure as one of 10 strategic, long-term goals in furtherance of the Agency's mission to protect human health and the environment.[7]

Since the mid-1990s, there also has been substantially increasing academic interest in use of information disclosure as a regulatory tool to affect environmentally related behavior by firms. This Article reviews recent scholarly literature on informational regulation in the environmental arena, focusing primarily upon work contained in major economics and legal journals. During the course of this review, various theories, frameworks, and principles underlying contemporary thinking and analysis on informational regulatory approaches to environmental protection will be identified and considered.

Many relevant disciplines inform the contemporary environmental policy debate, including ecology, engineering, political science, psychology, and political and moral philosophy (ethics), and observers might therefore question a narrow focus on the disciplines of law and economics in analyzing environmental regulatory policy concerns. Regarding informational regulation, a quick and pragmatic answer to such a query is that these disciplines (including the related sub-discipline of law and economics) have combined to produce the most compelling scholarship on this subject. Though their application to environmental protection concerns often invites criticism,[8] economic approaches are of significant value in facilitating greater understanding of complex environmental regulatory policy issues.[9] In this regard, economic arguments are often more powerful than moral suasion alone and bring important weapons into play for use in protecting the environment.[10] The foundations of such approaches include assessing the economic importance of environmental degradation (through use of such tools as cost-benefit analysis), identifying economic causes of environmental degradation, and designing economic incentives to slow, stop, or reverse, such degradation.[11]

Thus, in seeking to develop alternative policy tools within the legal infrastructure to supplement or replace traditional environmental regulatory approaches, economic theory and method can be highly useful in evaluating or improving upon any such proposed instruments.[12] This is not to say, however, that contributions of environmental economics to the collective choice problem posed by societal interaction with the natural environment are of greater importance than contributions of other relevant disciplines.[13] Economic analysis is merely one important tool in the collective—inevitably political—decisionmaking process; a tool most helpful when fully integrated with insights gleaned from other relevant disciplines and approaches applicable to complex environmental regulatory problems.[14]

II. Informational Regulation Defined

The concept of informational regulation, or regulation through mandatory disclosure of information, is not a new development in American law.[15] Indeed, information disclosure has been a pervasive regulatory strategy since the 1930s through the federal securities laws and the work of the Securities and Exchange Commission.[16] However, a "great modern surge of informational regulation" occurred during the "rights revolution" of the 1960s and 1970s, a

TIVE-BASED APPROACHES TO ENVIRONMENTAL MANAGEMENT AND ECOSYSTEM STEWARDSHIP 11 (2000) (joint World Resources Institute (WRI)/EPA conference summary) (efforts to make environmental performance information public "can lead to greater accountability and voluntary improvement in performance on the part of industry"); PRESIDENT'S COUNCIL ON SUSTAINABLE DEV., TOWARDS A SUSTAINABLE AMERICA: ADVANCING PROSPERITY, OPPORTUNITY, AND HEALTHY ENVIRONMENT FOR THE 21ST CENTURY 41 (1999) ("An information-rich system, one that generates and disseminates accurate and useful information . . . motivates those who are being measured to perform better."); Robert Stavins & Bradley Whitehead, *Market-Based Environmental Policies*, *in* THINKING ECOLOGICALLY: THE NEXT GENERATION OF ENVIRONMENTAL POLICY, *supra* note 2, at 109 (listing public information disclosure as one of six market-based instruments promoted as "next-generation" alternatives to command-and-control approaches).

7. *See* U.S. EPA, EPA STRATEGIC PLAN 17, 50-52 (1997) (EPA 190-R-97-002).

8. *See, e.g.*, MARK SAGOFF, THE ECONOMY OF THE EARTH: PHILOSOPHY, LAW, AND THE ENVIRONMENT (1988) (arguing against use of the economic efficiency criterion in social regulation in favor of an approach addressing environmental problems in primarily moral, aesthetic, cultural, and political terms).

9. *See* Clifford S. Russell, *Complex Regulation and the Environment: An Economist's View*, 9 RESEARCH PUB. POL'Y ANALYSIS & MGMT. 95, 95-109 (1998). *See generally* Richard A. Posner, *The Decline of Law as an Autonomous Discipline: 1962-1987*, 100 HARV. L. REV. 761, 767-68 (1987) (discussing the rise of economics as a discipline complementary to legal analysis including in the area of environmental law).

10. R. KERRY TURNER ET AL., ENVIRONMENTAL ECONOMICS: AN ELEMENTARY INTRODUCTION vii-viii (1993). *Accord* Allen V. Kneese & William D. Schulze, *Ethics and Environmental Economics*, *in* HANDBOOK OF NATURAL RESOURCES & ENERGY ECONOMICS 191 (Allen V. Kneese & James L. Sweeney eds., 1985) (demonstrating framework within which economic theory and method can provide interesting contributions to philosophical and ethical discourse on environmental policy).

11. TURNER ET AL., *supra* note 10, at vii.

12. *But see* SAGOFF, *supra* note 8, at 6 (arguing against use of the economic efficiency criterion).

13. RUSSELL, *supra* note 1, at 1.

14. *Id.*; Russell, *supra* note 9, at 95, 106; Robert Dorfman, *An Introduction to Benefit-Cost Analysis*, *in* ECONOMICS OF THE ENVIRONMENT: SELECTED READINGS 297, 319-21 (Robert Dorfman & Nancy S. Dorfman eds., 3d ed. 1993). *See also* Partha Dasgupta, *The Economics of the Environment*, 1 ENV'T & DEV. ECON. 387, 387-92 (1996) (arguing that economic analysis is incomplete if the environment is ignored given the importance of the environmental-resource base to human activity); Michael A. Toman, *Economics and "Sustainability": Balancing Trade-Offs and Imperatives*, 70 LAND ECON. 399, 409 (1994) (asserting that environmental debates over concept of "sustainability" should incorporate both economic and ecological analyses; each discipline should adapt research emphases and methodologies to make best use of interdisciplinary contributions of each).

15. *See* Cass R. Sunstein, *Informational Regulation and Informational Standing:* Akins *and Beyond*, 147 U. PA. L. REV. 613, 618 (1999). *See generally* ANTHONY I. OGUS, REGULATION: LEGAL FORM AND ECONOMIC THEORY 121-49 (1994) (undertaking economic analysis of information regulation).

16. Sunstein, *supra* note 15, at 618. *See generally* Cynthia A. Williams, *The Securities and Exchange Commission and Corporate Social Transparency*, 112 HARV. L. REV. 1197, 1211-27 (1999) (comprehensive discussion of intellectual and historical background of securities laws including purposes for which Congress adopted mandatory disclosure as regulatory method); Louis Lowenstein, *Financial Transparency and Corporate Governance: You Manage What You Measure*, 96 COLUM. L. REV. 1335, 1335-36 (1996) (discussing underlying justifications for disclosure policies of federal financial securities laws, including the intent to make domestic financial markets fair and efficient and to induce corporate managers to practice effective corporate governance and oversight); John C. Coffee Jr., *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 VA. L. REV. 717, 723 (1984) (discussing original premise of mandatory disclosure obligations of federal securities laws).

phenomenon primarily manifested in health, safety, and environmental laws.[17] This mode of regulation became "especially prominent" in the 1980s and 1990s as policymakers searched for effective and cost efficient alternatives to conventional, command-and-control-based regulatory approaches.[18]

Indeed, a notable recent trend in the environmental arena has been an increasing reliance on information disclosure as a regulatory tool.[19] Tom Tietenberg describes information disclosure strategies as the "third phase" in the evolution of pollution control policy, following the initial phase of traditional legal regulation, i.e., command-and-control, and a subsequent phase of market-based approaches (such as tradable permits and emission charges).[20] However, as Paul Kleindorfer and Eric Orts have observed, unlike federal securities regulation, "environmental law has not yet evolved to emphasize disclosure of information as a primary focus."[21] Instead, the emergence of informational regulation in the environmental arena has been "piecemeal," "inchoate," and "haphazard."[22]

As considered in this Article, informational regulation is generally defined as rules requiring mandatory disclosure of information on environmental operations or performance of regulated entities to third parties, such as workers, consumers, shareholders, or the public in general.[23] Such regulation seeks to enlist the aid of such nongovernmental forces as economic markets and public opinion either in complement to, or as a substitute for, traditional regulatory strategies of government standard setting and enforcement.[24] In its pure form, it operates as a substitute, the primary focus of informational regulation being "the [poorly understood] effect that disclosure of information has on the social institutions of markets and public opinion."[25] Thus, in theory, even in the absence of more traditional regulatory controls, post-disclosure pressures brought to bear by these social institutions will create market incentives positively affecting the attitudes of regulated entities toward environmental performance. Said another way, market forces unleashed by public disclosure of environmental performance information create incentives for self-regulation not provided by traditional regulatory approaches.[26]

Although numerous examples of informational regulatory approaches exist[27] in the environmental arena, §313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) is perhaps the most widely analyzed example of this approach.[28] Among other things, EPCRA requires covered companies to submit annual data to EPA on amounts of certain toxic chemicals released into the air, water, land, or transferred off-site. EPA maintains this data in a national computer database—the toxics release inventory (TRI)—accessible by the public, primarily through the Internet.[29] Public disclosure and dissemination of TRI data, especially through media reports and well-known outlets such as Environmental Defense's "Scorecard" Internet website,[30] has been credited with prompting covered firms to reduce overall covered chemical releases by more than 40%.[31] Although criticized by some for perceived weaknesses in how data is reported or interpreted,[32] there is widespread agreement that the TRI has significantly affected firm behavior and environmental performance.[33]

The perceived success of the TRI in effecting "voluntary" performance improvements by regulated entities has generated significant optimism among scholars and policymakers regarding the potential public policy benefits of expanding

17. Sunstein, *supra* note 15, at 618-24. *See also* ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 636-40 (2d ed. 1996) (discussing informational approaches as an alternative to conventional regulatory approaches); STEPHEN G. BREYER, ADMINISTRATIVE LAW AND REGULATORY POLICY: PROBLEMS, TEXT, AND CASES 13-14 (1985) (discussing use of information disclosure as a regulatory tool in such areas as securities regulation, product safety, occupational safety and health, and telecommunications).

18. Sunstein, *supra* note 15, at 618-19; PERCIVAL ET AL., *supra* note 17, at 636-40.

19. *See* Paul R. Kleindorfer & Eric W. Orts, *Informational Regulation of Environmental Risks*, 18 RISK ANALYSIS 155, 156 (1998).

20. Tom Tietenberg, *Disclosure Strategies for Pollution Control*, 11 ENVTL. & RESOURCE ECON. 587, 587-88 (1998).

21. Kleindorfer & Orts, *supra* note 19, at 156.

22. *Id.*

23. *See* Tietenberg, *supra* note 20, at 588; Kleindorfer & Orts, *supra* note 19, at 156.

24. *See* Tietenberg, *supra* note 20, at 588; Kleindorfer & Orts, *supra* note 19, at 156-57.

25. Kleindorfer & Orts, *supra* note 19, at 165.

26. *See* Shameek Konar & Mark A. Cohen, *Information as Regulation: The Effect of Community Right-to-Know Law on Toxic Emissions*, 32 J. ENVTL. ECON. & MGMT. 109, 109-11 (1997) [hereinafter Konar & Cohen, *Information as Regulation*].

27. For example, environmental labeling, also referred to as "eco-labeling," is an increasingly popular instrument for conveying to consumers information related to environmental implications of products in an effort to affect consumer (and eventually producer) behavior regarding environmental concerns. *See* Helmut Karl & Carsten Orwat, *Economic Aspects of Environmental Labeling*, *in* INTERNATIONAL YEARBOOK OF ENVIRONMENTAL AND RESOURCE ECONOMICS 1999/2000: A SURVEY OF CURRENT ISSUES 107-70 (Henk Folmer & Tom Tietenberg eds., 1999) [hereinafter INTERNATIONAL YEARBOOK]. Other notable examples of informational regulation include the requirement of §112(r) of the Clean Air Act (CAA) Amendments of 1990 for business to create and publicly disclose risk management plans (RMPs) for accidental chemical releases and the preparation and public dissemination of annual "consumer confidence reports" under the Safe Drinking Water Act (SDWA) Amendments of 1996. 42 U.S.C. §7412(r), ELR STAT. CAA §112(r); 42 U.S.C. §300g-3(c)(4), ELR STAT. SDWA §1414(c)(4).

28. 42 U.S.C. §§11001-11050, ELR STAT. EPCRA §§301-330.

29. U.S. EPA, *Toxics Release Inventory*, *at* http://www.epa.gov/enviro/html/tris/tris_ query.html (last modified Jan. 5, 2000).

30. Environmental Defense, *Scorecard*, *at* http://www.scorecard.org/ (last visited Apr. 4, 2001).

31. HARLAN, *supra* note 6, at 12. Based on 1998 year information, EPA asserts that reported releases of TRI-covered chemicals have been reduced by 46% since 1988. Although 1987 is the first calendar year for which TRI data was released, subsequent information has demonstrated the 1987 TRI data to be "particularly unreliable." Konar & Cohen, *Information as Regulation*, *supra* note 26, at 113. Thus, the data released in 1988 is generally the earliest baseline used for studies or comparisons under the TRI. *Id.*

32. *See, e.g.*, Abkowitz et al., *supra* note 6, at 416 (discussing concerns that nontargeted disclosure of TRI data can be ineffective or misleading); Ronald B. Outen, Designing Information Rules to Encourage Better Environmental Performance (unpublished manuscript, Oct. 18, 1999) (paper prepared for joint WRI/EPA conference, "Environmental Policies for a New Millennium: Using Incentives for Ecosystem Protection and Stewardship"); ALEXANDER VOLOKH ET AL., ENVIRONMENTAL INFORMATION: THE TOXICS RELEASE INVENTORY, STAKEHOLDER PARTICIPATION, AND THE RIGHT-TO-KNOW: PART 1 OF 2: SHORTCOMINGS OF THE CURRENT RIGHT-TO-KNOW STRUCTURE (Reason Public Policy Inst. 1998).

33. Outen, *supra* note 32, at 4. *See also* Sidney M. Wolf, *Fear and Loathing About the Public Right-to-Know: The Surprising Success of the Emergency Planning and Community Right-To-Know Act*, 11 J. LAND USE & ENVTL. L. 217 (1996) (analysis of some of the earliest reported annual TRI data).

the use of informational regulation as an environmental protection tool. Belief is widespread that mandatory information disclosure is a significantly underutilized policy tool with the potential to achieve substantial benefits in environmental improvements at relatively low cost. However, as discussed below, recognized weaknesses in the TRI as a policy instrument also demonstrate that environmental informational regulation continues to be a work in progress.

III. Economic Literature on Regulating Through Information Disclosure

Informational regulation is often justified on political or ethical and moral grounds. In this vein, such regulations are argued to enhance democratic processes (citizen participation) or address concerns that individuals have the "right-to-know" risks they may face.[34] However, over the past several years, economists have begun to pay increasing attention to information disclosure strategies in the environmental arena. The economic literature in this area is described as "young," and the empirical research performed to date is termed "sketchy and incomplete."[35] Nonetheless, both economic theory and empirical evidence produced to date suggest that informational regulatory strategies can effectively motivate environmental performance improvement even in the absence of traditional regulatory controls.[36]

Kennedy, Laplante, and Maxwell (1994)[37]

This *Journal of Environmental Economics and Management* article was the first to construct a theoretical economic model to assess the potential role of mandatory environmental information disclosure as a regulatory instrument.[38] The central question addressed by Peter Kennedy, Benoit Laplante, and John Maxwell is whether and under what circumstances government should intervene to correct a market-failure regarding insufficient disclosure of environmental information regarding a "polluting product."[39] The authors noted that such information provision can have "associated positive externalities"—educating consumers about adverse environmental impacts of a product may alter consumer behavior in ways that have external benefits; in this case, reduced consumption of a polluting product.[40] According to the authors, however, a market failure occurs because consumers, in deciding whether to acquire information on their own about a product's environmental attributes, may not fully take into account these positive externalities. Thus, the market tends to under-provide information in this situation.[41]

Kennedy et al. argued that a role exists for government-mandated disclosure to correct this market failure if no other corrective policy instrument is available (such as an appropriate corrective tax on the product that would produce a true social optimum level of consumption without any need for information disclosure).[42] Indeed, where another corrective policy is unavailable, "the government may not be able to affect consumption of the polluting product other than through information policy."[43] However, despite finding a role for government-mandated disclosure in this situation, the authors further conclude that information disclosure alone "is not a panacea for pollution problems."[44] Their mathematical model suggests that the underlying consumption externality (leading to pollution) remains uncorrected in this circumstance, thus failing to induce socially optimal levels of consumption of the product in question.[45]

34. *See, e.g.*, Tietenberg, *supra* note 20, at 599; Sunstein, *supra* note 15, at 619. *See also* William M. Sage, *Regulating Through Information: Disclosure Laws and American Health Care*, 99 COLUM. L. REV. 1701, 1801-25 (1999) (analyzing justifications for mandatory disclosure involving "public accountability, constraints on government, and the integrity of the American political process"). For an analysis of empirical studies of information disclosure regulation from the perspective of citizen participation and "right-to-know" justifications, see Don Sherman Grant II, *Allowing Citizen Participation in Environmental Regulation: An Empirical Analysis of the Effects of Right-to-Sue and Right-to-Know Provisions on Industry's Toxic Emissions*, 78 SOC. SCI. Q. 859 (1997) (suggesting support for the hypotheses of conflict environmental sociologists that the absence of resources to support actual citizen participation under "right-to-know" regulation renders such schemes a largely symbolic gesture); Richard C. Rich et al., *"Indirect Regulation" of Environmental Hazards Through the Provision of Information to the Public: The Case of SARA, Title III*, 21 POL'Y STUD. J. 16 (1993) (study suggesting that inadequate funding and insufficient implementation render citizen "right-to-know" or "regulation through information" strategies ineffective).

35. Tietenberg, *supra* note 20, at 595, 599. *See also* Kleindorfer & Orts, *supra* note 19, at 163 (describing informational regulation as "largely unexplored territory" from the standpoint of economic analysis).

36. Tietenberg, *supra* note 20, at 599. On the other hand, Tietenberg suggests that the current evidence is "sufficiently sketchy and incomplete" that it is not yet possible to draw firm conclusions as to whether information disclosure strategies produce economically efficient outcomes or are cost effective. *Id.*; Tom Tietenberg & David Wheeler, Empowering the Community: Information Strategies for Pollution Control (unpublished manuscript, Oct. 1998) (paper prepared for Frontiers of Environmental Economics Conference, Arlie House, Va. (Oct. 23-25, 1998)).

37. Peter W. Kennedy et al., *Pollution Policy: The Role for Publicly Provided Information*, 26 J. ENVTL. ECON. & MGMT. 31 (1994).

38. For another theoretical economic model developed to evaluate consumer and firm behavior when information—in this case TRI data—is used as a regulatory tool, see Seema Arora & Shubhashis Gangopadhyay, *Toward a Theoretical Model of Voluntary Overcompliance*, 28 J. ECON. BEHAV. & ORG. 289 (1995) ("A key message of th[is] paper is that market forces are important if information on the environmental records of firms is publicly available."). Arora and Gangopadhyay theorize that publicly available information allows firms that comply with environmental regulations to be rewarded by the marketplace because of a segment of consumers presumed more likely to buy the products of "environmental leaders." *Id.*; *see also* Mark A. Cohen, *Monitoring and Enforcement of Environmental Policy*, *in* INTERNATIONAL YEARBOOK, *supra* note 27, at 47 n.9.

39. Kennedy et al., *supra* note 37, at 32.

40. *Id.*

41. *Id.*

42. *Id.* at 39-40.

43. *Id.* at 34.

44. *Id.* at 42.

45. *Id.* at 39, 42. However, within the regulatory context, some argue whether goals seeking "optimal" levels of pollution are realistic much less attainable. Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 271 (2001); *see also* Rena I. Steinzor, *Devolution and the Public Health*, 24 HARV. ENVTL. L. REV. 351, 364 (2000) ("economic efficiency is an important attribute, but not the preeminent mission, of federal environmental laws"). Under this viewpoint, even supporters of market-based approaches to environmental regulation acknowledge that tasks such as setting pollution levels or specific reduction targets are inherently political. Karkkainen, *supra*, at 271; *accord* Russell, *supra* note 9, at 95. Nevertheless, and even if attempts to achieve economic "efficiency" are abandoned, positive moves toward the social optimum may be made when alternative, nontraditional regulatory

Nonetheless, even though economic efficiency is not obtained, the authors emphasized that social welfare is indeed improved in such cases by the public provision of information (inasmuch as consumption of the polluting product does decrease).[46] Thus, the work of Kennedy, Laplante, and Maxwell suggests that provision of environmental information can effectively produce improvements to the environmental status quo even in the absence of other regulation.[47]

approaches lead to cost-effective improvements in achieving acceptable pollution levels. Karkkainen, *supra*, at 271. *See infra* notes 46-47 and accompanying text.

46. Kennedy et al., *supra* note 37, at 39-40. With respect to those situations where a corrective tax can be imposed on a polluting product, the authors' model also suggests that no role exists for public information provision. In such a circumstance, the appropriate corrective tax induces the true social optimum without need for an additional policy instrument such as an information provision mechanism. *Id.* at 40. The authors acknowledged, however, that there nonetheless may be additional "political benefits" to information disclosure in this circumstance not captured in their model. *Id.* at 42.

47. Although attributed broader application in this Article, the theoretical model developed by Kennedy et al., appears to be most applicable to disclosure strategies involving imparting product-specific environmental information—such as through product labeling policies—to consumers. *See* Mario F. Teisl & Brian Roe, *The Economics of Labeling: An Overview of Issues for Health and Environmental Disclosure*, 27 AGRIC. & RESOURCE ECON. REV. 140, 140 (1998) (defining "product labeling as any policy instrument of a government or other third party that somehow regulates the presentation of product-specific information to consumers"). Utilizing environmental labeling or other "point-of-purchase" methods of conveying environmentally related product information attempts to induce consumers to integrate the environmental costs of the choices they face into their decisionmaking. Peter S. Menell, *Structuring a Market-Oriented Federal Eco-Information Policy*, 54 MD. L. REV. 1435, 1435-36 (1995). A wealth of scholarly literature exists which narrowly focuses on the policy aspects of environmental labeling as an information disclosure strategy. *See, e.g.*, Karl & Orwat, *supra* note 27; Menell, *supra*; Teisl & Roe, *supra*. For an earlier work in the area of utilizing information disclosure in the form of hazard warnings (labeling) on consumer products as a regulatory tool, see WESLEY A. MAGAT & W. KIP VISCUSI, INFORMATIONAL APPROACHES TO REGULATION (1992) (utilizing extensive survey data to analyze consumer reaction to experimental labeling information regarding products posing serious health or environmental risks).

However, Teisl and Roe argue that little in the way of empirical research has been performed to adequately assess the market effectiveness of environmental labeling as a policy tool. Teisl & Roe, *supra*, at 144. On the one hand, they suggest that existing research indicates that product labeling indeed can significantly change both consumer and firm behavior. *Id.* at 143. However, they argue that what is lacking is research that develops understanding of the conditions necessary to maximize the potential effectiveness of a labeling policy. *Id.* In other words, "what characteristics of the interaction between the label, the consumer, and the product affect the impact of information" and thus maximize policy effectiveness? *Id.* at 143-44. Indeed, Teisl and Roe argued that "lack of knowledge regarding the market effectiveness of labeling policy characteristics is particularly evident, and potentially troublesome, with respect to environmental labeling." *Id.* at 144. There is widespread use of environmental labeling programs in countries around the world by governments and nongovernmental organizations (NGOs). *See, e.g.*, Karl & Orwat, *supra* note 27, at 141-43 (presenting a table overviewing examples of international voluntary third-party eco-labeling programs). Such widespread use suggests that this form of information disclosure is perceived as an effective method of altering firm and consumer behavior. Teisl & Roe, *supra*, at 144. However, Teisl and Roe observed that certain studies of environmental certification programs have produced the counterintuitive result of indicating that such information programs are ineffective in altering consumer behavior or have even produced negative consumer reaction. *Id. See, e.g.*, Mario F. Teisl et al., *Ecocertification: Why It May Not Be a "Field of Dreams,"* 81 AM. J. AGRIC. ECON. 1066-71 (1999) (presenting results of empirical study suggesting the potential ineffectiveness of ecolabeling as an information disclosure policy tool). Thus, while research demonstrates that information disclosure in the form of environmental labeling has the capacity to alter consumer or firm behavior, a failure to carefully study and consider the design and implementation of such programs can lead to ineffective policies that fail to maximize net social benefit.

Hamilton (1995)[48]

James Hamilton was among the first to analyze the effectiveness of information disclosure as a regulatory tool through study of TRI data on chemical releases by covered firms. Hamilton used a stock market "event-study" methodology to ascertain whether publicly traded companies experienced adverse stock price returns on the date TRI releases were first reported. He asserted that information reported through the TRI provides "news" to the financial community and stockholders to the extent that such data diverges from previous expectations about a firm's pollution behavior.[49] For example, such unexpected information might suggest higher than expected environmental-related costs or liability exposure or a loss of firm reputation and goodwill all of which would reduce future profitability.[50] One function of an informational regulatory tool such as the TRI is to provide information to social institutions such as economic markets. Thus, whether the disclosure of such unexpected data had a negative aggregate effect on some stock prices would be one, albeit a somewhat weak, indication that the TRI program is actually functioning in this manner.

Of the publicly traded firms reporting annual TRI data in 1989, Hamilton included 436 in a regression sample used to estimate stock price reactions because of the availability of complete stock price data.[51] On the day the TRI information was officially released (June 19, 1989—actually the first ever public announcement of TRI data), the average abnormal return for these 436 companies was negative and statistically significant.[52] Such abnormal returns translated into a monetary value of an average of $4.1 million in stock value lost per firm on the first day the TRI data reported by such firms was officially released.[53] As indicated above, Hamilton attributed these results to an adverse change in investor expectations about a firm's pollution costs brought about by new information supplied by the public release of the TRI data.[54] Thus, the results of Hamilton's study support the hy-

48. James T. Hamilton, *Pollution as News: Media and Stock Market Reactions to the Toxics Release Inventory Data*, 28 J. ENVTL. ECON. & MGMT. 98 (1995).

49. *Id.* at 99.

50. *Id. See also* Konar & Cohen, *Information as Regulation*, *supra* note 26, at 111-13 (speculating on types of potential economic liabilities that investors may believe to be revealed by disclosure of negative information through the TRI); Karkkainen, *supra* note 45, at 324-25 (same). Indeed, Professor Karkkainen asserts that, because of the TRI's "quantifiable, comparable, computer-accessible data are instantaneously available and more informative than most other publicly reported environmental information," the TRI may carry "greater weight in capital markets" and have a "disproportionate impact on capital market evaluations of firm-level environmental performance." Karkkainen, *supra* note 45, at 324.

51. Hamilton, *supra* note 48, at 103.

52. *Id.* at 109.

53. *Id.*

54. *Id.* Hamilton also observed that a company's drop in stock value was substantially reduced if, prior to disclosure of adverse TRI data, investors had already incorporated previous adverse information (such as existing Superfund liabilities) into expectations about that firm's environmental performance. For example, Hamilton noted that firms in the primary metal industry experienced less of a negative abnormal return than other firms, which he attributed to the possibility that investors already perceived such firms as polluters. *Id.* at 111.

pothesis that the TRI functions as a conduit of environmental information to economic markets.[55]

Konar and Cohen (1997)[56]

Shameek Konar and Mark Cohen expanded upon the prior work of Hamilton by examining whether negative stock price reductions reported under Hamilton's analysis were subsequently translated into significant reductions in toxic emissions by adversely affected firms. In other words, these authors empirically analyzed whether the adverse reaction of the stock market to disclosure of negatively perceived environmental information through the TRI induced a subsequent behavioral effect on these firms regarding environmental performance.[57]

In performing their analysis, Konar and Cohen identified and ranked the 40 companies receiving the largest negative abnormal stock returns in 1989 as a result of TRI announcements.[58] Utilizing various statistical models, the authors found these firms: (1) to be in the upper third of polluting firms (per dollar revenue) in their respective industries, but not necessarily among the largest absolute emitters of TRI releases; (2) to have subsequently reduced their TRI emissions more than other firms in their respective industries, including firms with the largest TRI-reported emissions per dollar revenue; (3) to have made other significant attempts to improve environmental performance (such as reducing the number and severity of oil or chemical spills); and (4) to have a lower likelihood of receiving large fines from the government in subsequent years.[59] Thus, the results of the Konar and Cohen study suggest that pressures brought to bear by economic markets following information disclosure can induce firms to improve their environmental performance.[60]

Khanna, Quimio, and Bojilova (1998)[61]

Madhu Khanna, Wilma Quimio, and Dora Bojilova build upon the earlier work of Hamilton and Konar and Cohen. As the authors observe, the prior studies demonstrated that investor reaction is greater if the information released under the TRI represents unanticipated news about firms' environmental performance.[62] In such cases, these firms are "punished" by larger stock price reductions because previous investor information did not suggest they were "known" polluters. However, other firms that are larger emitters of TRI releases, but also "known" polluters on the basis of previous available information incorporated into investors' expectations, did not experience a similar level of market "penalty."[63] The implication is that there are diminishing effects on economic markets in providing additional information about known polluters.[64] Thus, over the long run, repeated release of TRI data to the public may result in diminishing effectiveness of this regulatory tool as pollution levels for all firms become more and more well-known.

However, Khanna et al. observe that a unique feature of the TRI is the ability to benchmark the environmental performance of particular firms over time.[65] Thus, changes in performance over time relative to their own previous levels and those of other firms can be readily observed. Therefore, the authors determined to analyze the TRI's effectiveness as a long-run policy tool based on its ability to provide repeated information to economic markets about known polluters. The study focused on the U.S. chemical industry, the largest emitter of TRI releases based on industrial sector. The first step in this study examined the impact of TRI data on the stock market returns of chemical firms over a six-year period (1989-1994). The authors next developed an econometrically estimable model to examine the impact of this market reaction to information on subsequent firm behavior, as measured by subsequent TRI release data.[66]

The authors' empirical analysis established that chemical industry firms experienced negative average stock market returns during the one-day period following public disclosure of TRI data.[67] While not statistically significant in the first year (1989), repeated provision of TRI information caused the negative returns to be statistically significant over the next five-year period (1990-1994), especially "for firms whose environmental performance worsened over time and relative to other firms."[68] Thus, although these firms were generally known to be large polluters relative to firms in other industries, they nonetheless experienced significant reductions in stock price over time due to market reactions to repeated disclosure of TRI data. Thus, the authors found no support for the notion of diminishing effectiveness

55. For additional research on the issue of whether economic markets value and react to the disclosure of environmental information by way of the release of TRI data and otherwise, see Shameek Konar & Mark A. Cohen, *Does the Market Value Environmental Performance?*, __ REV. ECON. & STAT. (forthcoming 2001) (manuscript on file with author) (analyzing the extent to which a firm's environmental reputation is valued in the marketplace utilizing TRI disclosure data and environmental litigation data required to be publicly disclosed under federal securities regulations); Walter G. Blacconiere & W. Dana Northcut, *Environmental Information and Market Reactions to Environmental Legislation*, 12 J. ACCT., AUDITING & FIN. 149 (1997) (examining the relationship between stock price reactions and environmental information, including TRI data).

56. Konar & Cohen, *Information as Regulation*, *supra* note 26.

57. *Id.* at 110.

58. *Id.* at 118.

59. *Id.* at 123.

60. However, in a subsequent study, these same authors observe that stock price reductions are not the sole explanation for TRI emissions reductions by firms, because other firms that did not experience significant reductions in stock price following public announcement of TRI data nonetheless subsequently reduced their TRI emissions. Shameek Konar & Mark. A. Cohen, Why Do Firms Pollute (and Reduce) Toxic Emissions? (unpublished working paper, March 2000) (manuscript at 7, on file with author). The authors theorize that differences across firms in the levels of voluntary TRI release reductions from initially reported levels vary due to "both firm-specific factors that affect the 'ability' of the firm to reduce pollution (such as age of assets and financial ability) and firm-level 'incentives' (such as community pressures or effect on brand name reputation)." *Id.*

61. Madhu Khanna et al., *Toxics Release Information: A Policy Tool for Environmental Protection*, 36 J. ENVTL. ECON. & MGMT. 243 (1998).

62. *Id.* at 244.

63. *Id.*

64. *Id.*

65. *Id.* For an extensive discussion of utilization of the TRI as a performance monitoring and benchmarking tool, see Karkkainen, *supra* note 45, at 294-331. *See also infra* notes 172-177 and accompanying text.

66. Khanna et al., *supra* note 61, at 244.

67. *Id.* at 245.

68. *Id.*

of providing additional environmental information about known polluters.[69]

Unlike the Konar and Cohen study, however, the Khanna et al. study found the impact of these abnormal market returns on subsequent firm behavior when measured only by reductions in total aggregate TRI releases to be statistically significant.[70] Although subsequent on-site toxic releases were significantly reduced, these reductions were largely offset by increases in off-site releases (wastes transferred off-site).[71] Total generation was thus roughly unchanged. Because a large part of the off-site transfers were to recycling and energy recovery facilities, the authors surmise that positive net social benefits were probably obtained as off-site abatement of pollution was substituted for on-site releases of toxins into the environment.[72] Thus, the implication is that losses in market value triggered by information disclosure induced these firms to engage in behavior with a net environmental benefit to society, even if it did not lead them to reduce toxic chemical use or creation in their processes.

Kleindorfer and Orts (1998)[73]

Paul Kleindorfer and Eric Orts explored the law and economics of informational regulation of environmental risks, separately considering the benefits of such a policy tool within both an economics and legal framework.[74] Kleindorfer and Orts focused their analysis upon the "consequences for firm behavior of the monitoring and enforcement incentives resulting from information provided to third parties, whether they are local communities, nongovernmental organizations [(NGOs)], or consumers."[75] Within this specific scope, the authors identified certain key economic theories and research supporting this concept of informational regulation.

The first was the Coasean approach of internalizing externalities such as environmental damages by clarifying respective property rights and allowing the involved parties to negotiate acceptable terms.[76] In theory, and assuming the absence of transaction costs and that the bargaining parties possess complete information, a polluting firm and an affected local community suffering environmental damages will bargain to a Pareto efficient solution with the distributional aspect (who has to pay) depending on the initial allocation of rights.[77] However, because the assumptions underlying the Coase theorem are very rarely satisfied (informational asymmetries between the parties, especially identifying pollution sources and their owners, greatly increase transactions costs), the authors observed that widespread application of a "pure Coasean approach" is considered impractical.[78]

Nonetheless, Kleindorfer and Orts argued that "one interpretation of the move toward" informational regulation would be to reduce such information asymmetries and thus reduce transaction costs which are an impediment to effective bargaining with agents who control pollution sources.[79] The authors emphasized that "[t]his interpretation is especially compelling when one considers impacts which are largely local and borne by an identified group of stakeholders, such as a community hosting an industrial facility."[80] Said another way, informational regulation—assuming it provides accurate and meaningful information—will improve the efficiency of private "bargaining processes" in ways more closely aligned with the

69. *See also* Paul Lanoie et al., *Can Capital Markets Create Incentives for Pollution Control?*, 26 ECOLOGICAL ECON. 31 (1998) (in a study cited by Khanna et al., finding that firms that appeared more than once on a listing of polluters by the Canadian government experienced more significant changes in stock market returns than firms which did not).

70. Khanna et al., *supra* note 61, at 264.

71. *Id.* at 245.

72. *Id.*

73. Kleindorfer & Orts, *supra* note 19.

74. This Article focuses primarily upon Kleindorfer and Orts' economic analysis of informational regulation. However, the authors' also endeavor to place informational regulation within the context of a legal framework for examining environmental law and regulation. Within this legal framework, the authors observe that informational regulation is one of three separate and distinct approaches to environmental regulation.

The first and the deepest-rooted of two "conventional" approaches—"private rights" regulation—utilizes legal institutions to support private rights in property, including environmental components of property ownership, by enforcing contracts and ownership rights to property. Kleindorfer & Orts, *id.* at 163-64. However, legal institutions—primarily courts—become directly involved in regulating environmental concerns only when such property rights are in dispute. A classic form of such private rights regulation is the law of nuisance. *Id.* For an economic analysis of property rights as a basis for environmental policy, see Daniel W. Bromley, *Property Regimes in Environmental Economics*, *in* INTERNATIONAL YEARBOOK OF ENVIRONMENTAL AND RESOURCE ECONOMICS 1997/1998, at 1-27 (1997). For a contrasting view of private property rights incorporating social and environmental ethic constraints into "absolutist" legal and economic perspectives, see Joan L. McGregor, *Property Rights and Environmental Protection: Is This Land Made for You and Me?*, 31 ARIZ. ST. L.J. 391 (1999).

The second "conventional" approach is "government-centered" regulation, which relies upon governmental creation and enforcement of specification or performance-based regulatory standards whether through command-and-control statutes or market-based alternatives. Kleindorfer & Orts, *supra* note 19, at 163. "Informational regulation" is identified as a distinct, alternative approach that can either substitute for or complement the conventional approaches. As emphasized above, the distinguishing feature of informational regulation is reliance on social, rather than governmental, institutions and mandates to achieve regulatory results. The combined pressures of economic markets and public opinion, rather than government edict, induce organizations to comply with socially created environmental standards and behavioral norms. *Id.* at 165.

75. *Id.* at 160. The authors suggested that informational regulation as considered by their analysis "has not received much attention in economics." *Id.* at 159. While that statement still rings somewhat true, the paper was written and submitted for publication (October 1997) essentially during the same time frame that the separate studies performed by Konar and Cohen and Khanna et al. were being written and published.

76. *Id.* at 160. *See generally* Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960). *See also* Tietenberg, *supra* note 20, at 588-89 (discussing the Coase theorem as "the starting point for thinking about information approaches to pollution control").

77. Kleindorfer & Orts, *supra* note 19, at 160.

78. *Id.* Of course, information asymmetries are not the only concern. Professor Russell suggests that a larger problem prohibiting practical application of the Coase theorem is the difficulty in organizing typically large numbers of "pollutees" to bargain at all, especially in situations where pollution externalities can affect thousands, even millions, of people spread across several political jurisdictions. *See* RUSSELL, *supra* note 1, at 46; RUSSELL, *supra* note 9, at 99-100. Accordingly, "[o]ften the *only* way to deal with an externality of this sort is to have rights and duties assigned by legislation at the level of jurisdiction that includes all the affected parties." RUSSELL, *supra* note 1, at 46.

79. Kleindorfer & Orts, *supra* note 19, at 160.

80. *Id.*

Coasean ideal.[81] From this standpoint, informational regulation can be considered to follow the "normative" Coase theorem that encourages policymakers to structure law and regulation so as to remove impediments to such private bargaining.[82]

Another important stream of economic theory and research identified as applicable to informational regulation is the "growing literature on regulatory transactions costs," which concerns inefficiencies and costs introduced by the regulatory process itself.[83] Kleindorfer and Orts argued that informational regulation has the potential to reduce regulatory transaction costs in both monitoring and enforcement, especially in contrast to the "more bureaucratic procedures" associated with traditional regulatory models.[84] The authors opined that "[r]elying on market pressures . . . and public pressure to enforce environmental standards replaces regulators with thousands of unpaid, proactive enforcers in society."[85] However, for informational regulation to realize this potential, reliable information about firms' environmental operations and performance is essential.[86]

Tietenberg (1998)[87]

Tom Tietenberg surveyed the economics landscape regarding information disclosure strategies as a policy tool to induce positive environmental behavior by firms either as a complement to or a replacement for traditional regulatory strategies. Tietenberg summarized a number of functioning information disclosure programs—such as the TRI—and reviewed current literature on economic analysis of disclosure strategies, including the empirical TRI studies of Hamilton, Konar and Cohen, and Khanna et al.[88] As an original contribution, however, Tietenberg's work provides a conceptual framework of how policy setting—in this case with a specific focus on information made available to third parties in an effort to enlist market forces to aid pollution control—influences the type of disclosure strategy employed.[89]

Tietenberg asserted that the "community setting," e.g., when local residents are subject to toxic emissions from a nearby plant, is the most difficult policy setting within which to incorporate third-party disclosure strategies.[90] This is due to the lack of any obvious contractual relationship between the "polluter" and "pollutee," such as in the polluting product setting (purchase relationship between consumer and seller) or an occupational setting (employment relationship between firm and worker exposed to pollutants).[91] In the community setting, therefore, any action taken by those affected by environmental damage must be indirect because of the lack of such direct "behavioral linkages."[92]

To effectively address the difficulties inherent in the "community setting," Tietenberg argued that four separate functions must be considered in establishing an effective information disclosure strategy. First, effective mechanisms for discovering the extent and magnitude of the particular environmental risks faced must be established.[93] This involves evaluation of a complex causation process, including considerations of determining the amounts of emitted substances posing a risk, the degree of exposure to these substances, and the sensitivity of the affected population to such exposure.[94] Second, the information required must be assured to be reliable.[95] Tietenberg emphasized that disclosure of inaccurate or incomplete information may do more harm than good if it fails to identify actual, existing environmental concerns or if it promotes unjustified fears.[96] In this regard, Tietenberg observed that among the ways to assure disclosure of reliable information are the standardization of collection methods and the establishment of appropriately large penalties for providing false or misleading information.[97]

Third, Tietenberg argued that necessary information must be disseminated in a form that is both useable by and accessible to the community.[98] And, fourth, policymakers must consider available options for the target audience to act upon the information. Tietenberg suggested that such options range from allowing the information disclosed to generate its own pressure through preexisting channels to the creation of new channels to allow application of additional pressure.[99] Preexisting channels include the "product market" (where consumers can make purchasing decisions according to environmental considerations), the "capital market" (where investors can make investment decisions on the basis of environmental considerations), the "labor market" (where hiring or retention of employees can be affected by environmental preferences of the labor market), the judicial system (suing polluters through tort law actions), and the legislature (information-building support for additional leg-

81. *Id.* at 161. Indeed, more and better environmental data and information is considered a prerequisite to broader reliance on the market's ability to resolve environmental problems. *See* Daniel C. Esty, *Toward Optimal Environmental Governance*, 74 N.Y.U. L. REV. 1495, 1506 (1999). However, even if environmental markets are made to function more efficiently in the future through elimination of such impediments as information asymmetries and other informational inadequacies, "we are still some distance from a Coasean world of no or low transaction costs in the environmental property rights marketplace." *Id.* at 1507. Nonetheless, no governmental activity faces the degree of uncertainty that afflicts the environmental regulatory arena due to the pervasive information inadequacies that currently exist. *Id.* at 1509-10. Thus, despite the improbability of ever achieving a pure Coasean equilibrium in the real world, provision of new environmental data through informational regulation—again, assuming disclosure of accurate and meaningful data—can greatly assist in eliminating current informational inadequacies that significantly limit our ability to develop effective policy options to resolve environmental problems. *See id.* at 1510.

82. *See* ROBERT COOTER & THOMAS ULEN, LAW AND ECONOMICS 93-94 (3d ed. 2000) (discussing the "normative Coase theorem").

83. Kleindorfer & Orts, *supra* note 19, at 161.

84. *Id.*

85. *Id.* at 162.

86. *Id.*

87. Tietenberg, *supra* note 20. For an updated and expanded version of this paper, see Tom Tietenberg, *Disclosure Strategies for Pollution Control*, *in* THE MARKET AND THE ENVIRONMENT: THE EFFECTIVENESS OF MARKET-BASED POLICY INSTRUMENTS FOR ENVIRONMENTAL REFORM 14-49 (Thomas Sterner ed., 1999).

88. Tietenberg, *supra* note 20, at 593-99.

89. *Id.* at 589.

90. *Id.* at 590.

91. *Id.*

92. *Id.*

93. *Id.*

94. *Id.*

95. *Id.*

96. *Id.* at 591.

97. *Id.*

98. *Id.*

99. *Id.*

islation).[100] Potential new channels include the incorporation of environmental considerations into national constitutions (already a trend in many developing countries)[101] or granting new rights for private enforcement actions, such as through legislative "citizen suit" provisions.[102]

IV. Legal Literature on Regulating Through Information Disclosure

If the economics literature is "young," the legal literature on informational regulation is in its infancy. However, within the last few years, legal scholars have begun to explore informational approaches as an alternative to conventional forms of regulation with increasing frequency. Indeed, interest in informational regulation among legal scholars, especially in the last few years, finally appears to be catching up to the level of interest in this subject already demonstrated by economists. Without question, however, the analyses and evaluations of legal scholars considering mandatory information disclosure as a regulatory tool have been significantly influenced by earlier work performed by economists in this field.

Sunstein (1999)[103]

In a recent *University of Pennsylvania Law Review* article, Cass Sunstein described informational regulation as "one of the most striking developments in the last generation of American law."[104] In cataloging the history of the use of information as a regulatory tool in American law, Professor Sunstein asserted that informational regulation is designed to further two separate yet often overlapping goals. First, such statutes have been used to enhance the effectiveness of economic markets by providing information to assist consumers in making informed choices. Mandatory hazard warnings for cigarettes, pharmaceutical products, pesticides, asbestos, and saccharin are cited as examples of this type of approach.[105] Second, Sunstein asserted that some information disclosure mechanisms are meant to enhance democratic processes by triggering political, rather than market, safeguards. In this category, Professor Sunstein listed such statutes as the National Environmental Policy Act (NEPA) and EPCRA.[106]

Sunstein observed that informational strategies are displacing command-and-control approaches with increasing frequency, most prominently during the last two decades in the fields of health, safety, and the environment. He attributed this growth to the significant advantages that informational regulation can have over command-and-control strategies, including reduced regulatory costs, greater flexibility in achieving regulatory ends and means, and democracy-enhancing citizen oversight capabilities that can be largely self-enforcing.[107]

However, Sunstein also cautioned that informational strategies can be inferior to conventional regulatory strategies in two important ways. First, information disclosure can impose significant, perhaps even prohibitive, costs on a targeted regulated community, increasing the potential that such costs may outweigh benefits to be gained from disclosure.[108] Second, Sunstein argued that information disclosure is sometimes ineffectual or even counterproductive. The primary reason for this latter problem is the limited ability of individuals to process information. "If information is not provided in a clear and useable form, it may actually make people less knowledgeable than they were before, producing overreactions, or underreactions, based on an [in]ability to understand what the information actually means."[109] Additionally, disclosure strategies may be disproportionately ineffective with those who are undereducated, elderly, or indigent or otherwise in little position to act on information once disclosed.[110]

For such reasons, Sunstein warned that whether informational regulation is superior as a policy instrument to command-and-control approaches or even complete reliance on economic markets unaccompanied by disclosure requirements is dependent upon "the details."[111] He asserted that "[t]he most promising setting involves a market failure in the provision of information and reason to believe that information can be provided in such a way as to be understandable to the people who receive it."[112] And, it should be added, when the information in question also can be disseminated to recipients "arguably in a position to act on it."[113]

100. *Id.* at 591-92.

101. *See* Carl Bruch et al., *Constitutional Environmental Law: Giving Force to Fundamental Principles in Africa*, 26 COLUM. J. ENVTL. L. 131 (2001). Bruch, Director of the Africa Program at the Environmental Law Institute, and his co-authors note that "at least [32] countries in Africa (approximately two-thirds) have some constitutional provisions ensuring the right to a healthy environment." *Id.* at 143.

102. Tietenberg, *supra* note 20, at 592-93.

103. Sunstein, *supra* note 15.

104. *Id.* at 613.

105. *Id.* at 619.

106. *Id.* at 621-22. In general, NEPA requires the generation and disclosure of environmentally related information before the government may go forward with certain type of projects that will have a major effect on the environment. *See generally* JOHN FELLEMAN, DEEP INFORMATION: THE ROLE OF INFORMATION POLICY IN ENVIRONMENTAL SUSTAINABILITY 1 (1997) ("NEPA is essentially an information policy, with the environmental impact statement (EIS), which must precede every major Federal environmentally related decision, as its keystone."). As discussed earlier, EPCRA created the annual TRI information database, and further requires generation and disclosure of information regarding location, types, and quantities of potentially hazardous chemicals to state and local governments and local emergency response officials. *See id.* at 139.

107. Sunstein, *supra* note 15, at 624-26.

108. *Id.* at 626. As examples, Professor Sunstein cites estimated costs to industry of as much as $2 billion to comply with Food and Drug Administration (FDA) disclosure rules. Therefore, an important question becomes what benefits in terms of reduced mortality or morbidity are produced in return for this significant cost. Similarly, Sunstein notes that the Occupational Safety and Health Administration's hazard communication policies are estimated to save 200 lives per year at an annual cost of $360 million, an expenditure of $1.8 million per life saved. *Id.* at 626-27. Professor Sage notes that this figure is "far better than a large number of regulations, and is probably an amount well worth spending; but it is more than many agencies spend for life-saving regulations." *Id.* at 627. However, it also should be noted that $1.8 million per life saved is actually well within the range of estimates of the implied value of a statistical life derived by independent researchers in wage-risk studies or other methods of valuing risk. *See, e.g.*, W. KIP VISCUSI, RATIONAL RISK POLICY (1998); W. Kip Viscusi, *The Value of Risks to Life and Health*, 31 J. ECON. LITERATURE 1912 (1993); Ted R. Miller, *The Plausible Range for the Value of Life: Red Herrings Among the Mackerel*, 3 J. FORENSIC ECON. 17 (1990).

109. *Id.* at 627.

110. *Id.* at 628-29.

111. *Id.* at 629.

112. *Id.*

113. Russell, *supra* note 9, at 105.

Sage (1999)[114]

This *Columbia Law Review* article explored various rationales for mandatory information disclosure laws within the context of the American health care industry. However, as Prof. William Sage emphasized, such rationales also have important implications for other regulated practices, including most certainly the environmental field.[115]

Professor Sage's analysis identified four distinct but interrelated justifications for mandatory information disclosure laws. The first two seek to bring balance to contractual relationships (in Professor Sage's analysis, purchasing relationships) by eliminating information asymmetries that impede efficiency and fair dealing. The first—termed the "competition rationale"—theorizes that information disclosure enhances competition within economic markets and improves their efficient operation by eliminating information asymmetries that favor sellers over buyers.[116] The second—identified as the "agency rationale"—involves related problems associated with intermediaries (such as employers, government, and other benefit plan sponsors) who act as purchasing agents for defined groups of potential buyers within the market.[117] Laws requiring such intermediaries to disclose certain information to their principals (such as information on potential conflicts of interest) can reduce agency costs, allowing principals to more efficiently, effectively, and fairly monitor the agency relationship.[118]

The third rationale identified by Professor Sage is labeled the "performance rationale."[119] This rationale recognizes the ability of information disclosure to improve the dynamic performance of a regulated system. Professor Sage noted that "performance-related" information disclosure mechanisms differ from substantive performance standard-setting regulation typical of federal workplace and environmental laws in two primary respects.[120] First, such mechanisms do not establish absolute performance standards but rather emphasize "narrowing gaps in relative performance" and promoting incremental quality improvement over time.[121] Second, as also emphasized in other literature reviewed above, performance-related disclosure "depends primarily on extra-governmental enforcement mechanisms such as competitive forces, grassroots activism, and reputational concerns to achieve its desired effect."[122]

Borrowing from economic theory, Professor Sage observed that information is a "public good"[123] that even well-functioning markets may under-produce because potential producers are unable to fully capture the benefits of such production.[124] Government intervention in the form of mandatory disclosure requirements addresses this "public good" problem by "stimulating information generation and overcoming barriers to information sharing."[125] Often, such disclosure-based intervention allows legislatures or administrative agencies pragmatic and workable alternatives to substantive rulemaking in promoting meaningful performance improvements within a specific regulatory system. This is especially true under circumstances in which difficulties inherent in rulemaking within the modern regulatory state render establishment of or changes in substantive performance standards procedurally or politically unmanageable.[126]

In addition to its potential benefits, a number of potential problems with the performance rationale for disclosure also exist.[127] Among the most important include the "key question" of performance-based disclosure mechanisms; that is, how to identify the performance criteria to be disclosed that will "force" the regulatory system to achieve the "ends" or systemic changes desired.[128] Indeed, performance improvements achieved by regulated entities may be limited almost exclusively to those criteria and measures actually chosen for disclosure. Thus, selecting appropriate and meaningful performance goals, choosing what information in what quantity and quality should be disclosed to achieve those goals, and determining the means, methods, and tools for such reporting are crucial undertakings.[129] Professor Sage suggests that public regulatory processes are unlikely to be able to easily accomplish these tasks, and that private sector leadership in assisting government agencies in establishing such productivity goals, performance measures, and reporting tools and methods may be of significant value.[130]

The final justification for mandatory disclosure laws identified by Professor Sage is the "democratic rationale."[131] The "democratic rationale" recognizes that economic analysis alone cannot satisfactorily resolve all concerns within the sphere of a complex collective choice problem of significant social and political import.[132] Although Sage raised this issue within the context of the American health care system, a parallel exists with respect to the multifaceted social problems inherent in society's interaction with the natural environment. The decisionmaking process for such complex, aggregate societal concerns is inevitably political and "require[s] balancing individual rights and preferences against collective obligations and interests."[133] Thus, mandatory disclosure laws both enable and reinforce

114. Sage, *supra* note 34.

115. *Id.* at 1701.

116. *Id.* at 1715-16.

117. *Id.* at 1743.

118. *Id.* at 1746.

119. *Id.* at 1771.

120. *Id.* at 1781.

121. *Id.*

122. *Id.*

123. A "public good" is generally defined as a commodity that combines two essential characteristics. First, consumption of the good—in this case information—by a consumer who pays for the good does not leave less of the good for others to consume. Second, it is impossible or prohibitively expensive for the supplier of the good to exclude those who do not pay for it (free riders) from enjoying its benefit nonetheless. Thus, a market failure exists because potential suppliers of the good lack sufficient economic incentives to provide the good in the first instance. For this reason, the market likely will "under-supply" the commodity in question. For a discussion of market failures in relation to public goods (including information) as grounds for government intervention through regulation, see OGUS, *supra* note 15, at 33-35, 123-24.

124. Sage, *supra* note 34, at 1771.

125. *Id. Accord* Sunstein, *supra* note 15, at 624 (observing that "compulsory disclosure of information can provide the simplest response" to a market failure in the form of an inadequate supply of information).

126. Sage, *supra* note 34, at 1771-72.

127. *See id.* at 1780-96.

128. *Id.* at 1781.

129. *Id.* at 1781-82.

130. *Id.*

131. *Id.* at 1801.

132. *Id.* at 1802.

133. *Id.*

principles of representative democracy by assisting society in "bringing difficult decisions into the open and providing the deliberative process with the information needed to resolve them."[134]

Professor Sage emphasized that "[t]he democratic rationale for disclosure also applies to information concerning private behavior, if in the aggregate it has public implications."[135] Drawing parallels with capital investment markets governed by the disclosure requirements of federal securities laws, Sage suggested that some regulatory fields are "so expensive, so complex, and so essential to social well-being" that a convergence of public *and* private oversight facilitated by an information-rich political process is warranted.[136] Increasing the transparency of corporate operations and performance within such fields through mandatory disclosure allows two sets of agents—"private and public"—to act in a monitoring role.[137] In this respect, Professor Sage asserted that the democratic rationale is closely related to the agency rationale.[138] Most certainly, the environmental realm also involves complex social problems sufficient to justify consideration of mandatory disclosure rules to facilitate this type of dual supervisory role over private corporate behavior with substantial public implications.

Pedersen (2001)[139]

William Pedersen's analysis focused upon the capacity of informational regulation to control social costs such as pollution and other socially harmful externalities.[140] Pedersen argued that programs requiring disclosure of information regarding social costs created by regulated entities are calculated to provoke either collective public action "to address the topics of disclosure or a considered decision against such action."[141] The ultimate objective of "social cost disclosure" is to either facilitate state or local regulation of the sources of such social costs as a result of the information disclosed, or promote voluntary, preemptive action by such sources to forestall any such new regulation.[142] Indeed, Pedersen asserts that the costs of such disclosure programs are justified only when they reveal information with a realistic chance of triggering such new regulation or preemptive voluntary action.[143]

Pedersen suggests that the growth of social cost disclosure programs could fundamentally transform the role of regulatory agencies in performing their respective public missions, replacing weak, passive agencies with robust, politically independent participants in the social and political dialogue.[144] In theory, agencies that actively and accurately shape the public message conveyed by information disclosure programs would significantly increase their public standing, thus gaining stronger influence, and to some extent control, over definition and development of their primary regulatory goals and objectives.[145] Peterson further argues that this transformation would, in turn, also induce evolutionary change in the command-and-control regulatory system, as independent agencies able to credibly and effectively influence the social dialogue could shape significant restructuring of their respective legislative and regulatory mandates.[146] However, unless agencies take "affirmative responsibility" for the goals, objectives, and public message communicated by these programs, Pedersen argued, information disclosure tools will simply replicate weaknesses in the current command-and-control system from which they are ostensibly intended to depart.[147]

In support of this contention, Pedersen analyzed the TRI—"the oldest, most established, and best publicized federal social cost disclosure program"—which he claimed shares many of the defects of the traditional command-and-control regulatory system.[148] Foremost among these common defects is the failure of either regulatory approach to organize around well-established goals that articulate the ultimate social benefits desired.[149] Pedersen argued that such goals are necessary to effectively guide the direction and choice of methods of a particular policy instrument.[150] Absent such goals, individual regulatory decisions tend to fragment and have little or no connection to any larger regulatory purpose.[151] In the case of TRI, Pedersen asserted that Congress enacted this disclosure program without articulating such goals or giving any

134. *Id.* at 1803. For an intriguing proposal for utilizing information disclosure as the foundation for a proposed new governmental model of "democratic experimentalism," see Michael C. Dorf & Charles F. Sabel, *A Constitution of Democratic Experimentalism*, 98 COLUM. L. REV. 267 (1998). Professors Dorf and Sabel advocate a self-governmental model within which private firms are required to share knowledge and information, termed "information pooling," to complement a system of decisionmaking and experimentation at the local or regional level. *Id.* at 267. This information pooling supports the setting of broad goals and objectives by regional agencies and subnational units of government and experimentation with the means and solutions for obtaining them. The authors further assert that such information pooling would increase public administrative efficiency by promoting mutual learning among coordinating regulatory entities and private firms and a heightened accountability through citizen participation in decisions that affect them. *Id.*

135. Sage, *supra* note 34, at 1805.

136. *Id.*

137. *Id.* at 1805-06.

138. *Id.* at 1805.

139. William F. Pedersen, *Regulation and Information Disclosure: Parallel Universes and Beyond*, 25 HARV. ENVTL. L. REV. 151 (2001).

140. In this regard, Pedersen distinguishes between disclosure of information regarding the social costs, i.e., pollution and other environmental impacts, created by the operations of regulated entities and information disclosed by "more traditional product labeling efforts." *Id.* at 151. Pedersen's focus is on the former type of disclosure that primarily seeks "to reveal information that will help non-Federal governments and firms consider regulation or voluntary action," rather than attempting to inform individual consumers about hidden risks that specific products might impose on them. *Id.* For a discussion of the latter type of disclosure (product labeling efforts), see *supra* note 47.

141. *Id.* at 160.

142. *Id.* at 160-61. For an economic model suggesting that an increased threat of government regulation induces firms to voluntarily act to reduce pollution levels, see John W. Maxwell et al., *Self-Regulation and Social Welfare: The Political Economy of Corporate Environmentalism*, 43 J.L. & ECON. 583 (2000). Maxwell et al. presented empirical data implying that the public release of TRI data "significantly lower the information costs faced by consumer and environmental groups, thereby increasing the threat of regulation faced by firms and increasing the incentives for self-regulation," i.e., voluntary, preemptive action. *Id.* at 604.

143. Pedersen, *supra* note 139, at 161.

144. *Id.* at 151-52.

145. *Id.* at 152-55.

146. *Id.*

147. *Id.* at 152.

148. *Id.*

149. *Id.*

150. *Id.*

151. *Id.* at 178.

in-depth consideration of the policy issues inherent in such a regulatory approach.[152]

Although acknowledging the TRI's lauded success in inducing major release reductions by regulated entities in a short period of time, Pedersen emphasized that the ostensible goal of the TRI is to "accurately inform[ ] the public about 'toxic releases.'"[153] However, major weaknesses in the program prevent the TRI from achieving this basic goal.[154] These weaknesses include: (1) of the chemicals covered by the TRI, only a relatively small fraction of the sources of releases of such chemicals come within the scope of the reporting requirements[155]; (2) only a miniscule fraction of chemicals used commercially in the United States fall within the scope of the TRI's coverage, including scores of which may meet or exceed hazards posed by chemicals that are covered[156]; and (3) the TRI fails to provide any information characterizing the hazards or risks of covered and reported releases.[157] As a result, Pedersen argues that the TRI comes nowhere close to achieving its purported goal of accurately informing the public of either the true extent of toxic releases or of risks faced as a result.[158]

Absent well-defined and "operationally meaningful" goals, regulatory programs tend to "follow the course of least bureaucratic or political resistance."[159] Both the TRI and command-and-control regulatory approaches have followed this pattern by focusing primarily on pollution sources and substances that are bureaucratically and politically easy to regulate. Thus, the absence of goals for either regulatory approach reduces incentives for either to broaden their coverage to include "smaller, politically far more troublesome, but substantively more important, sources" of pollution.[160] As noted above, in Pedersen's view, a potential solution is for regulatory agencies to seize the initiative by actively shaping the message communicated by social cost disclosure programs in order to define and justify, both to themselves and to the public, the fundamental goals and priorities the agencies should pursue through its programs.[161] Such aggressive use of information disclosure would, in turn, lay the foundation for substantive and targeted change in the regulatory system itself.[162]

Karkkainen (2001)[163]

Like Pedersen, Prof. Bradley Karkkainen examined the TRI as a means of evaluating the promise of informational regulation in the environmental arena. However, in contrast to Pedersen's somewhat less enthusiastic appraisal, Professor Karkkainen extolled the TRI as a defining event in the evolution of informational regulation—an approach that "pioneer[s] the systematic use of performance monitoring and benchmarking as regulatory tools."[164]

Karkkainen observed that information reported under conventional regulatory requirements is "fragmentary" and "narrowly tailored" to specific program requirements, typically generating only sufficient data to gauge minimal regulatory compliance.[165] In contrast, the TRI establishes a computerized, "broadly accessible," standardized, cross-media metric of facility-level environmental performance information unrelated to any specific, fixed regulatory standard.[166] Indeed, Professor Karkkainen emphasizes that the TRI may be the first informational regulatory tool to "exploit the revolutionary potential of contemporary information technology to store, manipulate, and disseminate large volumes of performance information efficiently, quickly and cheaply."[167] This emphasis supports what Karkkainen submitted is the TRI's primary purpose: improving the environmental performance of parties most directly responsible for significant environmental impacts by measuring and publicly disclosing certain aspects of that performance.[168]

Karkkainen asserted that information disclosure under the TRI successfully drives improvements in environmental performance by focusing on "[s]tandardization, comparability, and computerization."[169] Because data reported under the TRI is objective, quantifiable, and standardized, the information disclosed is comparable across specific reporting units and reporting periods.[170] By combining these features with broad, computerized, public accessibility of the data, a performance metric is created that "transforms the firm's understanding of its own environmental performance, while facilitating unprecedented levels of transparency and accountability" to external parties.[171]

152. *Id.* at 158-59.

153. *Id.* at 152, 166. Indeed, EPA's own pronouncements support Pedersen's assertion that the TRI's basic goal is to inform local governments and the public about toxic exposures they face. *See id.* at 166 n.60 (quoting EPA statements set forth in several *Federal Register* notices).

154. *Id.* at 164.

155. *Id.* This deficiency is attributed primarily to the fact that coverage of sources under the TRI is restricted only to certain industry sectors (primarily major industrial sources) and businesses of a certain (primarily large) size. Moreover, even many otherwise covered sources release covered chemicals in amounts that fall under regulatory reporting thresholds. *Id.* at 165-69.

156. *Id.* at 169. Citing Environmental Defense, Pedersen observes that the 650 substances currently covered under the TRI are less than 1% of the over 75,000 chemicals used commercially in the United States, for the vast majority of which there exists no basic hazard assessment data regarding potential toxicity. *Id.* at 169 & n.68, 199 & n.146. At an early point in the TRI program (1992), it was reported that, due to industry classifications, chemical lists and reporting thresholds, only about 5% of total chemical emissions actually fell within reporting parameters. FELLEMAN, *supra* note 106, at 143.

157. Pedersen, *supra* note 139, at 170-71. As Pedersen notes, the TRI itself provides only a quantitative listing of various types of releases of covered chemicals by covered sources. *Id.* at 170. *Accord* Felleman, *supra* note 105, at 152 (the TRI's "[g]ross annual estimates of source emissions do not answer basic questions regarding exposure and health").

158. Pedersen, *supra* note 139, at 152.

159. *Id.* at 177, 178.

160. *Id.* at 178, 179.

161. *Id.* at 153-54.

162. *Id.* at 154.

163. Karkkainen, *supra* note 45.

164. *Id.* at 260.

165. *Id.* at 260-61. *See generally* Susan C. Helms, *Report Card*, ENVTL. F., Nov./Dec. 1999, at 23-24 (describing current environmental regulatory reporting requirements as chaotic, piecemeal, incomplete, inaccessible, uninterpretable, inconsistent, and ineffective).

166. Karkkainen, *supra* note 45, at 261.

167. *Id.* In this regard, Karkkainen suggested that the TRI may be the first regulatory instrument mandating that a federal agency compile information in a computerized database and make that information directly available to the public through online Internet access. *Id.* at 289 (citing SUSAN G. HADDEN, A CITIZEN'S RIGHT-TO-KNOW: RISK COMMUNICATION AND PUBLIC POLICY 94 (1989)).

168. *Id.* at 287.

169. *Id.* at 290, 295.

170. *Id.*

171. *Id.* at 295.

According to Karkkainen, public disclosure of TRI data drives covered facilities and firms to improve environmental performance by unleashing a multilayered, mutually reinforcing system of internal and external performance monitoring and benchmarking.[172] This informal monitoring regime contains multiple, overlapping components as outlined below. As Professor Karkkainen observed, however, identifying and separating causal links between specific performance improvement and the multiple forms of monitoring likely involved in any specific instance may be problematical.

- *Self-Monitoring*: The TRI puts information in the hands of the firm itself; information often, especially in the early disclosures of TRI data, previously unknown to the firm.[173] This enables corporate managers to engage in both internal and external comparative benchmarking of environmental performance.[174] Comparisons and tracking performance over time are possible among the firm's own production processes, facilities, and operating units, and those of peer or competitor firms.[175] Such benchmarking permits establishment of performance baselines, improvement targets, and the translation of general environmental goals into specific performance objectives.[176] Thus, in contrast to fixed regulatory standards, the TRI becomes an "open-ended performance standard," demanding of both the firm and its competitors continuous improvement in relation to past performance.[177]

- *Peer Monitoring*: External pressures unleashed by public disclosure of TRI data have encouraged industry self-regulatory efforts, most notably the American Chemistry Council's (formerly the Chemical Manufacturers Association) Responsible Care® program.[178] Although strongly questioning their effectiveness, Karkkainen concluded that Responsible Care® and similar programs are an intriguing experiment in industry self-regulation made possible by the self- and peer-performance monitoring and benchmarking capabilities of the TRI.[179]

- *Regulators as Monitors*: Federal, state, and local governmental regulators, NGOs, and citizens/environmentalists also have ready access to TRI performance data.[180] Thus, these entities can also use TRI data to track firm or industry performances and engage in benchmarking comparisons among them at national, regional, or local levels.[181] Such monitoring efforts may cause governmental entities to consider new or revised regulatory requirements and enforcement priorities, or NGOs and environmental activists to create political pressures advocating regulatory action against perceived problem firms or industries.[182] Implicit threats of future regulatory action often generate self-imposed or market-driven pressures on firms or industries that disclose negative TRI performance data to undertake preemptive, self-regulatory action to reduce such threats.[183]

- *Community Monitoring/"Informal Regulation"*: Professor Karkkainen asserted that mandatory disclosure of TRI data advances a model of community-based "informal regulation" recently developed by World Bank economists.[184] That is, the TRI provides communities with informational leverage to support effective self-help actions—boycotts and pickets, social ostracism of firm managers or employees, adverse publicity, potential lawsuits, political pressure for regulatory action—intended to force firms to comply with informal, community-generated environmental standards.[185] If costs become too high, firms may be forced to negotiate de facto environmental standards with community residents, even though such standards are not legally binding.[186] Karkkainen contended that such TRI-supported, community-based "informal regulation" is already pervasive in the United States.[187]

- *Markets as Monitors*: Economic markets also play a significant role as external monitors of the TRI-measured performance of firms. Citing the Hamilton and Konar and Cohen studies discussed in part III above, Karkkainen observed that capital market evaluations of TRI performance—primarily through adverse stock market reactions to negative TRI information—have been a powerful motivator of improvements by some firms in such performance.[188] Labor markets may also play a role, as adverse TRI-measured performance information

172. *Id.* at 261-62.
173. *Id.* at 296-97.
174. *Id.* at 261, 295-96.
175. *Id.* at 261.
176. *Id.*
177. *Id.*
178. *Id.* at 309. Responsible Care® attempts to establish—through voluntary compliance with industry-written codes of "best environmental management practices"—a self-regulating regime of peer monitoring through which industrywide norms, innovation, benchmarking, and competitive peer pressure raises environmental performance on an industrywide scale. *Id.* at 306. For a more detailed overview of the Responsible Care® initiative, see Andrew King & Michael Lenox, *Industry Self-Regulation Without Sanctions: The Chemical Industry's Responsible Care Program*, 43 ACAD. MGMT. J. 698 (2000); VASANTHAKUMAR N. BHAT, TOTAL QUALITY ENVIRONMENTAL MANAGEMENT: AN ISO 14000 APPROACH 62-67 (1998). *See also* Forest Reinhardt, *Market Failures and the Environmental Policies of Firms: Economic Rationales for "Beyond Compliance" Behavior*, 3 J. INDUS. ECOLOGY 9, 13-14 (1999) (discussing Responsible Care® and incentives of chemical industry to initiate such private regulation in an effort to forestall potentially more stringent and inflexible government regulation).
179. Karkkainen, *supra* note 45, at 309.
180. *Id.* at 309-10.
181. *Id.* at 311.
182. *Id.* at 310-12.
183. *Id.*
184. *Id.* at 316 & n.250.
185. *Id.*
186. *Id.*
187. *Id.* at 318.
188. *Id.* at 323. Karkkainen also emphasized that other capital markets—specifically the insurance and commercial lending markets—may play a role, as adverse TRI performance data may affect the availability and cost of insurance and nonequity capital. *Id.* at 323-24.

> may render recruitment and retention of employees more costly and difficult.[189] Pressure to improve performance also may come from consumer markets as customer purchase decisions, including "supply-chain" purchasing in "business-to-business" markets, are affected by poor showings in TRI rankings by product manufacturers.[190]

Despite its demonstrated success in inducing significant release reductions, however, Professor Karkkainen notes that the TRI is "still relatively crude and underdeveloped" as an informational regulatory tool.[191] As discussed previously, one limitation of the TRI is its unduly narrow and incomplete coverage, rendering it, "at best, [a] potentially highly misleading indicator of environmental performance."[192] Indeed, because of its high visibility and broad accessibility, as well as an "absence of a broader and more comprehensive set of metrics," many users incorrectly perceive the TRI as a proxy for a firm's overall environmental performance.[193] However, the limited performance metric captured by the TRI's disclosure regime has absolutely no bearing upon any number of important dimensions and indicators of environmental performance.[194]

Further, the lack of either strict monitoring of emissions or systematic verification of reported emission estimates under the TRI appreciably undermines the quality, credibility and comparability of the data.[195] The untimeliness of TRI data—a time lag of approximately two years exists from the end of a reporting period to public release of that period's data—also limits its usefulness as the most recently available data actually involves significantly dated conditions.[196] The totality of these factors tends to significantly reduce the value of the TRI as a metric of firm environmental performance.[197]

Despite such limitations, Professor Karkkainen envisions that enhanced information disclosure tools could lead to "the emergence of a performance-based approach to environmental regulation" significantly superior to conventional regulatory strategies.[198] In this regard, Karkkainen argues that the TRI's underlying approach of performance monitoring and benchmarking based on mandatory information disclosure holds a "crucial advantage" over conventional regulation.[199] Information disclosure tools generate large amounts of "performance-revealing information of superior scope, utility, and power," while simultaneously shifting the information production burden from regulator to regulated.[200] Thus, such tools surmount the substantial information deficiencies that impede the effectiveness of technology-oriented, command-and-control approaches,[201] as well as market-based substitutes such as tradable permit systems and emissions fees.[202] For informational regulation to realize its enormous potential, however, policy instruments such as the TRI "must be refined, extended to a more representative set of higher-quality metrics, and applied more rigorously and systematically."[203]

Stewart (2001)[204]

Richard Stewart analyzed informational regulation within a "reflexive law" framework.[205] A reflexive regulatory model seeks to "promote the internalization of environmental norms by firms and other organizational actors as opposed to directly controlling their external conduct."[206] The fundamental aim is to facilitate self-regulation by creating structures and processes that promote external transparency in the operations and performance of firms.[207]

In a seminal *Northwestern University Law Review* article, Prof. Eric Orts argued that "reflexive environmental law" encourages companies to create internal and "permanent operational and decision-making processes to address environmental concerns."[208] Unlike conventional command-and-control regulation that relies upon direct government investigation and enforcement, "reflexive environmental law" is a "paradigmatic alternative . . . rel[ying] on [information] disclosure first and enforcement second."[209] Instead of directly regulating complex social problems often beyond the capacity of legal institutions alone to address satisfactorily, a reflexive approach "aims at fundamental structural change in the everyday life of business institu-

189. *Id.* at 325-26.

190. *Id.* at 326-27. However, Karkkainen notes that evidence regarding the significance of the role of consumer markets in this regard "is at best mixed." *Id.* at 326.

191. *Id.* at 262.

192. *Id.* at 331-35. The factors emphasized by Karkkainen as contributing to the arbitrarily narrow scope of TRI coverage include: an emphasis on quantity of releases rather than relative toxicity of a particular substance; an absence of exposure data or other risk relevant information; the incomplete nature of the chemical substances covered; volumetric reporting thresholds; and underinclusive coverage of pollution sources. *Id.*

193. *Id.* at 331.

194. *Id.* at 331-32.

195. *Id.* at 335-36.

196. *Id.* at 336.

197. *Id.* at 262.

198. *Id.*

199. *Id.* at 262-63.

200. *Id.*

201. *Id.* Karkkainen emphasized that "[t]he conventional regulatory process is constrained by the almost impossibly large demands for information placed upon the agency at the standard-setting stage." *Id.* at 263. "[D]aunting" informational undertakings are required for regulators to investigate and establish technology-based regulatory standards, including the need to "keep pace with rapid changes in knowledge, technology, and environmental conditions." *Id.* at 263-70. More, even higher information demands are necessary to support health- or risk-based regulatory standards which some argue should be the primary focus of our regulatory system. *Id.* at 267-68; *see* Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613, 1692-94 (1995); Steinzor, *supra* note 45, at 355 (protecting the public health should be the primary mission of environmental regulation).

202. Karkkainen, *supra* note 45, at 262. Market-based approaches similarly impose "formidable information problems due to the voluminous and "difficult to acquire" nature of information necessary ex ante to establish proper market prices for permits or to set the correct permit fee to achieve optimal pollution levels. *Id.* at 270-71; *accord* RUSSELL, *supra* note 13, at 199, 205, 356 (noting disadvantages of market-based instruments such as permit or charge systems revolving around their "information intensity," which is at its greatest when the desired goal is to achieve static economic efficiency).

203. Karkkainen, *supra* note 45, at 262.

204. Richard B. Stewart, *A New Generation of Environmental Regulation?*, 29 CAP. U. L. REV. 21 (2001).

205. *See id.* at 127-43.

206. *Id.* at 127.

207. *Id.* at 134.

208. Orts, *supra* note 1, at 1339.

209. *Id.* at 1234.

tions."[210] The ultimate endeavor is "nothing less . . . than the transformation of business culture."[211]

Professor Stewart identified informational regulation as an emerging reflexive environmental law approach, together with environmental audit and management systems and alternative regulatory compliance programs such as EPA's Project XL.[212] He generally defined informational regulation as "any governmental strategy that disseminates information regarding the environmental performance of firms and other organizations."[213] Despite wide variation in form and content available under informational approaches, the unifying focus is "external transparency"; that is, making sure that third parties have accurate and understandable information about firm environmental performance.[214] Such external transparency promotes market-based and other societal influences and interactions generated by public stakeholder consumption of appropriate performance information that induce environmentally preferred behavior by the disclosing firms.[215]

Stewart identified three general categories of informational regulatory forms: "negative," "neutral," and "positive."[216] "Negative" informational forms—typically mandated by government to overcome the failure of private markets to produce such information—include eco-labeling programs requiring disclosure of harmful or potentially harmful attributes of products, processes or firm activities, or other regulatory programs, such as the TRI, that require reporting and public dissemination of such information.[217] NEPA is described as an example of a "neutral" form, given that the burden is placed on governmental agencies to generate, disclose, and, in theory, utilize the required information.[218] "Positive" information strategies include voluntary eco-labeling programs, whether government-sponsored or privately sponsored, seeking to reduce an evaluation of firm products, processes, or overall environmental performance "into a simple, environmentally beneficial sign."[219]

Similar to other authors, Professor Stewart credited the TRI as establishing the potential impact of informational regulation as a policy tool of environmental protection.[220] However, Stewart also noted inherent limitations in utilizing information disclosure as a regulatory tool. For example, he observed that "[i]nformation strategies rely entirely on stakeholders to act upon the information" disclosed.[221] Echoing concerns expressed by Sunstein, as discussed above, he noted that individuals such as consumers or investors have "limited time, energy, and attention" and, therefore, may have limited ability or willingness to properly process and act upon information, even assuming perfect accuracy and effective dissemination.[222] Moreover, the inherent complexity and significant uncertainty that often characterize environmental concerns substantially impede the ability to communicate information accurately, effectively, and in a manner that does not lend itself to oversimplification or distortion.[223] Even if such communication problems can be overcome, there is little empirical evidence available to allow more than theoretical speculation on how individuals will act upon information conveyed and how such action specifically influences market and social behavior or firm performance.[224]

Stewart argued, as part of a reflexive law approach, that information-based strategies are targeted at a far broader audience than investors and consumers.[225] An organization's success is dependent upon a "viable social franchise as well as a healthy economic franchise."[226] Social and reputational factors, political and regulatory relationships and environments, competitiveness pressures and other business interactions, and community-based demands are all potential pathways through which information disclosure can operate to encourage environmentally preferred organizational behavior and to condemn conduct not meeting accepted social norms.[227] Thus, although acknowledging that reflexive approaches are unlikely to replace conventional environmental regulation, Professor Stewart asserted that informational regulation may become increasingly useful as a complement to both market-based and command-and-control regulatory approaches.[228]

Cohen (2001)[229]

In a recent *Environmental Law Reporter* (*ELR*) Dialogue, Prof. Mark Cohen explored policy lessons learned from ex-

210. *Id.* at 1313. Similarly, Professor Stewart emphasized:

> Reflexive law concerns structure and process; it neither establishes formal rules of interaction nor directs substantive outcomes. As the third stage in the evolution of law, it seeks to coordinate the goals and activities of the various elements of society. Recognizing that substantive or rule-based laws cannot encapsulate the increasing complexity of economic, social and moral demands, the law should produce a harmonious fit between social and institutional structures and goals through organization and procedure. This more passive, mutable and indirect approach is justified—even required—by the increasing complexity of societal goals, relations and circumstances.

Stewart, *supra* note 204, at 130-31.

211. Orts, *supra* note 1, at 1313.

212. Stewart, *supra* note 204, at 133. For a discussion of environmental audit and management systems, see *id.* at 143-47. For a discussion of Project XL and other EPA experimental regulatory reform programs, see Case, *supra* note 3, at 40-46.

213. Stewart, *supra* note 204, at 133-34.

214. *Id.*

215. *Id.* at 134.

216. *Id.*

217. *Id.* at 139-40. Stewart characterized California's Proposition 65—the Safe Drinking Water and Toxic Enforcement Act—as an example of a "negative label program" because it prohibits knowing exposure of individuals to substances categorized as carcinogenic or teratogenic without providing a warning. *Id.* at 139. For further discussion of the Proposition 65 information disclosure program, see Karkkainen, *supra* note 45, at 345-47.

218. Stewart, *supra* note 204, at 140-41.

219. *Id.* at 136-39.

220. *Id.* at 143.

221. *Id.* at 136.

222. *Id.* at 141.

223. *Id.* at 141-42.

224. *Id.* at 135, 142.

225. *Id.* at 142.

226. *Id.*

227. *Id.*

228. *Id.* at 131, 143.

229. Mark A. Cohen, *Information as a Policy Instrument in Protecting the Environment: What Have We Learned?*, 31 ELR 10425 (Apr. 2001). An earlier version of this work was included as part of the Environmental Defense's "Project 2001: The Potential Role of Information Policy in Environmental Management."

perience with existing environmental information disclosure programs. In addition, Professor Cohen also identified gaps in current knowledge on use of information disclosure as a regulatory tool and outlined important policy concerns and future research needs in this area.[230]

Although empirical evidence clearly demonstrates that mandatory disclosure can significantly affect firm environmental performance,[231] the specific mechanisms that induce voluntary action by firms are not fully understood.[232] However, Professor Cohen emphasized that understanding the "how" in how information disclosure induces improved environmental performance that exceeds minimum legal requirements is critical and necessary.[233] The success of one program—such as the TRI—cannot be assumed to be transferable to another program unless mechanisms that allowed the original success are better understood.[234] Simply put, the limited empirical evidence to date regarding the TRI does not satisfactorily sort out the relative contributions of multiple mechanisms—such as market forces, public pressures, reputational concerns, attempts to forestall additional regulation, and internalization of normative environmental and social values—to improved environmental performance.[235] Thus, policymakers cannot assume that other information disclosure programs will be successful simply because of past positive experience with the TRI.[236]

As discussed previously, information disclosure programs provide firms with significant internal and external benchmarking opportunities.[237] According to Professor Cohen, the convergence of increased benchmarking capacity and the desire of firms to be perceived as superior environmental performers causes information disclosure to take on many positive attributes of market-based regulatory tools such as marketable permits or emission charges.[238] Incentives are provided for firms to exceed minimum regulatory requirements for environmental performance as long as the costs are less than the perceived benefits to the firm.[239] However, though encouraging beyond-compliance behavior, information disclosure programs (similar to emission charges) offer no guarantee of a specific reduction in a certain polluting activity or even that any reduction at all will be achieved.[240] Professor Cohen emphasized that this is an important consideration for evaluating information disclosure as a substitute for traditional regulation rather than a complementary program.[241]

Professor Cohen observed that experience with existing disclosure programs demonstrates concerns for data accuracy and the speed at which information is actually disseminated.[242] Moreover, even if data is completely accurate and reflective of current practices, existing government-mandated disclosure programs such as the TRI are historical, not predictive.[243] Thus, the information disclosed tends to reflect what the company has done, not what it is likely to do in the future. Indicators of future environmental performance—such as a firm's environmental management systems, policies, and practices, or environmental research and development, or new environmental performance initiatives—generally are ignored by government-mandated disclosure programs.[244] In stark contrast, however, private ratings organizations typically utilize such criteria as essential predictors of future environmental performance in preparing evaluations of specific firm or industry sector performance.[245]

Indeed, Professor Cohen noted that collection and dissemination of information indicative of future environmental performance may actually prove of equal or greater value than ostensibly more objective information such as that released by the TRI.[246] For reasons similar to those expressed above by Pedersen and Karkkainen,[247] Professor Cohen observed that TRI emissions data is incomplete, potentially misleading and confusing to various stakeholders, and considered to be of extremely limited value by segments of the financial community.[248] In an effort to address such issues, voluntary disclosure standardization efforts are underway, including most notably the Global Reporting Initiative

230. Much of this effort was based on the findings of a national summit on information disclosure programs hosted by VCEMS and Vanderbilt University on March 3, 1999. *Id.* at 10425 n.1; *see* Abkowitz et al., *supra* note 6. A full version of the report containing the findings of this national summit is available at http://www.vanderbilt.edu/VCEMS/papers/summit.html (last visited May 3, 2001).

In this Article, the discussion of Professor Cohen's *ELR* Dialogue is restricted to certain of the "lessons learned" to date from experience with existing information disclosure mechanisms and corresponding "knowledge gaps" identified by the author. The reader is referred to Professor Cohen's Dialogue itself for the author's discussion of various policy issues affecting potential creation of new, or expansion of existing, programs and corresponding research needs.

231. *See, e.g., infra* notes 48-72 and accompanying text (discussion of Hamilton, Konar and Cohen, and Khanna et al. empirical studies, respectively).

232. Cohen, *supra* note 229, at 10425.

233. *Id.* at 10426.

234. *Id.*

235. *Id.* at 10427; Karkkainen, *supra* note 45, at 328.

236. Cohen, *supra* note 229, at 10426.

237. Karkkainen, *supra* note 45, at 261, 295-96; Khanna et al., *supra* note 61, at 244.

238. Cohen, *supra* note 229, at 10427.

239. *Id.*

240. *Id.* On the other hand, a marketable permit regime involves the setting of a specific target level of emission reduction in advance that will be achieved assuming adequate compliance by market actors. *Id.*

241. *Id.*

242. *Id.* For example, data inaccuracy can occur because required forms are improperly completed or because of transcription mistakes or incorrect interpretation of data during inputting into computer databases. In addition, because TRI data is up to 18 months old by the time it is publicly released by EPA, it is considered to be already outdated at the time of release. *Id.*

243. *Id.*

244. *Id.*

245. *Id.* Professor Cohen lists such organizations as Innovest and SAM Sustainability Group in this regard. *Id. See also* Ans Kolk, *Evaluating Corporate Environmental Reporting*, 8 BUS. STRATEGY & ENV'T 225, 228-32 (1999) (discussing various approaches, criteria, and indicators used by private ratings organizations in evaluating information disclosed through formal corporate environmental reports).

246. Cohen, *supra* note 229, at 10427.

247. *See supra* notes 153-58 and 191-97 and accompanying text.

248. Cohen, *supra* note 229, at 10427, 10428; *accord* Donald J. Reed, The Wall Street Perspective on Corporate Environmental Information Disclosure Stream (unpublished manuscript, Sept. 22, 1999) (paper prepared for joint WRI/EPA conference, "Environmental Policies for a New Millennium: Using Incentives for Ecosystem Protection and Stewardship") (criticizing and questioning the value of current information disclosure streams in providing information to financial markets).

(GRI), to promote consistency in and assist comparability of environmental performance information.[249]

However, standardization of environmental performance information across companies and industrial sectors has proven extremely difficult, and some researchers have concluded that such a monumental task may not be possible.[250] Given such circumstances, Professor Cohen argued that proposals for new or expanded government-mandated disclosure should be more comprehensive in approach. This includes considering expansion of disclosure requirements to include currently noncovered emission sources and environmental impacts, incorporation of indicators predictive of a firm's future environmental performance rather than data that merely presents a limited snapshot of isolated aspects of past performance.[251] Moreover, to assist policymakers in focusing on the most socially desirable solutions, Professor Cohen further recommended that existing and proposed information disclosure policies be subjected to a cost-benefit analysis to determine whether the social benefits of such programs exceed their social costs.[252]

V. Conclusion

The economic and legal literature raises both optimistic and cautionary notes regarding the future of informational regulation in the environmental arena. Optimistic, because empirical studies, though limited, have demonstrated that information disclosure is a powerful lever in motivating positive environmental performance improvements by regulated firms. Cautionary, because careful analysis demonstrates that environmental informational regulation to date has been, at best, a blunt and unfocused instrument. Indeed, the difficulties inherent in deconstructing various potential causal explanations for the TRI's specific successes seemingly elicit more questions than answers regarding the utilization of mandatory information disclosure as a regulatory tool without attendant performance-related requirements or standards.[253] Commentators emphasize the need for further empirical research to assist regulators and other policymakers in better understanding specific links between components of disclosure strategy and environmental performance improvement, and in learning to design and target disclosure instruments to maximize their effectiveness and efficiency.[254]

We are far from having sufficient information, knowledge, and experience to be able to declare informational regulation a suitable replacement for command-and-control strategies in regulating environmental protection. Indeed, many are skeptical whether that day will ever come. Nonetheless, research and experience to date most certainly suggests that information disclosure strategies are a worthwhile supplement to such regulatory efforts, especially within the realm of encouraging "beyond compliance" environmental performance by regulated firms. Further, rapidly coalescing legal and economic theoretical analyses of informational regulation have already narrowed down some of the determinants of when this approach is more apt to work effectively and efficiently and when it is not.[255] Continuing maturation of theory and further empirical research should advance the current state of the practice and allow better informed and targeted development of more efficient and effective informational regulatory tools in the environmental arena.

249. Cohen, *supra* note 229, at 10428. *See also* David W. Case, *Legal Considerations in Voluntary Corporate Environmental Reporting*, 30 ELR 10375, 10376 (May 2000) (discussing notable standardization efforts).

250. Cohen, *supra* note 229, at 10428. Indeed, as Professor Karkkainen aptly warns, "[n]ot all aspects of environmental performance lend themselves to standardized performance measurement. Indeed, many of the most critical environmental problems are so deeply local in character that efforts to create standard measurements may prove futile or counterproductive." Karkkainen, *supra* note 45, at 367.

251. Cohen, *supra* note 229, at 10427, 10428.

252. *Id.* at 10430-31. In this regard, Professor Cohen observes that, when information disclosure programs induce desired environmental performance (emissions reductions beyond legally required amounts), the private costs of this performance are presumably less than the private benefits (reducing market pressures, obtaining cost reductions from elimination of waste, etc.) or firms would decline to voluntarily do so. In contrast, whether social benefits (pollution reductions) exceed the social costs in these circumstances is unknown. Thus, Professor Cohen argued that, "[g]iven that the public might be misinformed about the risks of various pollutants and media attention might have more to do with which firms reduce emissions than any social cost-benefit analysis, it would not be entirely surprising to learn that firms reduce certain emissions at a cost that exceeds their social benefits." *Id.*

253. Karkkainen, *supra* note 45, at 328-29.

254. *See, e.g., id.* at 328; Cohen, *supra* note 229, at 10430-31; Tietenberg, *supra* note 20, at 600; Konar & Cohen, *Information as Regulation*, *supra* note 26, at 123-24; Russell, *supra* note 9, at 104-05.

255. Kleindorfer & Orts, *supra* note 19, at 156 (asserting that "more careful systematic thinking about the legal and economic nature of [informational regulation] will yield a better prediction about when this approach is likely to work efficiently and effectively and when it will not"); Tietenberg, *supra* note 20, at 600 (listing some of the "determinants of successful disclosure strategies" that research to date has identified); Sage, *supra* note 34, at 1826-27 (discussing regulatory contexts within which disclosure laws are likely to have the greatest influence and promote meaningful change).