Rethinking Environmental Disclosure

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Twenty years ago, legal scholars and regulators alike were convinced that information-forcing regulations heralded a new era in environmental law. Coming off the success of the Toxics Release Inventory (TRI), which seemed to decrease toxic chemical pollution solely by forcing industry to disclose if they released certain chemicals, many called information regulation the third wave of environmental law. New information disclosure policies were enacted and old policies reinvigorated, leading to a plethora of information-based regulations throughout environmental law. Now, twenty years later, the emergence of big data and artificial intelligence (AI) approaches to environmental analysis have only further increased the belief in the benefits of information-forcing approaches. In this time, the central premise that information regulation works to change behavior and improve environmental outcomes has been largely unquestioned.

Despite the widespread enthusiasm, after decades of implementation it is increasingly clear that information regulation largely fails to achieve its environmental goals. This Article makes two main contributions. By drawing on quantitative and qualitative case studies of information-forcing regulations, it first answers the question of whether this approach to environmental regulation is effective. It

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evaluates the success of information-forcing policies, finding that these policies often fail both to change behavior towards improving environmental conditions and to achieve other stated goals. This Article then analyzes the mechanisms behind information forcing in conjunction with these case studies to propose characteristics that determine the success, or failure, of information regulation. It finds that contrary to popular belief, persuasive and economic mechanisms do not drive environmental behavior change. Instead, information-forcing regulations with legal mechanisms of action show the most promise and efficacy. Moving beyond sweeping promises of efficiency and transparency to understand the specific characteristics that make these programs successful is essential moving forward into an era of big environmental data.

INTRODUCTION

In 1986, Congress passed the Emergency Planning and Community Right-to-Know Act (EPCRA), which, among other things, required companies to disclose if they released certain toxic chemicals into the environment under a program called the Toxic Release Inventory (TRI).[1] TRI had none of the command-and-control hallmarks that were typical of environmental regulation at the time.[2] There were no mandates that companies reduce their emissions or pay fines to the Environmental Protection Agency (EPA). Instead, it merely required information disclosure in the form of a simple annual statement if companies released certain chemicals into the environment.[3] And in the eyes of the world, it was an immediate success.[4] Toxic chemical releases appeared to decrease.[5] Market incentives aligned toward protecting environmental health.[6] Transparent environmental information was newly available to the public.[7] And all as the result of a relatively low-cost, simple regulatory intervention.[8]

For academics, the advent of TRI was also the advent of a new approach to environmental regulation. Some ten years after the enactment of EPCRA in 1986, regulators and academics became fascinated by the success of TRI. Cass Sunstein called it "one of the most striking developments in the last generation

1. Emergency Planning and Community Right-to-Know Act (EPCRA), 42 U.S.C. § 11001 et seq. (1986).

2. *See, e.g.*, Bradley C. Karkkainen, *Framing Rules: Breaking the Information Bottleneck*, 17 N.Y.U. ENVTL. L.J. 75, 75 (2008) ("[T]he first generation of environmental law in the United States largely reflected a model of direct regulatory proscription of unwanted individual and corporate behaviors through a series of regulatory commands of the 'thou shalt not' variety.").

3. EPCRA § 313, 42 U.S.C. § 11023 (2019).

4. *See, e.g.*, Mary Graham, *Is Sunshine the Best Disinfectant? The Promise and Problems of Environmental Disclosure*, 20 BROOKINGS REV. 24 (2002) (describing how EPA dubbed TRI "one of the most effective environmental requirements ever").

5. *See generally* Shameek Konar & Mark A. Cohen, *Information As Regulation: The Effect of Community Right to Know Laws on Toxic Emissions*, 32 J. ENVTL. ECON. & MGMT. 109 (1997) (describing reductions in toxic releases after the passage of TRI).

6. *See, e.g.*, James T. Hamilton, *Pollution as News: Media and Stock Market Reactions to Toxics Release Inventory Data*, 28 J. ENVTL. ECON & MGMT. 98 (1995) (showing drops in stock price after firms disclosed toxic chemical releases pursuant to TRI).

7. *See, e.g.*, Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking*, *Precursor to a New Paradigm?*, 89 GEO. L.J., 257, 317 (2001) (describing how TRI generated new "informal regulation" by community groups as the result of more available and transparent environmental information).

8. While the predominant reaction at the time was enthusiasm, there were pockets of skepticism centered around the disconnect between required TRI disclosures and actual risk to public health. By focusing solely on volume of chemicals released, the relative risk of more harmful chemicals might be underweighted. *See generally* Alexander Volokh, *The Pitfalls of the Environmental Right-To-Know*, 2002 UTAH L. REV. 805 (2002) (describing the problems with TRI's disclosure approach).

of American law."[9] Others referred to it as "revolutionary,"[10] a "watershed,"[11] and "the third wave in pollution control policy."[12] EPA administrators concurred, calling TRI "among the most important weapons in efforts to combat pollution."[13] Legal literature in the decade following TRI's implementation described how the principles of information-forcing regulation could be applied in other areas, leading to a wave of disclosure requirements in the form of new policies, reinvigorated pieces of existing regulation, and private sector standards.[14] Information forcing appeared to be the future of environmental law.

In the decades since, the language of transparency and disclosure have become endemic as positive features of environmental policy. The aura of TRI's success bolsters the assumption that similar projects should enjoy the same success. The belief in the efficacy of TRI extends far outside the environmental field, where it is used as an example of how disclosure can be successful even by those skeptical of the value of disclosure regulation.[15] Today, information-forcing regulation can be seen throughout environmental governance, with tactics that span from regulations that require mandatory disclosure of toxic chemical releases to those that dictate the development of environmental impact statements to private governance mechanisms that create sustainability certifications for consumer products.[16] Future proposals hope to increase the types and uses of information regulation throughout environmental law.[17]

But at the same time that information forcing has become an undeniable part of how we approach environmental problems, legal academics and critics have largely moved on. The initial wave of academic excitement in the early 2000s characterized disclosure regimes as the next wave of environmental law, but little has been done since to evaluate the impacts of information-forcing regulation over time and beyond TRI. Instead, TRI's successes have enshrined

9. Cass R. Sunstein, *Informational Regulation and Informational Standing: Akins and Beyond*, 147 U. PA. L. REV. 613, 613 (1999).

10. Andrew B. Schatz, *Regulating Greenhouse Gases by Mandatory Information Disclosure*, 26 VA. ENVTL. L.J. 335, 335 (2008).

11. Karkkainen, *supra* note 7, at 260.

12. Tom Tietenberg, *Disclosure Strategies for Pollution Control*, 11 ENVTL. RES. ECON. 587, 587 (1998).

13. *See* Karkkainen, *supra* note 7, at 287 n.130 (quoting *Toxics Emissions Seen Lower by EPA*, CHEM. MKTG. REP., Oct. 8, 1990, at 9).

14. This wave included new information regulation policies built to mimic TRI across the globe. *See* Karkkainen *supra* note 7, at 347–50.

15. Paula J. Dalley, *The Use and Misuse of Disclosure as a Regulatory System*, 34 FLA. ST. U. L. REV. 1089, 1126 (noting that TRI "was successful in reducing toxic releases").

16. *See infra* Part II for a description of these regulations.

17. *See generally* Daniel C. Esty & Quentin Karpilow, *Harnessing Investor Interest in Sustainability: The Next Frontier in Environmental Information Regulation*, 36 YALE J. ON REG. 625 (2019) (calling for an expansion of how information regulation can be used to motivate corporate sustainability); Sarah E. Light, *NEPA's Footprint: Information Disclosure as a Quasi-Carbon Tax on Agencies*, 87 TUL. L. REV. 511 (2013) (advocating for the use of information regulation as a carbon tax); Andrew Schatz, *Regulating Greenhouse Gases by Mandatory Information Disclosure*, 26 VA. ENVTL. L.J. 335 (2008) (proposing information regulation for greenhouse gasses).

the assumption that information regulation as a whole is effective.[18] Recent work by Professor Katrina Kuh and others has begun to show how information-forcing regulations are failing to achieve public transparency goals, but the core assumption that information disclosure regulation drives positive environmental outcomes remains under-scrutinized.[19]

Information regulation is becoming even more important in the age of big data and artificial intelligence, where the power of information to drive social outcomes is increasing dramatically.[20] Enthusiasm for transparency-based initiatives is riding high, hinging on the assumption that disclosing information can drive beneficial societal outcomes.[21] Current efforts to increase environmental disclosure focus on increasing evidence that environmental risks may be commercially material, not any evidence that disclosure is useful.[22] But the rise of big data not only heralds new potential for information; it signals an era in which the vast quantities of available data are becoming even more difficult to parse.[23] Whether increasing information availability can improve environmental conditions is not clear and depends on understanding how and when information regulation has been successful in the past.

This Article scrutinizes information regulation, drawing from examples across environmental law to show how information-forcing policies often fail to change behavior towards improving environmental conditions, to increase useful environmental information, and to achieve their stated public transparency goals. Far from helping to solve information bottlenecks, information-forcing regulation instead produces too much of the wrong kind of information. This reality is in stark contrast to the accepted wisdom that paints information-forcing

18. *See, e.g.*, Katrina Fischer Kuh, *Informational Regulation*, *the Environment*, *and the Public*, 105 MARQ. L. REV. 603, 659 (2022) ("Considerable commentary characterizes many of the information regulation approaches . . . as successful examples of the genre because they have influenced the behavior of upstream private sector and government entities in ways beneficial to the environment.").

19. *See id.* at 603 (describing the failures of information-forcing regulation from a transparency standpoint but noting that "empirical data shows that corporations required to publicly report releases under the Toxic Release Inventory (TRI) do change their conduct to reduce those releases despite being under no legal obligation to do so").

20. *See generally* Julie E. Cohen, *The Regulatory State in the Information Age*, 17 THEORETICAL INQUIRIES IN L. 371 (2016) (describing this as an era of "informational capitalism").

21. *See, e.g.*, Daniel C. Esty, *Environmental Protection in the Information Age*, 79 N.Y.U. L. REV. 115, 175–82 (2004) (arguing that better environmental information enables new regulatory strategies, from environmental property rights to command-and-control); Robert L. Glicksman, David L. Markell & Claire Monteleoni, *Technological Innovation*, *Data Analytics*, *and Environmental Enforcement*, 44 ECOLOGY L.Q. 41, 65 (2017) (discussing the benefits of information in improving compliance monitoring and enforcement); Gary D. Bass, *Big Data and Government Accountability: An Agenda for the Future*, 11 I/S: J. L. & POL. INFO. SOC. 13, 20 (2015) (noting that information is the cornerstone of government accountability).

22. Virginia Harper Ho, *Modernizing ESG Disclosure*, 2022 U. ILL. L. REV. 277, 280 (2022).

23. *See* Karen Bradshaw Schulz, *Information Flooding*, 48 IND. L.J. 755, 755 (2015) ("Consumers are under siege. A flood of information is forcing consumers to abandon rational decision-making. The very laws designed to help consumers navigate information—mandated disclosures—are causing them to become even more overwhelmed.").

policies as an economical and effective way to achieve environmental goals. This Article works to square these two extremes by developing a typology of characteristics that determine the success, or failure, of information regulation.

Part I characterizes the current landscape of information regulation in environmental law, showing how these policies occur in a much wider range of governance regimes than would be suggested by the academic focus on TRI. It discusses the history and theoretical foundations of these approaches as well as the myriad goals that information regulations seek to achieve. Existing literature does not answer the question of what mechanisms drive information regulation, noting that this remains something of a mystery.[24] However, understanding these pathways is an essential foundation to knowing when and how information regulation is successful. This Section takes an in-depth look at the mechanisms underpinning information regulation, discussing their theoretical operation and the fail-points that often arise in practice when they are implemented.

Part II uses several case studies to describe the limitations of information regulation and characterize what mechanisms may drive their success. Because the outcomes of information-forcing goals are often not coherently tracked, Part II relies on a combination of quantitative data and qualitative evidence. It evaluates several programs, including the National Environmental Policy Act (NEPA) and TRI, and finds that in general these programs have failed to meet their informational goals.

Part III draws on these case studies to evaluate the success of information regulation as a whole. It argues that beyond failing to meet its intended goals, information regulation often serves to further intensify environmental inequities by giving knowledge to small groups of sophisticated actors while providing few benefits to affected peoples and communities. These data asymmetries are exacerbated by advances in analytic tools that widen gaps between those with the ability to analyze the data and those without.

Part IV considers the implications of these findings, drawing on the identified characteristics of information-forcing regulation to propose a typology of characteristics that determine whether information-based regulation is likely to be successful. It goes on to make several concrete recommendations moving forward, including better use of the information obtained through information

24. David W. Case, *The Law and Economics of Environmental Information as Regulation*, 31 ENVTL. L. REP. 10773, 10789 (2001) ("[C]areful 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 . . . 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 . . . ."); Mark A. Cohen, *Information as a Policy Instrument in Protecting the Environment: What Have We Learned*, 31 ENVTL. L. REP. 10425, 10425 (2001) ("What is not fully understood, however, is the mechanism by which these programs induce firms to voluntarily reduce emissions beyond any legal requirement.").

forcing. Despite academic cautions that the success of one disclosure program does not guarantee the success of a new program, information disclosure has become a key feature of environmental law.[25] To be effective moving forward, information regulation must be designed with mechanistic pathways in mind.

I.
UNDERSTANDING INFORMATION REGULATION

TRI is the poster child of information regulation, but it is only one example of information and disclosure regimes at work. Different types of information-forcing laws have been an important regulatory approach for decades, both in environmental law and other areas.[26] For the most part, information regulations have evolved organically over time outside of structured policy initiatives.[27] The result is a landscape of information regulation that is highly heterogenous, consisting of laws that have varying goals and mechanisms of action. This Section details the landscape of information-forcing laws, describing the foundations of this approach to environmental regulation. It explores the theoretical underpinnings of information regulation and summarizes current theories on what mechanisms drive the success of these policies.

A. Defining Information Regulation

There is no singular definition of information regulation. Early work focused exclusively on disclosure requirements for private firms as the defining feature of this type of regulation.[28] More recent definitions are broader, for instance calling information regulation anything that "generate[s] and strategically deploy[s] information to support environmental regulation."[29] Despite definitional heterogeneity, information-forcing regulations are, at their core, laws that require the disclosure of information for its own sake without tying this information to any regulatory burden or action. While some have defined information regulation even more broadly as "any regulation which

25. *See* Cohen, *supra* note 24, at 10425 (describing the landscape of information regulation).

26. *See, e.g.*, William F. Pedersen, *Regulation and Information Disclosure: Parallel Universes and Beyond*, 25 HARV. ENVTL. L. REV. 151 (2001) (describing the use of disclosure in environmental law, beginning with the Toxics Release Inventory in the 1980s); David E. Pozen, *Transparency's Ideological Drift*, 128 YALE L.J. 100 (2018) (tracing the evolution of transparency laws, including public records and consumer protection disclosure, beginning in the mid-1960s); William M. Sage, *Regulating through Information: Disclosure Laws and American Health Care*, 99 COLUM. L. REV. 1701 (1999) (detailing the use of disclosure in health care laws); Sunstein, *supra* note 9 (discussing broadly the use of disclosure in areas ranging from FOIA to election law).

27. Cohen, *supra* note 24, at 10431 ("[E]nvironmental information mechanisms in the United States were not formed as part of a well-designed system of integrated programs. Instead, they have largely evolved in isolation of traditional environmental regulatory policy and developments in the law.").

28. *Id.* at 10774 ("regulation through mandatory disclosure of information"); Sunstein, *supra* note 9, at 613 ("regulation through disclosure").

29. Kuh, *supra* note 18, at 604.

provides to third parties information on company operation," these definitions end up including nearly all environmental laws and overlook key features of information regulation as a distinct category.[30]

Historically, information regulation disclosure by private entities (e.g. TRI) and by government agencies (e.g. the Freedom of Information Act (FOIA)) were both considered types of information-forcing regulation.[31] In the years since, transparency laws, or laws that require information disclosure by the government, have become the subject of their own robust field of study looking at how these laws can give the public an opportunity to monitor government agencies and hold them accountable for perceived wrongs.[32] These laws are often differentiated from other types of information regulation.

In this Article, I consider information regulation to include both transparency laws and other types of information-forcing laws that share the goal of altering environmental outcomes. I do not include purely process-based transparency laws in this category, for instance sunshine laws or FOIA, which have no explicit goal of changing environmental behavior. Transparency laws and information-forcing laws share several fundamental features that merit thinking about them as a unified category of regulation.

I therefore define information-forcing regulation as regulation that mandates the generation and disclosure of information by public or private entities but does not impose any additional regulatory burdens that depend on the substance of these disclosures. For instance, information that is required for the submission and approval of a permit is not considered information-forcing regulation because the information is being used in the service of a clear regulatory determination. On the other hand, if firms are required to submit information solely so that information can be made available to the public, this would be considered information-forcing regulation. No regulatory consequences or determinations are predicated on the information that firms provide. Instead, information-forcing laws seek information for its own sake. This Article asks whether information-forcing laws are an effective regulatory approach in the environmental context. It therefore focuses primarily on public information regulation, but in several instances it also considers private governance mechanisms where they interface with regulation.

B. History of Information-Forcing Regulation

Information forcing as a feature of American law dates back to early common-law disclosure requirements, but it came into its own with the New

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

31. *See* Sunstein, *supra* note 9, at 614.

32. For instance, through FOIA. *See, e.g.*, Christina Koningisor, *Public Undersight*, 106 MINN. L. REV. 2221, 2225 (2022).

Deal rise of administrative agencies.[33] The Securities and Exchange Commission (SEC) pioneered the adoption of this regulatory strategy in the 1930s.[34] In the decades since, information forcing has gone through a number of resurgences, namely in the 1970s, late 1990s, and again today with the rise of big data and machine learning analytics.[35]

While information regulation began earlier, it first came to prominence in environmental law in the 1970s when the rights revolution brought the ideal of information regulation to environmental governance.[36] This trend was not just taking place in the environment; information regulation became a popular tool throughout federal agencies in disparate areas of law over the same time period.[37] The Federal Department of Agriculture (FDA) and Occupation Safety and Health Administration (OSHA), for instance, both developed robust disclosure-based regimes oriented at increasing consumer awareness of health risks.[38] This was followed by additional disclosure-oriented policies adopted during the Reagan Administration in the 1980s.[39]

The adoption of disclosure-based regulations was facilitated by their bipartisan appeal, which remains one of the major benefits of information regulation today.[40] In general, the disclosure requirements enacted by the SEC and other agencies in its wake are focused on remedying information asymmetries that have caused market failures. Because of the lack of regulatory burdens tied to these disclosures, information is a relatively palatable form of regulation across the board.

By the 1990s, the success of TRI, combined with the technological innovation of the dot com era, engendered renewed interest in information-forcing regulation in environmental law. Internet communications and better monitoring technologies enabled environmental information to be easily obtained, shared, and analyzed for the first time.[41] These new technological

33. Sunstein, *supra* note 9, at 618.

34. Case, *supra* note 24, at 10774.

35. *Id.* at 10774–75.

36. *See* Gary D. Bass & Alair MacLean, *Enhancing the Public's Right-to-Know about Environmental Issues*, 4 VILL. ENVTL. L.J. 287 (1993) (describing the right to know movement); *see also* Bradley C. Karkkainen, *Bottlenecks and Baselines: Tackling Information Deficits in Environmental Regulation*, 86 TEX. L. REV. 1409, 1409–11 (2007) (describing the National Environmental Policy Act [NEPA] and its pitfalls).

37. Sunstein, *supra* note 9, at 619–20.

38. *Id.*

39. Dalley, *supra* note 15, at 1092 (describing the Reagan Administration's disclosure efforts as "as part of a trend to inform and educate rather than regulate").

40. *Dalley*, *supra* note 15, at 1092–93 (discussing reasons for the political popularity of disclosure, including that "[d]isclosure is a 'soft' form of intervention" and that it is "easier to require disclosure than to regulate substantively"); MARY GRAHAM, DEMOCRACY BY DISCLOSURE: THE RISE OF TECHNOPOPULISM 11 (2002) ("[R]evealing information to the public . . . combined the ideas of corporate transparency and public participation often favored by Democrats with the lower cost, less intrusive, market-oriented approaches typically championed by Republicans.").

41. Karkkainen, *supra* note 7, at 261 (noting that "TRI may be regarded as the first regulatory instrument to exploit the revolutionary potential of contemporary information technology to store,

capabilities, in combination with TRI's success, led academics and others to call for the expansion of information regulation to all areas of environmental law, from climate change to pollution control.[42] Professor John Felleman characterized this transition as one "from the negative 'need to know' of the original Administrative Procedure Act (APA), to the neutral 'right to know' of the FOIA, to the proactive open systems of electronic dissemination."[43]

Now, two decades later, there has been another resurgence of interest in forms of information regulation.[44] Advances in data collection, storage, and analysis technologies are fueling a new era of transparency policies and regulation.[45] Agencies are increasingly focusing on improving digital data accessibility and availability for the public.[46] While these innovations are influencing all aspects of society, the impacts on environmental management have unique elements. The movement towards opening data, increasing transparency in supply chains, and improving public participation in environmental decision-making is driven by the ethos of information regulation: that disclosing environmental information can improve environmental outcomes.[47] This resurgence raises the question whether the focus on digital, open data to the public is achieving its goals.[48] The SEC's requirement that firms disclose climate-based risks is the most recent example in a wave of new information-forcing regulation. As part of the broader moves towards transparency in both the public and private sectors, information is increasingly seen as a solution in and of itself.

Much has been written about the SEC's disclosure-based approach to regulation. While environmental disclosure is meaningfully different than securities regulation, this literature provides the foundation for understanding the theory underpinning disclosure as a method of regulation. The SEC is the biggest

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manipulate, and disseminate large volumes of performance information efficiently, quickly, and cheaply"); Esty, *supra* note 21, at 156–60 (describing how the technological advances of the 1990s impacted environmental law).

42. Schatz, *supra* note 17, at 347–61.

43. JOHN FELLEMAN, DEEP INFORMATION: THE ROLE OF INFORMATION POLICY IN ENVIRONMENTAL SUSTAINABILITY 1, 4 (1976) (noting further that "[e]nvironmental information has been in the forefront of this latest transition transformation to open information").

44. *See e.g.*, Cohen, *supra* note 20, at 370 (arguing that we are in the midst of a fundamental "shift from an industrial mode of development to an informational one" which requires further consideration of the role of information in regulation).

45. *See, e.g.*, Bass, *supra* note 21, at 17–20.

46. FELLEMAN, *supra* note 43, at 5 ("A central thrust of public environmental information policy of the past two decades has been to increase the transfer of existing hard-copy tabular and mapped data to digital form, and to open this information to a broad set of internal and external end-users. This focus has governmental efficiency and accountability as its primary objectives.").

47. *See, e.g.*, Gregg P. Macey, *The Architecture of Ignorance*, 6 UTAH L. REV. 1627, 1632–37 (2013); Esty, *supra* note 21, at 197–207; William Boyd, *Environmental Law*, *Big Data*, *and the Torrent of Singularities*, UCLA L. REV. DISC. 544, 551–53 (2016); Glicksman et al., *supra* note 21, at 45–48.

48. *See, e.g.*, Ronan Kennedy, *Rethinking Reflexive Law for the Information Age: Hybrid and Flexible Regulation by Disclosure*, 7 GEO. WASH. J. ENERGY & ENVTL. L. 124, 131 (2016); Cohen, *supra* note 20, at 383–86.

disclosure success story, but it is one that has been increasingly questioned by scholars in recent years.[49] These criticisms provide important lessons for environmental disclosure, but more importantly they call into question the theoretical foundation it rests on. If disclosure does not always achieve its purpose, even in the highly controlled world of SEC materiality, it is even more unlikely that it will succeed in the heterogenous and complex world of environmental regulation.[50]

Outside the SEC, one of the largest bodies of disclosure regulation is aimed at the public sector. Transparency requirements are built into government bodies at both the state and federal levels.[51] These public sector disclosure regulations have been criticized on a number of grounds, but the underlying rationale that the public should have some degree of oversight over government actions remains persuasive.[52] The resulting public oversight laws require government bodies to share information on their decision-making with the public, and they are a central feature of government operation at both the state and federal levels.[53] The emphasis in these laws is generally on promoting accountability, trust, and rationality in government.[54] Most do not include substantive goals like improving environmental outcomes. Public transparency laws have been criticized on multiple grounds, including the difficulty of public access to disclosed information.[55]

C. Theoretical Foundations of Environmental Information-Forcing Regulation

According to its proponents, information-forcing regulation is a potentially effective and economically efficient tool to improve environmental outcomes outside of traditional command-and-control avenues.[56] By requiring information

49. *See, e.g.*, Dalley, *supra* note 15, at 1113–19 (2007) (discussing the limitations of disclosure-based regulation); OMRI BEN-SHAHAR & CARL E. SCHNEIDER, MORE THAN YOU WANTED TO KNOW: THE FAILURE OF MANDATED DISCLOSURE (2014) (arguing broadly that disclosure regulations rarely work to achieve their stated aims); Amanda Rose, *A Response to Calls for SEC-Mandated ESG Disclosure*, 98 WASH. U. L. REV. 1821 (2021) (describing the pitfalls of SEC ESG disclosure).

50. Dalley, *supra* note 15, at 1091 (noting about the relative success of SEC disclosures that "[i]t is at least doubtful whether disclosure could accomplish similar goals in different circumstances, and there is no reason at all to assume that disclosure could accomplish different goals in different circumstances").

51. *See generally* Pozen, *supra* note 26; Cary Coglianese, Heather Kilmartin & Evan Mendelson, *Transparency and Public Participation in the Federal Rulemaking Process: Recommendations for the New Administration*, 77 G.W. L. REV. 924 (2009).

52. *See, e.g.*, Koningisor, *supra* note 32, at 2225 (listing some of the critiques of public disclosure laws).

53. *Id*. at 2232–37 (listing types of public transparency laws).

54. *See generally* David E. Pozen, *Transparency's Ideological Drift*, 128 YALE L.J. 100 (2018) (describing different rationales behind public transparency laws).

55. Koningisor, *supra* note 32, at 2238–46 (discussing major criticisms of public oversight laws).

56. *See generally* Karkkainen, *supra* note 2; Karkkainen, *supra* note 7; Konar & Cohen, *supra* note 5; William F. Pedersen, *Regulation and Information Disclosure: Parallel Universes and Beyond*,

disclosure, these regulations can help to solve information asymmetries that lead to nonoptimal Coasean outcomes.[57] The public theoretically can, if armed with detailed information obtained from required disclosures, better account for the full range of both use and non-use values that may be impacted by pollution or other environmental harms.[58] Sharing information provides important avenues of action to individual actors across the board. Consumers can make more informed purchasing decisions. Investors can choose to invest in more environmentally responsible companies. Employees can choose to work for companies with strong environmental records. Impacted parties can pursue judicial or legislative avenues to try to recoup damages and reduce future environmental harms. Avenues like citizen suits, for instance, provide mechanisms for private actors to enforce environmental laws, but only when citizens have the appropriate information to understand the causes of pollution and targets of litigation.[59] Disclosure programs can also facilitate new methods of information exchange and improve cooperation between industry entities and the EPA.[60]

Environmental disclosure rests on the same theoretical foundations as securities and other types of disclosure. At their core, these disclosure regimes operate on the principle that remedying information asymmetries by providing additional information will create more efficient outcomes.[61] However, environmental disclosure is in many ways different than disclosure mandated by the SEC and others. In the words of Professor Paula Dalley, SEC disclosure works because "it operates in a singular environment: a highly developed, relatively efficient market with an enormous support structure of both market and informational intermediaries, in a context in which decision-makers often seek professional advice and make great efforts to be as rational as possible."[62]

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25 HARV. ENVTL. L. REV. 151 (2001); Tietenberg, *supra* note 12; Thomas C. Beierle, *The Benefits and Costs of Disclosing Information about Risks: What Do We Know about Right-to-Know?*, 24 RISK ANALYSIS 335 (2004).

57. The Coase theorem argues that in the absence of high transaction costs, markets will come to optimal pollution control solutions even absent legal mandates. Information regulation can reduce transaction costs by providing additional information to all parties. Tietenberg, *supra* note 12, at 588–89.

58. *See* Kuh, *supra* note 18, at 610–12 (describing the theoretical benefits of information regulation for the public).

59. *See*, *e.g.*, David E. Adelman & Robert L. Glicksman, *Reevaluating Environmental Citizen Suits in Theory and Practice*, 91 U. COLO. L. REV. 385, 394–95 (2020); Eric Biber & Berry Brosi, *Officious Intermeddlers or Citizen Experts? Petitions and Public Production of Information in Environmental Law*, 58 UCLA L. REV. 321, 325 (2010); Barton H. Thompson Jr., *The Continuing Innovations of Citizen Enforcement*, 2000 U. ILL. L. REV. 185, 216–17 (2000).

60. *See* Cohen, *supra* note 24, at 10426–27.

61. This is based on the Coasean idea that markets will create efficient solutions to pollution problems in the absence of high transaction costs or information asymmetries. *See* H.E. Frech, *Pricing of Pollution: The Coase Theorem in the Long Run*, 4 BELL J. ECON. & MGMT. SCI. 316, 316–17 (discussing the general application of the Coase theorem in environmental law); Dalley, *supra* note 15, at 1094–96 (describing how disclosure can reduce information asymmetries).

62. Dalley, *supra* note 15, at 1090–91.

This structured market allows for a clear mechanistic link between information and changes in behavior.[63] Environmental disclosure, on the other hand, is a much less tightly linked field. Instead of information being transmitted through established pathways to actors actively seeking this information and reflected in real-time adjustments to stock prices, environmental information operates over much more diffuse pathways, often targeting not relatively rational investors but the public at large. Whereas the institutional investors that form the primary audience for SEC disclosures actively seek information that will allow them to make more advantageous investments, very few members of the public are similarly motivated to, for instance, search out information on local toxics facilities in their area. And even if they are, the resulting environmental data requires significant translation and analysis before it can convey useful signals on environmental risks. Even environmental information with seemingly high public salience and visibility, like Proposition 65's prevalent warnings on cancer-causing chemicals in California, are often ignored.[64]

Information regulation has evolved organically, largely outside of coherent policy initiatives, leading some to call it a "blunt and unfocused instrument."[65] The attractiveness of information forcing has not been in the rational evidence presented of its success as a tool but instead in the inherent logic in its approach to environmental governance. This logic is persuasive to policymakers and academics because it draws on foundational principles of democratic governance and administrative action. This Section details the goals and methods of information forcing, describing the theoretical underpinnings of this approach.

1. Goals of Information Regulation

Information regulation has multiple goals, ranging from changing behavior to improve environmental outcomes to providing the environmental information necessary to promoting transparent and democratic outcomes. Underlying these objectives is the implicit recognition that the most attractive elements of information regulation as an approach include its low cost and relative palatability to industry. TRI, for example, has very low compliance costs for regulated firms and very low administrative costs for the EPA.[66] Most information regulations seek to fulfill these implicit goals in addition to their explicit articulated goals.

63. *Id.* (noting that "[t]his environment provides a mechanism by which disclosed information can reach its audience, affect behavior, and cause a desired result through its operation on a single variable, the price of a security").

64. Katrina Fischer Kuh, *Informational Regulation*, *the Environment*, *and the Public*, 105 MARQ. L. REV. 603, 627–28 (2022).

65. Case, *supra* note 24, at 10789.

66. Karkkainen, *supra* note 7, at 291–94.

a. Catalyzing Behavior Change

The primary goal of information-forcing regulation is to decrease environmentally costly behavior by capitalizing on information disclosure as a catalyst for social pressure and for new companies to make more environmentally friendly decisions without strict, top-down regulation. This can happen either by triggering new regulation based on disclosed information or by promoting voluntary private sector action to reduce negative externalities.[67] Behavior change can be either internally or externally motivated. Improving firms' self-monitoring is an important feature of information regulation, with regulatorily mandated tracking potentially motivating behavior change when industry recognizes the extent of their environmental impacts.[68] Some go so far as to argue that information regulation is a form of reflexive environmental law that encourages firms to self-regulate by shifting overall norms.[69] Most firms seem to view information regulation in a relatively positive light, which supports this theory.[70] External motivations for behavior change include pressure from peers, government oversight, and public scrutiny.[71]

The targets of behavior change vary depending on the specific information-forcing regulations in question. In some cases, information-forcing regulations are designed in such a way that the entity being forced to disclose information is also the entity whose behavior regulators are trying to alter. In the case of TRI, for instance, firms are required to disclose information on toxics releases with the hope that being forced to do so will encourage firms to emit fewer toxics.[72] Some information-forcing laws instead target consumer behavior. In these cases, information from companies or third parties is communicated to the public in ways that regulators hope will alter their behavior. Labeling policies, like Proposition 65, are key examples of these types of information-forcing regimes.

b. Increasing Environmental Information

Beyond behavior change, one of the most important goals of information-forcing regulation is to generate additional environmental information. This goal is perceived as particularly important given the widespread gaps in available

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67. *See* William F. Pedersen, *Regulation and Information Disclosure: Parallel Universes and Beyond*, 25 HARV. ENVTL. L. REV. 151, 160–61 (2001).

68. *See* Karkkainen, *supra* note 7, at 294–39505 (explaining how self-monitoring in the context of TRI forces firms to "to 'confront disagreeable realities' concerning their environmental performance").

69. *See* Eric W. Orts, *A Reflexive Model of Environmental Regulation*, 5 BUS. ETHICS Q 779, 779–81 (1995); Richard B. Stewart, *A New Generation of Environmental Regulation*, 29 CAP. U. L. REV. 21, 127–29 (2001).

70. *See, e.g.,* Karkkainen, *supra* note 7, at 287 n.131 (describing industry's positive views of TRI).

71. *See id.* at 261–62.

72. Though firms' motivations for releasing fewer toxics are unclear. It could be that firms are choosing to release fewer toxics to avoid the burden of TRI reporting, or it could be that fear of public backlash leads them to reduce emissions.

environmental data. Those gaps undermine attempts to create timely, effective environmental policy.[73] Environmental regulations have long suffered from a lack of accurate information, both on baseline environmental conditions and in ongoing monitoring and enforcement of human activities. Increasing the information base is an essential piece of creating effective regulation in the first place, ensuring that environmental laws are followed, and determining whether existing regulatory approaches are working or need to be improved.[74] Managers and academics alike recognize the importance of improving environmental information availability; however, practical constraints, like the cost of collecting environmental data on wide temporal and spatial scales, undermine data collection goals.[75]

In theory, information-forcing regulation can begin to fill these gaps by mandating that firms disclose data that would otherwise not be available to regulators. In the best-case scenario, the information provided through information forcing can directly feed into environmental decision-making, decreasing information bottlenecks and increasing the efficiency of regulatory interventions.[76] While regulation often hinders innovation, information-forcing regulation may help to foster innovation by providing needed information to support scientific research and advance environmental goals.[77] Some have gone so far as to argue that all environmental regulation should include incentives or requirements for private parties to produce and disclose environmental data to the government and the public.[78]

c. Promoting Public Transparency

Information-forcing regulation often has a core aim of promoting public transparency. This is distinct, but related, to purely information-based goals. Transparency goals tout the importance of providing environmental information to the public not only for the ways in which the public might use this information or alter their behavior, but also for the importance of transparency itself in promoting democratic administration.[79] While increasing the amount of environmental information is essential for improving the basis for environmental

73. *See, e.g.*, Eric Biber, *The Problem of Environmental Monitoring*, 83 U. COLO. L. REV. 1 (2011); Karkkainen, *supra* note 7, at 283 (noting that "the availability of information is a critical constraint on the shape, extent, 'fit,' and effectiveness of environmental regulation").

74. For discussions of the importance of environmental information for regulation, see generally Karkkainen, *supra* note 2; Eric Biber, *supra* note 73.

75. *See* Karkkainen, *supra* note 7, at 283–86.

76. *See generally* Karkkainen, *supra* note 2 (describing how increased environmental information, for instance through regulations like NEPA and TRI, can reduce information barriers and improve environmental regulation outcomes).

77. *See* Kleindorfer & Orts, *supra* note 30, at 167.

78. Karkkainen, *supra* note 2, at 83.

79. Sunstein, *supra* note 9, at 625 ("[I]nformational regulation also has substantial advantages. A well-functioning system of deliberative democracy requires a certain degree of information, so that citizens can engage in their monitoring and deliberative tasks.").

management and decision-making, transparency aims extend beyond this and provide an important element of perceived legitimacy on the part of the public.[80]

However, in recent years, scholars have begun to question the importance of increased transparency to the administrative state as a whole.[81] While some level of transparency is important, increasing transparency beyond certain thresholds can undermine agency proceedings and ultimately decrease legitimacy.[82]

Information-forcing regulation in the environmental sector implicates transparency considerations broader than just those articulated in administrative law discourse. Many view information regulation as a subset of environmental right-to-know laws. While the contours of the right to know as a legally established right remain unclear, some argue that the right to know is grounded in the fundamental rights of freedom of expression, liberty, self-government, and health and safety.[83] These foundations in fundamental rights potentially strengthen the state duty to report on environmental conditions enshrined in information regulation. Recent international recognition of the right to a healthy environment may be further justification for an environmental right to know.

The importance of information regulation as an accountability mechanism has been ingrained in these policies from the beginning. Local community organizers were some of the first to push for the disclosure of environmental information and the "right to know" that led to the passage of ECPRA and the development of TRI, even when mainstream environmental managers and advocates were skeptical of their potential.[84]

2. Mechanisms of Information Regulation

Despite the enthusiasm for information regulation, the mechanisms through which it works, or intends to work, are unclear. Even in the most studied example of TRI, economists and others are quick to point out that the mechanisms for any reported behavior changes are undetermined.[85] Instead, academics have

80. Kleindorfer & Orts, *supra* note 30, at 167–68 (noting transparency alongside other values as important to the authors' conception of "perceived legitimacy").

81. *See generally* Pozen, *supra* note 26.

82. *See id*. at 100 (noting that "[a]s public institutions became subject to more and more policies of openness and accountability, demands for transparency became more and more threatening to the functioning and legitimacy of those institutions").

83. *See* Shannon M. Roesler, *The Nature of the Environmental Right to Know*, 39 ECOLOGY L.Q. 989, 1000–28 (2012).

84. *See* Karkkainen, *supra* note 7, at 319–23 ("TRI owes its very existence to community-based 'informal regulation' of toxic polluters.").

85. Kathryn E. Durham-Hammer, *Left to Wonder: Reevaluating, Reforming, and Implementing the Emergency Planning and Community Right-to-Know Act of 1986*, 29 COLUM. J. ENVTL. L. 323, 348 (2004) ("Underlying EPCRA's reporting requirements is the assumption that companies will change their use and release of hazardous waste because they are ashamed of being flagrant polluters in comparison to their competitors. However, this assumption is not based on convincing empirical evidence. In fact, though touted as one of EPCRA's important mechanisms for reducing pollution,151 it is pure speculation."); Cohen, *supra* note 24, at 10425 ("What is not fully understood, however, is the

hypothesized several different mechanisms through which information regulation may work, but they have ultimately shied away from identifying causal mechanisms in depth.[86] Understanding these mechanisms in further depth is essential to characterizing when, and how, information-forcing mechanisms will be successful.[87] This Section draws from the legal literature to provide further insight into the mechanistic underpinnings of information forcing, illustrating both the theoretical pathways that drive information forcing as well as the potential fail-points for each of these pathways.

a. Persuasive Mechanisms

Environmental policy instruments are often grouped into what some have called the "five P's": prescriptive regulation, property rights, penalties, payments, and persuasion.[88] Each of these approaches uses different regulatory tools to achieve environmental outcomes. Of these, information-forcing mechanisms most clearly fall into the category of persuasive instruments. By their nature, information-forcing regulations are intended to force the disclosure of information that may lead to changes in internal norms or external perceptions. Persuading the public that certain companies are irresponsible can, in theory, drive changes in consumer attitudes and behavior that in turn incentivize companies to modify their operations. Likewise, new information can, in theory, reveal undesirable company practices that drive adjustments in firm processes from the inside. Despite theoretical support for these persuasive mechanisms, persuasion often fails to drive meaningful behavior change in practice.

External changes to public perception are often cited as one of the main mechanistic drivers behind disclosure regulation. Many assume disclosure requirements like TRI will work because firms fear the reaction of the public to negative information about them, an assumption that is often supported by little more than an intuitive notion of reputational risk.[89] Katrina Kuh has categorized the persuasive elements of information regulation into three major categories: (1) public as audience, or regulations designed to better inform individuals of environmental consequences, (2) public as catalyst, or regulations designed to persuade companies or governments to change their behaviors to avoid public

mechanism by which these programs induce firms to voluntarily reduce emissions beyond any legal requirement.").

86. *See* Case, *supra* note 24, at 10789; Cohen, *supra* note 24, at 10425–26.

87. Others have recognized the importance of this, though little work has been done to understand these mechanisms in the intervening years. Cohen, *supra* note 24, at 10426 ("[W]e cannot assume the success of one program is transferable to another program unless we understand the mechanism by which the first program succeeded.").

88. James Salzman, *Teaching Policy Instrument Choice in Environmental Law: The Five P's*, 23 DUKE ENVTL. L. & POL'Y F. 363, 364 (2013).

89. Durham-Hammer, *supra* note 85, at 345.

backlash, and (3) public as target, or regulations designed to change the behaviors of members of the public.[90]

This narrative is heavily driven by a Coasean rationale: information regimes work by revealing missing information and allowing the market to correct based on a more complete picture of the environmental consequences of certain actions.[91] Disclosing environmental information helps to highlight the environmental externalities created by industrial activities, creating opportunities for the public to understand the true cost of production.[92] Armed with this information, consumers can choose not to purchase products where the environmental costs are particularly high.[90] When companies lose customers, they will adapt by improving environmental practices. The public in this account, then, is working to force companies to internalize environmental externalities, which is the end goal of many environmental regulations. This law-and-economics reasoning has widespread appeal and has often been cited in support of information-forcing policies outside of environmental law.[93] This reasoning is supported by some evidence that in specific, highly publicized cases, information can drive changes in public opinion.

According to theoretical accounts, disclosure regimes also achieve their persuasive outcomes by improving the bargaining power of the public. Information-forcing regulations give communities information that may allow them to better negotiate with corporate actors.[94] Information disclosed as a part of information-forcing regimes can help communities to identify the most problematic environmental polluters and improve their negotiating position with these entities. This new leverage is an essential tool in motivating change on a more local, extralegal scale.

Additionally, information regulation can achieve its persuasive goals through improved internal accountability. Some point to improved benchmarking and monitoring as key features driving information regulation's success.[95] Creating a system that allows for cheap and easy collection, dissemination, and tracking of information over time creates new opportunities for firms to monitor their own performance and that of their peers.[96] At its best,

90. Kuh, *supra* note 18, at 610–12.

91. *See* Kleindorfer & Orts, *supra* note 30, at 160–61.

92. *See* Tietenberg, *supra* note 12, at 591–92 (describing how "consumers may choose less environmentally harmful products when effective information makes the choices clear").

93. *See generally* Sage, *supra* note 26 (discussing information-forcing policies in the healthcare system).

94. *See* Durham-Hammer, *supra* note 85, at 345 ("Citizens living in those hot spots can potentially deploy a variety of costly, disruptive, and, therefore, frequently effective countermeasures, including boycotts and pickets, social ostracism of the firm's employees and managers, adverse publicity, lawsuits or the threat of lawsuits, and political pressure on regulators and elected officials to enforce existing regulatory standards, enact new requirements, or exercise discretionary governmental authority against the offending firm."); Cohen, *supra* note 24, at 10426.

95. *See* Karkkainen, *supra* note 7, at 296–305.

96. *See id.* at 305–09.

this system can not only facilitate but incentivize firms to continuously improve their environmental performance over time. This line of thinking stems from the overall recognition that lack of environmental information is a major impediment to effective regulation.[97] Improved information availability fosters industry self-monitoring, peer monitoring between firms in the same industry, and monitoring by agencies, nongovernmental organizations (NGOs), and members of the public. Implementing better methods of monitoring environmental performance may cause firms to confront uncomfortable realities and improve their processes as a result.[98] The impacts of better internal accountability can be seen not just at the individual firm level but throughout entire supply chains as well. Claudia Polsky and Megan Schwarzman show that better information on toxic chemical prevalence spurred by Proposition 65 has led to dramatic changes in the decisions of many private sector actors.[99]

Information forcing can, in theory, work by shaming companies with poor environmental track records. This kind of shaming and moral valence is a cornerstone of many laws, particularly in the criminal justice system, though it has also been an important feature of environmental law. In the age of B-Corps and other socially responsible companies, these moral drivers may have more importance. There has been a dramatic rise in firms holding, or espousing to hold, sustainability goals that go beyond simple profit maximization.[100] For these firms, the revelation that their practices have negative environmental impacts might be sufficient to drive internal behavior changes.

While theory supports the powerful role of shaming and public persuasion, to date there is little data supporting the existence of a reputational effect.[101] Persuasion as a driving mechanism behind behavior change induced by information forcing has two primary pitfalls. The first is that increased information is rarely the basis for durable changes in public perception. The second is that even when internal or external opinions of company sustainability do change, these viewpoint shifts are unlikely to drive changes in behavior.

97. *See* Biber, *supra* note 73, at 4–6; Esty, *supra* note 21, at 117–18; Adam Babich, *The Unfulfilled Promise of Effective Air Quality and Emissions Monitoring*, 7 GEO. ENVTL. L REV. 569, 575 (2018).

98. *See* Karkkainen, *supra* note 7, at 295–305 (describing the impact of TRI self-monitoring on firm behavior).

99. Claudia Polsky & Megan Schwarzman, *The Hidden Success of a Conspicuous Law: Proposition 65 and the Reduction of Toxic Chemical Exposures*, 47 ECOLOGY L.Q. 823, 827–28 (2021) (describing Prop 65's "role in forcing supply chain, marketplace, and design-sector communication about listed chemicals that ultimately reduces their use").

100. Lucy Perez, *Does ESG Really Matter-and Why?*, MCKINSEY (Aug. 10, 2022), https://www.mckinsey.com/capabilities/sustainability/our-insights/does-esg-really-matter-and-why [https://perma.cc/2KQT-VMPV] (describing the rise in the number of firms publishing ESG reports, the growth in sustainable investing from $5 billion in 2018 to over $70 billion in 2021, and noting that consideration of ESG factors has become essential to maintaining a firm's social license).

101. For a further discussion of this, see Part II.A; Cohen, *supra* note 24, at 10426.

Under the standard rational model, information that companies disclose about their environmental performance should directly impact public opinion about how environmentally conscious that company is. However, this relationship is much more difficult in practice. As irrational actors, humans do not always factor new information into their viewpoints in the ways that economists, or regulators, might expect.[102] Studies of climate change drive this point home: new and more accurate information about climate impacts or the role of certain companies in contributing to warming events have little to no effect on pre-existing opinions.

When external and internal perceptions of firm behavior do change, these opinion changes are only mechanistically effective if they drive changes in consumer or employee behavior. While the environmental movement continues to assume that the pathway from changes in opinion to changes in behavior is a linear one, in practice that is often not the case. Repeated examples have shown that the positive environmental attributes of a product may matter less to consumers than other more salient qualities, like price.[103] Furthermore, persuasive mechanisms based on some moral beliefs from firms require that firms hold environmentally oriented values and that on some level they are capable of being shamed if they do not abide by these values.

Information forcing, moreover, relies on the premise that the information disclosed by companies under information mandates is accurate. In practice, the information obtained through disclosure requirements is neither accurate nor complete, a major fail-point for information-forcing regimes.[104] Information that is incomplete or inaccurate may be persuasive but in the wrong ways.

Understanding information forcing solely as a persuasion mechanism fails to adequately account for how and why information-forcing policies are passed and implemented. For instance, if the goal of information forcing is to persuade the public, one would expect to see regulators devoting considerable attention to ensuring that mechanisms are in place to bring disclosed information to the attention of the public. In reality, the opposite is often the case. Information-forcing policies have largely failed to include meaningful communication and transparency mechanisms, raising the question of just how much information forcing hinges on persuasion as a theory of change.[105]

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102. Dalley, *supra* note 15, at 1114–18 (giving an overview of the cognitive biases that shape how individuals and firms view information).

103. *See, e.g.*, Natalia Maehle, Nina Iversen, Leif Hem & Cele Otnes, *Exploring consumer preferences for hedonic and utilitarian food attributes*, 117 BRITISH FOOD J. 3039, 3051 (2015) (finding that price is more important than environmental characteristics to most consumers, except for highly pro-environment consumers).

104. *See* Tietenberg, *supra* note 12, at 590–91.

105. *See generally* Kuh, *supra* note 18 (describing the myriad failures of information-forcing regulation to promote public transparency).

b. Economic Mechanisms

Economic mechanisms, beyond those imposed by consumer choices, are perceived to be important drivers behind the success of information disclosure.[106] These economic mechanisms are based on the role of information in impacting the market value of firms.[107] The classic account holds that information disclosure can affect stock prices by revealing additional costs that firms may be required to bear, such as new pollution-control technologies to mitigate emissions.[108] Information can also illuminate issues in management that may depress the perceived value of the company. [109] Stock prices may also be affected by changes in public opinion, for instance when sustainably conscious consumers choose not to buy products from companies they view as environmentally irresponsible.[110] These economic impacts of information forcing are the easiest to measure, and, as a result, most academic studies focus on how information disclosure impacts the economic value of companies.[111]

The economic impacts of information disclosure can stem from persuasion and from the property-rights and penalty approaches to environmental regulation. Information forcing can be thought of as a penalty. In the case of TRI, for instance, firms that release toxics are forced to disclose this information, creating what is effectively a procedural penalty.[112] This information seems to have some financial impacts, with initial studies showing decreases in stock prices of firms that disclosed toxic releases.[113] Why this is taking place is unclear, but the financial costs certainly act as a form of penalty on polluting firms. Likewise, some have likened NEPA's burdensome information-disclosure requirements to a tax, arguing that the resources needed to comply with NEPA effectively create a tax on certain environmentally costly behavior.[114]

106. *See* Cohen, *supra* note 24, at 10425–26.

107. This is notably distinct from the economic fines, for instance, that make up a cornerstone of command-and-control regulatory approaches. While information regulation may have direct economic impacts on firms through either market price reductions or legal costs, the economic mechanisms seen to drive information regulation are the reactions of markets and firms to new information.

108. *See* Cohen, *supra* note 24, at 10425–26.

109. *See id.*

110. This overlaps then with persuasive mechanisms, discussed above in Part I.C.2.a.

111. *See*, *e.g.*, Konar & Cohen, *supra* note 5, at 109 (studying firm behavior in relation to TRI disclosures and concluding that "firms with the largest stock price decline on the day this information became public subsequently reduced emissions more than their industry peers").

112. While in the case of TRI this procedural burden may be relatively small, in other contexts, like NEPA, avoiding the procedural hurdle of complying with information disclosure requirements is a major driver behind agency decision-making. Bradley C. Karkkainen, *Toward a Smarter NEPA: Monitoring and Managing Government's Environmental Performance*, 102 COLUM. L. REV. 903, 920 (2002) ("The perverse consequence of NEPA's seemingly insatiable demand for information, then, is to create powerful incentives for agencies to structure and characterize their activities so as to avoid the full NEPA mandated EIS inquiry.").

113. *See* Konar & Cohen, *supra* note 5, at 110.

114. *See* Light, *supra* note 17, at 513–19.

Information forcing can also be thought of in some sense as a property-rights approach to regulation. Property-rights mechanisms are used in environmental law to privatize common pool resources, with the hope that private owners will have a stronger incentive to manage the resources sustainably over time. Property-rights approaches can also be used to impose limits on what owners can do with their property, a core tenet of local governments' use of zoning regulation as a mechanism of regulating environmental outcomes. Information forcing manifests a property-rights approach in a slightly different way. By forcing firms to give over data, the government is arguably forcing firms to give over part of their property.[115] Dictating what firms can do with their information that has environmental impacts, like requiring that they share it with the public, shares some theoretical similarities with local governance approaches to regulating land use.

Economic mechanisms work if the costs created by information regulation are high enough to induce firms to change their behavior. In the case of information regulation, these costs are reflected in changes to stock price. These changes can be due to poor public opinion or new information about company operations and potential future liabilities, but ultimately information disclosure will only have economic impacts on firms if the market reacts in some way to this new information. Therefore, information forcing's economic mechanism only works if there are market impacts and if those market impacts reflect significant enough costs to firms that changing their behavior becomes economically beneficial.

In practice, there is some evidence that markets do react to information better than individual consumers do. For instance, in early studies of TRI impacts, firms disclosing significant toxic releases saw temporarily decreased stock prices.[116] This suggests that there were some economic impacts to firms as a result of TRI disclosure. However, these impacts were very short-lived.[117] While protracted decreases in stock value would likely lead to changes in firm behavior, temporary declines may not yield significant operational alterations. The market, therefore, has not proven to create any durable financial incentives for firms to change their behavior.

Beyond requiring that the market react to new information in some way that introduces new costs on firms, the economic mechanism of information regulation will only work if the changes that companies need to make to achieve

115. While there is ongoing debate about whether data can, and should, be legally construed as property, it is undeniable that many of the rights in property's "bundle of sticks" apply to data. *See* Jannice Käll, *The Materiality of Data as Property*, 61 HARV. INT'L L.J. FRONTIERS 1, 1 (2020); Jeffrey Ritter & Anna Mayer, *Regulating Data as Property: A New Construct for Moving Forward*, 16 DUKE L. & TECH. REV. 220, 248–51 (2018).

116. *See* Konar & Cohen, *supra* note 5, at 110.

117. *See, e.g.*, Don Grant & Andrew W. Jones, *Do Manufacturers Pollute Less Under the Regulation-through-Information Regime? What Plant-Level Data Tell Us*, 45 SOCIO. Q. 471, 480 (2004) (finding no long-term impacts of TRI).

environmental goals are cost-effective enough to justify. Given that the costs in general are relatively low, any operational changes must also require relatively few resources. Unfortunately, the changes needed to reduce environmental impacts that are the subject of information-forcing regulation are generally very capital-intensive. Companies targeted by TRI, for instance, would need to undertake dramatic operational shifts that often include large capital outlays for new pollution-control technologies. These changes cost ample money and time to redesign and retrofit existing systems. Such costs may prevent companies from changing their operations on the basis of information-forcing regulations.

c. Legal Mechanisms

Lastly, information-forcing regulation can also work by strengthening existing legal approaches to environmental management. This manifests in administrative contexts by augmenting other environmental regulations, creating new avenues for environmental agencies to engage with industrial actors, and potentially providing pre-regulatory momentum for future efforts. Information forcing can also play an important role outside of administrative law in environmental litigation. The broad behavioral pathways that are opened through information disclosure are most effective when they work to complement and reinforce traditional forms of regulation.[118]

By creating procedures that both agencies and companies must follow, information-forcing mechanisms increase communication and cooperation between industry and regulators.[119] Strengthening these pathways creates opportunities for informal collaboration that allow new ways for environmental agencies to engage with industries they otherwise have difficulty targeting. Under Proposition 65, for instance, the regulatory relationship created by statute grants state managers an opportunity to encourage industry to move beyond just the disclosure provisions of Prop 65 to make substantive changes in chemical use.[120]

Additionally, information disclosure regulation can act as a pre-regulatory mechanism to build the momentum and infrastructure needed to catalyze more comprehensive regulation in the future. In cases where there is insufficient political will to pass stricter types of environmental regulation, information-forcing policies are more likely to be palatable. Once these policies are in place, in theory, their success and relative ease of implementation can generate enthusiasm for stricter measures. For instance, once TRI is in place, it would be relatively easy to amend it to add penalty provisions without requiring

118. *See* Kleindorfer & Orts, *supra* note 30, at 157 (explaining how information regulation may enhance traditional forms of regulation by adding "a mechanism of enforcement" and by easing "the task of direct regulation").

119. Cohen, *supra* note 24, at 10426–27.

120. Clifford Rechtschaffen, *The Warning Game: Evaluating Warnings Under California's Proposition 65*, 23 ECOLOGY L.Q. 303, 343 n.220 (1996).

completely new regulation, or to subject already identified toxic chemicals to more stringent command and control regulation.[121] This triggering function has been shown to have concrete impacts in the case of Proposition 65. Prop 65's information, in the form of listings and disclosure, has directly led to new toxics regulation at both the state and federal levels.[122]

Information disclosure regulation can also serve as a potential basis for litigation. Even though information-disclosure regimes themselves do not assign legal penalties to the substantive disclosures made by firms, this information can highlight other issues that may provide avenues for legal challenges by third parties.[123] In the case of local communities, and others with relatively little access to information, the data provided by information-disclosure regimes may be the only opportunity to identify environmental harms that can lead to a lawsuit.[124]

At the administrative agency level, information-forcing regulation only works to augment existing environmental regulation if administrators are able to use information-forcing regulation as part of a comprehensive regulatory strategy. At its best, information forcing can tie into other regulatory programs, generating new information and helping to solidify agency-industry relationships in ways that support other command-and-control regulation.[125] However, in practice, information forcing is often seen as an end in itself, with programs siloed away and information made inaccessible to other agencies or even other sections of the same agency that may be well-served by it.[126] This is, of course, a problem endemic to government agencies. Information forcing's legal roles require a more comprehensive and holistic approach to regulation than current environmental law and administrative agency makeup facilitate.

Beyond this, litigation that relies on information regulation only works if there are interested parties able to research disclosed information and bring lawsuits when warranted. In practice, while toxic torts are potentially very

121. *See* Polsky & Schwarzman, *supra* note 99, at 827 (describing future "regulatory ratcheting" in the case of Proposition 65 as taking place when "a new regulatory regime references the Prop 65 list, which essentially jump-starts or seeds that regime by populating it with the hundreds of chemicals that Prop 65 has already established as health harmful").

122. Polsky & Schwarzman, *supra* note 99, at 827.

123. Litigation is, for instance, one of the major drivers behind the success of Prop 65. *See id.* at 836–37 (2021).

124. *See* Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 317 (2001) (describing the role of TRI in initially informing communities of potential pollution problems).

125. Polsky & Schwarzman, *supra* note 99, at 841–62 (describing Prop 65's role in supporting and motivating the creation of new command-and-control regulation).

126. *See, e.g.*, Karkkainen, *supra* note 112, at 923–24 ("[T]he EIS procedure in many agencies is divorced from the ordinary processes of internal agency decisionmaking, both temporally and functionally. NEPA analyses are often conducted by specialized technical staff outside the agency's decisionmaking hierarchy, or contracted out to consulting firms (known as 'NEPA mills') that may have relevant technical qualifications and EIS-writing experience but rarely are in a position to influence agency decisions.").

lucrative, environmental lawsuits like these are extremely difficult and costly to bring.[127] While litigation risk is a powerful deterrent for corporate actors, information regulation has not yet proved to be a fertile ground for new litigation.

While information forcing's mechanisms can be thought of individually, one of the chief benefits of information-forcing regulation is its flexibility.[128] This flexibility also allows a variety of causal mechanisms to influence outcomes. Relying on one mechanism alone may be insufficient to induce action.[129] This "whole is the greater than the sum of its parts" argument is important to understanding information forcing's mechanisms.

II.
CASE STUDIES

This Section focuses on case studies from across the landscape of environmental law, providing background information on the policies at issue and beginning to tease out the key characteristics of successful versus unsuccessful information-forcing policies. Part III synthesizes these characteristics and concludes that information-forcing regulation is largely unsuccessful in achieving the goals of increasing environmental information, catalyzing changes in behavior, and promoting public transparency.

This Section discusses case studies along three different varieties of information disclosure: (1) information disclosure where private industry is the target of disclosure, (2) information disclosure where public agencies are the target, and (3) consumer-facing information disclosure intended primarily to alter consumer behavior (for instance, through sustainability labeling programs).

A. Private Disclosure: The Toxics Release Inventory

The Toxics Release Inventory (TRI) is the paradigmatic example of what appears to be successful information disclosure regulation. TRI was created as part of the Emergency Planning and Community Right-to-Know Act (EPCRA) in 1986, a case of quick congressional action to assuage public concern in the wake of the Bhopal chemical disaster in India that foisted TRI upon a largely unenthusiastic EPA.[130] The EPA worried about the bureaucratic difficulties of mandating disclosure and believed that this information would do little to improve environmental outcomes.[131] However, unlike with other more complex environmental regulations, the EPA was able to implement TRI relatively

127. *See, e.g.*, Anthony Roisman, Martha Judy & Daniel Stein, *Preserving Justice: Defending Toxic Tort Litigation*, 15 FORDHAM ENVTL. L. REV. 191, 203, 206 (2004) (describing the difficulties and costs with constructing successful toxic tort cases).

128. Sunstein, *supra* note 9, at 625.

129. *See* Karkkainen, *supra* note 7, at 328–29.

130. Karkkainen, *supra* note 7, at 259; *see generally* 42 U.S.C. §§ 11001–50 (containing the text of the EPCRA).

131. GRAHAM, *supra* note 40, at 32 (noting that EPA "considered disclosure a time-consuming distraction from the agency's regulatory mission").

quickly. The ease and relatively low cost of implementation remain two of TRI's most attractive qualities: the EPA estimated in 2002 that each TRI response costs firms an average of only $1,100 and just under 20 hours of time to create and submit to the EPA.[132]

TRI requires that firms handling large quantities of listed chemicals annually disclose any releases of these chemicals into the environment to the EPA.[133] The EPA makes this information available publicly, allowing NGOs, citizens, and others to see which companies have released toxics in the past.[134] However, TRI data contains no information on the relative toxicity of chemicals, the means by which they were released, or projected impacts on health or the environment.[135] Instead, TRI disclosures contain only volumetric quantity listings of the amounts of chemicals released. Importantly, the EPA makes the data from TRI disclosures available in standardized digital formats, creating what some have called the "first regulatory statute of the contemporary information age."[136] One of the drivers of TRI's success may be its early capitalization on advances in information technology that allowed relatively easy access to data, standardization, and analysis over time.[137]

A core goal of TRI was not just to make firms decrease pollution on their own but also to provide information to the public and spur communities to monitor conditions in their areas and work with industry to improve environmental outcomes.[138] Though the EPA makes data available, NGOs play an important role in translating this TRI information for the public. The EPA's website, for instance, is so complex, even in 2022, that it strongly suggests that users watch a video to understand how to complete a simple search.[139] NGOs have helped to bridge this gap, with the Environmental Defense Fund (EDF)

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132. Schatz, *supra* note 17, at 336. Compare this to the reporting burdens created by NEPA's EIS requirements, where costs to complete average in the millions of dollars. Karkkainen, *supra* note 112, at 918, n.65 (2002).

133. Limitations on the size of firms required to report in addition to the chemicals subject to reporting were necessary to reach compromise and ensure ECPRA made it quickly through Congress. GRAHAM, *supra* note 40, at 31–35.

134. *See, e.g.*, *TRI Toxics Tracker*, EPA, https://edap.epa.gov/public/extensions/TRIToxicsTracker/TRIToxicsTracker.html [https://perma.cc/2GNB-TH3T] (allowing people to search by location to ascertain nearby TRI facilities and obtain annual reports of any toxic releases).

135. *See, e.g.*, *Trends in Releases*, EPA, https://www.epa.gov/trinationalanalysis/trends-releases [https://perma.cc/26BA-6HXX] (charting only the overall number of facilities reporting and the pounds of chemicals released).

136. Karkkainen, *supra* note 7, at 289.

137. *Id.* at 287–95.

138. *See What is EPCRA?*, EPA, https://www.epa.gov/epcra/what-epcra [https://perma.cc/9U2T-P68C] ("The Community Right-to-Know provisions help increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities, working with facilities, can use the information to improve chemical safety and protect public health and the environment.").

139. *See* EPA, TRI 35th Anniversary Webinar Series (2021), https://www.epa.gov/toxics-release-inventory-tri-program/tri-35th-anniversary-webinar-series [https://perma.cc/59T7-PQNL].

leading these efforts through Scorecard, a scoring metric for companies that created easily digestible information on the location and relative severity of toxic releases.[140] America's Toxic 100, a list of the largest one hundred toxic emitters in the country, furthered this effort and aimed to shame the most polluting firms into changing their behavior. Unfortunately, but perhaps unsurprisingly given that TRI data does not seem to influence firm or consumer behavior significantly as discussed below, EDF and the majority of other NGOs working on TRI have discontinued these efforts over the last decade.

According to early accounts, TRI was a resounding success. This view began with the relative ease and speed of implementing TRI and was reinforced by two quantitative studies from the late 1990s and the EPA's own reports on TRI releases over time. Some individual cases of firm behavior change, notably Monsanto, coupled with these studies meant that by the late 1990s, the "power ascribed to disclosure had reached mythic proportions."[141] Unfortunately, follow-up studies over the decades since these initial reports have instead shown that TRI has not led to meaningful reductions in toxic releases over time. However, these studies are largely from outside the legal academy and thus have not changed the positive impression legal academics and regulators have of TRI and other information-forcing policies.

In 1995, James Hamilton published a study showing that firm stock prices exhibit statistically significant drops when they disclose TRI releases.[142] This study established TRI's potential success as a market mechanism, showing that information disclosure impacted market outcomes, at least in the short term. The impact of TRI on markets through stock prices has been reinforced by several other studies, validating the robustness of this result.[143] However, neither Hamilton's work nor the studies after attempted to connect reductions in stock prices to reductions in emissions over time, undermining the effectiveness of these studies in evaluating TRI's success.

Shameek Konar and Mark Cohen built on Hamilton's work and showed in 1997 that stock price reductions led firms to make operational changes resulting in lower TRI disclosures.[144] This study provided key support for the idea that TRI was a successful policy, highlighting specifically that firms with larger stock price reductions made larger operational changes to reduce emissions. However, follow-up studies quickly showed that firms that appeared to reduce emissions

140. *See* Andrew Schatz, *Regulating Greenhouse Gases by Mandatory Information Disclosure*, 26 VA. ENVTL. LJ. 335, 341 (2008) (describing EDF's now-defunct Scorecard website).

141. GRAHAM, *supra* note 40, at 24.

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

143. *See, e.g.*, Konar & Cohen, *supra* note 5, at 123; Cohen, *supra* note 24, at 10425.

144. Konar & Cohen, *supra* note 5, at 120.

were largely doing this by manipulating reporting requirements and not by changing the total amount of toxics they released.[145]

In addition to these two studies, the most important piece of evidence used by supporters of TRI comes from the EPA itself. The EPA found that toxic releases dropped 44 percent after disclosure was mandated.[146] These reductions continued over time, with a 58 percent reduction in reportable releases between TRI's implementation in 1988 and 2005.[147] These reported reductions are the main basis for the view that TRI is a successful regulatory strategy.[148] However, many studies have since shown that the EPA's numbers fail to reflect actual reductions in pollution.

The flaws with the EPA's reported TRI results are myriad. Most importantly, the EPA's reports track only the amount of toxic chemical releases under TRI over time. Moving beyond this to determine whether decreases in release amounts are due to TRI itself or other factors is critical for this data to have any meaning. The studies attempting to answer this question agree: apparent reductions in TRI releases are largely the result of "paper changes" in firm operations and not the result of actual reductions in toxic chemical use.[149] For instance, in the wake of TRI, firms reduced on-site toxic releases and instead shifted these releases onto other actors, leading to no net reductions in the amount of toxic wastes generated.[150] Further disaggregating data to the state level and incorporating important contributing variables show that "right-to-know programs have probably never had any net impact on manufacturers' environmental performance."[151]

TRI data is not only limited in how predictive it is; it is also subject to serious accuracy and data quality issues. In general, reported data is incomplete, inaccurate, outdated, and does not adequately indicate environmental performance or risks.[152] For instance, early studies showed that actual chemical disclosures could be up to 2.5 times the numbers reported under TRI.[153]

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145. Madhu Khanna, Wilma Rose H. Quimio & Dora Bojilova, *Toxics Release Information: A Policy Tool for Environmental Protection*, 36 J. ENVTL. ECON. & MGMT. 243, 265 (1998) (finding that TRI "did not cause firms to reduce total toxic waste generation," and instead only motivated firms to "reduce on-site releases and increase off-site transfers").

146. Tietenberg, *supra* note 12, at 593.

147. EPA 2005 TOXICS RELEASE INVENTORY (TRI) PUBLIC DATA RELEASE REPORT 260-R-07-001 4 (2005).

148. *See, e.g.*, Schatz, *supra* note 17, at 338 (citing these numbers in support of the proposition that "TRI is enormously successful in reducing toxic releases").

149. These paper changes include for instance redefining certain processes so they no longer are reportable under TRI; shifting releases onto other firms, or parent companies, to avoid disclosure requirements; and changes to toxic release estimation methods. Volokh, *supra* note 8, at 816–19.

150. Khanna et al., *supra* note 145, at 243.

151. Don Grant & Andrew W. Jones, *Do Manufacturers Pollute Less under the Regulation-through-Information Regime? What Plant-Level Data Tell Us*, 45 SOCIO. Q. 471, 480 (2004).

152. *See* Durham-Hammer, *supra* note 85, at 334–43 (providing an in-depth analysis of the flaws in TRI data).

153. GRAHAM, *supra* note 40, at 47.

Other empirical work on TRI suggests that there is extreme heterogeneity in the impacts of TRI across industries.[154] This finding has important implications for the design of new information regulation that seeks to capitalize on TRI's success. This heterogeneity may be impacted by the lack of understanding of the mechanisms underlying TRI. Moreover, TRI has been criticized for the poor quality and narrowness of the information it produces.[155] The choice to disclose toxic releases, for instance, with no interpretative information about the relative toxicity of the chemicals in question may exacerbate understanding issues on the part of the public.

Beyond changing firm behavior, a major goal of TRI is to inform the public.[156] Early empirical evidence suggested that TRI was most successful in reducing health risks in states with robust data analysis and dissemination programs, emphasizing the role of the public in evaluating TRI's outcomes.[157] There has been additional support for this, showing that TRI is particularly successful in areas with a more engaged environmental populace.[158] However, implementation of TRI over time shows that despite the importance of transparency to achieving TRI's goals, information is not provided to the public in ways that are useable or educational.[159] The EPA's position has been that it is "not in the retail information business," so it continues to provide barebones information in the hopes that other organizations will translate this information for the public.[160]

That TRI is failing to achieve these public transparency goals is uncontested. Some scholars have even gone so far as to argue that TRI is not just failing to achieve its goals but actively fostering increased inequality and environmental injustice.[161] Ironically, in attempting to improve environmental information, TRI has arguably just contributed to an increasingly clunky and unusable regulatory information system.[162] Mary Graham noted that "a simple

154. Elizabeth Connors, Holly H. Johnston & Lucia S. Gao, *The Informational Value of Toxics Release Inventory Performance*, 4 SUSTAINABILITY ACCT., MGMT. & POL'Y J. 32, 49–50 (2013).

155. Karkkainen, *supra* note 7, at 331–38 (discussing problems of data quality, misleading metrics, and outdated information in TRI disclosures).

156. *See* William F. Pedersen, *Regulation and Information Disclosure: Parallel Universes and Beyond*, 25 HARV. ENVTL. L. REV. 151, 160 (2001).

157. Hyunhoe Bae, Peter Wilcoxen & David Popp, *Information Disclosure Policy: Do State Data Processing Efforts Help More Than the Information Disclosure Itself?*, 29 J. POL'Y ANALYSIS & MGMT. 163, 163 (2010).

158. Cohen, *supra* note 24, at 10426 (noting that "states with higher membership levels of environmental organizations had larger TRI emission reductions, consistent with the theory that environmental group pressure can reduce emissions").

159. *See generally* Kuh, *supra* note 18.

160. GRAHAM, *supra* note 40, at 39.

161. Durham-Hammer, *supra* note 85, at 325–26.

162. GRAHAM, *supra* note 40, at 30 ("Each federal program had a different way of classifying materials and of collecting information from facilities. Water permits talked about chemical oxygen demand. Air permits listed total volatile organic compounds in pounds. That doesn't tell you anything chemical by chemical. Companies generally knew as little about their waste streams as regulators did.'").

impulse to provide the public with better information had produced an exceedingly complicated system."[163] As with other attempts to create public databases, TRI was the subject of debate over its every feature in its early years.[164]

In light of the existing empirical work that has been done to further illustrate TRI's impacts, it is increasingly clear that TRI is not causing firms to change their behavior to reduce pollution, nor is it achieving the public transparency goals it intended. TRI is the poster child of information regulation, and its failure to achieve its goals raises significant questions for whether information-forcing regulation is an effective regulatory strategy.

Anecdotal evidence suggests that TRI may motivate individual firms to change their behavior, though this promise is rarely realized in practice.[165] Importantly, a major motivator of these changes appears to be internal information generation: TRI, for the first time, required companies to consolidate and report information on a variety of different pollutants that previously were untracked or not aggregated.[166] The positive stories that do exist also universally happened in the immediate wake of TRI's passage, raising questions about whether disclosure regulations may be more effective when information is first brought to light.[167]

TRI has failed to produce accurate and high-quality information, provide information to the public in a helpful way, and catalyze changes in firm behavior. Some academics have predicted that the success of information regulation will hinge on (1) creating regulation that responds to an existing market failure in the provision of information and (2) information being provided to those who are able to use it.[168] Under this analysis, it is no surprise that TRI has largely failed to achieve its objectives. While it can be argued that the regulation responds to a gap in toxics release information, it is unlikely that TRI is providing information to those in a realistic position to use that information.

B. Public Disclosure: The National Environmental Policy Act

In the case of TRI, information disclosure is the central goal of a relatively narrow regulation. However, it is much more common to see information forcing in environmental law as a smaller piece situated within more comprehensive

163. *Id.* at 35.

164. *Id*. at 39.

165. *See, e.g.*, *id.*, at 21–23 (describing Monsanto's commitment to dramatically reduce toxics emissions in the wake of TRI's passage).

166. *See id*. at 22 ("[T]he numbers had never been added up before . . . . Data about toxic pollution subject to various government permits were collected, as required by law, but each kind of permit used a different measure and the information could not easily be combined. Now suddenly Congress had required that such waste be accounted for . . . .").

167. No doubt spurred by more media coverage at these early stages, *see, e.g.*, *id*. at 40–44 (describing the extensive media coverage of the first TRI disclosures).

168. Sunstein, *supra* note 9, at 628–29.

laws. The National Environmental Policy Act (NEPA) is one of these comprehensive regulations, combining several different regulatory mechanisms with information forcing to achieve wide-ranging environmental outcomes.[169] As explained below, NEPA does not neatly fit into the definition of information-forcing regulation, but it does share many of its overarching characteristics.

While NEPA is a very different beast from TRI, information disclosure is one of the central goals of NEPA, making it a good candidate for illustrating if, and how, information disclosure can function as part of larger regulatory initiatives. This broad scope also makes isolating the impacts of the information provisions of NEPA difficult. Nonetheless, NEPA has been the subject of considerable academic attention. While little of this work focuses specifically on the information disclosure role of NEPA, it provides a foundation for analysis of the successes and failures of NEPA as an information-forcing regulation and demonstrates that the information-forcing functions of NEPA are not the ones that precipitate changes in environmental outcomes. It also challenges the traditional characterization of NEPA as a true information-forcing regulation.

NEPA exhibits many of the overarching characteristics that define information-forcing regulation: it requires the production of information without imposing substantive penalties on the basis of the information provided. A comprehensive overview of NEPA's many provisions is beyond the scope of this Article. At the most fundamental level, NEPA creates procedures for environmental review for major federal actions.[170] It notably does not impose substantive requirements that projects be altered based on any identified environmental impacts.[171] Instead, agencies are only required to produce and review information on environmental impacts.[172] There are no penalties linked to the information that regulated entities provide. Scholars and managers recognize the centrality of NEPA's information-forcing provisions.[173] The regulatory burden of producing and disseminating the information that NEPA requires is specifically the source of much of the ill will towards NEPA among academics and environmental managers.[174]

169. National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. §§ 4321–4347 (2000).

170. National Environmental Policy Act of 1969, Pub. L. No. 91-190, 83 Stat. 852 (1970) (codified as amended at 42 U.S.C. §§ 4321–4347 (2012).

171. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989) ("[I]f the adverse environmental effects of the proposed action are adequately identified and evaluated, the agency is not constrained by NEPA from deciding that other values outweigh the environmental costs.").

172. And to take the requisite "hard look" at these impacts. *See, e.g.*, Marsh v. Or. Nat. Res. Council, 490 U.S. 360, 374 (1989).

173. *See, e.g.*, FELLEMAN, *supra* note 43, at 1 (noting that "NEPA is essentially an information policy"); Karkkainen, *supra* note 122, at 909 (framing NEPA as an information forcing regulation: "[NEPA] . . . sets out to enhance the government's environmental performance by compelling managers to produce, consider, and disclose information on the expected environmental impacts of proposed actions").

174. Karkkainen, *supra* note 112, at 904–05 (summarizing positive and critical attitudes towards NEPA's information generation and disclosure requirements).

NEPA is not solely an information-forcing law, as its extensive procedural mandates extend far beyond pure disclosures, and its goals range from promoting democracy to increasing public participation to promoting sustainability.[175] The extensive nature of these procedural requirements has led many scholars to argue that NEPA operates as a penalty default or some other type of regulatory burden.[176] Many have noted that the Environmental Impact Statements (EIS) process itself functions as a regulatory penalty.[177] This is particularly apparent in light of an increased move towards mitigated Finding of No Significant Impacts (FONSI) outcomes, illuminating the burdensome nature of the EIS process.[178] Despite the broad nature of NEPA, its role as an information-forcing regulation has been effectively undisputed. Nearly every legal article written on information disclosure in the past three decades includes NEPA as a major example of the genre.[179]

The theoretical basis for NEPA's information disclosure requirements echo behavior change, information increase, and public participation arguments for information disclosure regulations generally. Combining new agency-produced information under NEPA with the private information used to challenge NEPA outcomes increases the evidence base that agencies can use to make environmental decisions and induce pro-environmental changes.[180] NEPA's procedural requirements provide opportunities for the public, particularly NGOs, to engage in environmental decision-making.[181] Lastly, NEPA promotes the same government transparency goals that serve as an important theoretical foundation for information regulation as a whole.[182] Some have argued that disclosure schemes such as NEPA work by allowing "concerned groups [to] use the information in the political sphere."[183] NEPA creates foundational procedures that provide opportunities for environmental review and public engagement. In light of criticisms that information-forcing laws often fail to meaningfully engage the public, NEPA's procedural mechanisms for doing just

175. *See, e.g.*, THE NATIONAL ENVIRONMENTAL POLICY ACT: A STUDY OF ITS EFFECTIVENESS AFTER 25 YEARS, CEQ iv (1997) ("It is an eloquent and inspiring declaration which, well before the term 'sustainable development' became widely used, called for the integration of our varied aspirations as a society. NEPA is a tool with tremendous potential to help build community and to strengthen our democracy.").

176. Karkkainen, *supra* note 112, at 936 n.141 (arguing that NEPA functions like a penalty default); Sarah E. Light, *NEPA's Footprint: Information Disclosure as a Quasi-Carbon Tax on Agencies*, 87 TULANE L. REV. 511, 514 n.7 (2013) (arguing that the penalty default label is inaccurate).

177. Bradley C. Karkkainen, *Bottlenecks and Baselines: Tackling Information Deficits in Environmental Regulation*, 86 TEX. L. REV. 1409, 1431 (2007).

178. Karkkainen, *supra* note 112, at 920.

179. *See, e.g.*, Bradley C. Karkkainen, *Information-Forcing Environmental Regulation*, 33 FLA. ST. U. L. REV. 861, 879–83 (2006); Kuh, *supra* note 18, at 630–39; Sunstein, *supra* note 9, at 614.

180. Karkkainen, *supra* note 112, at 910–11, 914.

181. *See* FELLEMAN, *supra* note 43, at 1–2 (discussing the public engagement procedures at the heart of NEPA).

182. Karkkainen, *supra* note 112, at 915–16.

183. Dalley, *supra* note 15, at 1122.

that might consequently make NEPA more effective at reaching transparency goals.

This Section synthesizes the quantitative and qualitative work done on NEPA to (1) challenge the traditional characterization of NEPA as a true information regulation and (2) show that the information-forcing functions of NEPA that do exist do not precipitate changes in environmental outcomes. When NEPA is effective, it is largely due to project managers' desire to avoid the bureaucracy of the full EIS process that incentivizes environmentally beneficial actions, such as through the mitigated FONSI process.[184] NEPA's information-forcing functions create low deterrence outweighed by the desire to avoid the resource-intensive EIS process.

Studies of NEPA's substantive contributions to environmental law are extensive.[185] Drawing on this body, several themes are clear even across wildly different views on NEPA's value and effectiveness as a regulation. The first is that NEPA poses an enormous bureaucratic burden, which is its core mechanism for behavior change. While NEPA does change the information environment in which agencies make decisions, scholars seem to agree that this role is relatively small compared to the larger role that procedural mandates play.[186]

Under the classic definition of information regulation, these laws require the disclosure of information without any additional regulatory burden attached to that information. NEPA mostly follows this definition but departs from it in several nuanced and critical ways.[187] First, the NEPA process itself creates additive penalties that depend on the type of information disclosed. Agencies initially carry out Environmental Assessments (EA) to determine whether their projects are likely to lead to significant environmental impacts.[188] If the EA demonstrates that there will be significant impacts, agencies are then required to carry out a full EIS, which is a significantly longer and more detailed version of an EA.[189] If there is a Finding of No Significant Impacts (FONSI), agencies do not need to develop an EIS.[190] An intermediate option has recently become increasingly common: submitting "mitigated FONSIs," where agency EAs

184. Karkkainen, *supra* note 112, at 932–36.

185. *See, e.g.*, CEQ, *supra* note 175; John Ruple & Mark Capone, *NEPA - Substantive Effectiveness Under a Procedural Mandate: Assessment of Oil and Gas EISs in the Mountain West*, 7 GEO. WASH. J. OF ENERGY & ENVTL. L. 39 (2016); Kirk Emerson & Elizabeth Baldwin, *Effectiveness in NEPA Decision Making: In Search of Evidence and Theory*, 21 J. ENVTL. POL'Y & PLAN. 427 (2019).

186. Karkkainen, *supra* note 112, at 936.

187. Karkkainen, *supra* note 2, at 84 (describing NEPA as taking "the form of a command-style rule, it can be distinguished from the "Ten Thousand Commandments" model insofar as it has a more limited and narrowly tailored objective, seeking not to control behavior directly but rather to influence behavior indirectly by changing the information environment in which decisions are made").

188. 40 U.S.C. § 1501.5.

189. 40 CFR § 1502.

190. 40 CFR § 1501.6.

identify significant environmental impacts but the agencies immediately propose mitigatory measures to reduce these impacts as part of a FONSI finding.[191]

While an EIS is in some ways simply another form of required information disclosure, it is also an enormous procedural burden in both time and cost.[192] The strong trend toward developing mitigated FONSIs demonstrates the lengths that agencies will go to avoid having to complete an EIS.[193] Thus, NEPA requires not only information disclosure at its core, but also imposes significant procedural burdens depending on the type of information disclosed.[194] These procedural burdens act as a significant deterrent and shift NEPA away from the core group of information disclosure laws that do not place any burden on firms based on the content of their disclosures.

Beyond this, NEPA also differs from the classic set of information disclosure regulations in the extensive analysis needed to move from environmental information to an EA or EIS. Unlike TRI, which mandates the disclosure of relatively simple data, NEPA requires collection and analysis of complex data. This is a major downfall of NEPA: lack of good quality data hinders the evaluation process and requires agencies to either devote additional time to data collection or make decisions without the appropriate understanding of impacts and viable alternatives.[195] NEPA's information disclosure requirements are, in many cases, unachievable in the way that NEPA's drafters intended.[196] On paper, NEPA's goal is to provide information for fully informed decision-making. In practice, NEPA may actually incentivize agencies to produce limited and skewed information to support findings of no significant impact that avoid formal EIS requirements.[197]

While TRI also has issues with the quality of disclosed data, the root cause of the issue is likely different for NEPA: while TRI's accuracy issues stem from using industry self-reported data, NEPA's accuracy issues trace back to vague and overbroad information mandates dictated in the statute.[198] The scope of information potentially implicated by NEPA is enormous and without statutory guardrails.[199] As a result, agencies are unable to adequately collect and analyze the data needed to make robust NEPA decisions. Instead, agencies rely on

191. Karkkainen, *supra* note 112, 932–37 (discussing the impact of mitigated FONSIs).

192. *See, e.g.*, CEQ, *supra* note 175, at 7.

193. Karkkainen, *supra* note 2, at 85 (noting the reduction over time in the number of full EISs over time).

194. The Supreme Court recognizes that NEPA is procedural only. *See* Dep't of Transp. v. Pub. Citizen, 541 U.S. 752, 756–57 (2004) ("NEPA imposes only procedural requirements on federal agencies . . . ."). But procedural burdens can be substantial enough that they create substantive effects.

195. EPA, *supra* note 175, at 27.

196. Karkkainen, *supra* note 112, at 926.

197. *Id.* at 920–21.

198. *Id.* at 921–22 (noting that the "imprecision and open-endedness of NEPA's information production requirements have the counterproductive effect of contributing to the problem of low information quality").

199. *Id.* at 919–20.

incomplete but available information to create unwieldy documents that neither inform their decision-making nor provide public insight into environmental conditions.[200]

Furthermore, NEPA's Environmental Impact Statements require not just simple data, but analysis of the data to generate predictions about future environmental impacts.[201] As many have noted, this is scientifically very difficult to do.[202] The few studies done to assess the accuracy of these predictions are bleak, showing that most predictions made in EIS statements are inaccurate.[203] Combined, NEPA's procedural burdens and extensive information analysis make NEPA significantly different than simpler information regulations like TRI.

Qualitative evidence suggests that information disclosed pursuant to NEPA's requirements ultimately has little impact on environmental decisions.[204] This is in part due to issues with data availability and access within agencies and between interested external parties and the government.[205] NEPA's EIS documents are potentially fertile resources, with hundreds of pages of detailed data on environmental conditions. However, these reports are inconsistently available to the public, and when they are available, they are in PDF formats and contain non-standardized data which may be difficult for some to access and analyze.[206] Some scholars have pointed specifically to the information-forcing portions specifically as the root of NEPA's ineffectiveness. Professor Bradley Karkkainen argues that obtaining the comprehensive, predictive information on environmental impacts required by NEPA is essentially impossible.[207] Focusing on achieving these unrealistic goals prevents agencies from engaging in more effective forms of information collection and dissemination.

NEPA's achievement of public transparency goals is also flawed. Some argue that the most important pieces of NEPA's decision-making process remain

200. *See id.* at 925–27.

201. *See* 40 CFR § 1502.16 (discussing the types of environmental impacts NEPA EIS's must address).

202. *See, e.g.*, Melanie Kleiss, *NEPA and Scientific Uncertainty: Using the Precautionary Principle to Bridge the Gap*, 87 MINN. L. REV. 1215, 1223 (2003) (describing the difficulty with assessing cumulative impacts).

203. Karkkainen, *supra* note 112, at 928–29 (describing several studies of the accuracy of NEPA predictions).

204. *See id.* at 923.

205. Lauren Giles Wishnie, *NEPA for a New Century: Climate Change and the Reform of the National Environmental Policy Act*, 16 N.Y.U. ENVTL. L REV. 628, 648 (2008) ("[O]nce a NEPA document is produced, it is not available to the public or to researchers in a readily accessible format. EIS documents are typically collected only by the agency that produces them. EAs, meanwhile, may only be collected by an agency's regional office.").

206. *Id*. at 648 ("NEPA documents generate thousands of pages of information every year. However, much of that information remains inaccessible to the public at large due to the lack of standardizing and the failure to centrally collect data.").

207. Karkkainen, *supra* note 112, at 907.

inaccessible and opaque to the public.[208] Public involvement in the NEPA process is limited, suggesting that the value of information in this context is primarily limited to internal government decision-makers.[209] Findings that EIS filings that consider more project alternatives are also more likely to make substantive changes to projects that benefit the environment potentially support the value of information for internal decision-making.[210]

What positive impacts of NEPA do exist are weighed against significant resource costs. NEPA is very costly and very slow, often taking over four years from the initial stages to the completion of a final EIS.[211] In recent years, NEPA has begun to backfire, in many cases hindering the implementation of projects with positive environmental goals, for instance renewable energy.[212] NEPA's procedural burdens have been much decried, but these burdens are what ultimately make NEPA somewhat successful in contrast to other information regulations like TRI.

In sum, NEPA is effective in catalyzing some behavior changes on the parts of firms due to the threats of bureaucracy and procedural burdens. However, NEPA largely fails to promote public transparency since the information produced is inconsistently available and complex.

C. Consumer Disclosure

While NEPA and TRI focus mechanistically on changing the behavior of large firms or government actors, many more recent disclosure rules are instead targeted directly to consumers. These laws provide important further insight into how information regulation operates across environmental law. In the last decade, consumer labeling programs and other means of providing consumers with additional information to encourage more environmentally friendly outcomes have been perhaps the most visible and common forms of information regulation. This Section summarizes several examples of consumer-directed information regulation where there are instructive quantitative and qualitative studies to provide a survey of the landscape of information regulation beyond the blockbuster examples of TRI and NEPA.

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208. *Id*. at 925.

209. *Id.* ("As for the claim that NEPA enhances transparency, public input, and democratic accountability, note that only the formal NEPA process is opened to public scrutiny. The agency's real decisionmaking process remains underground, obscured from public view.").

210. Ruple and Capone, *supra* note 185, at 51.

211. *Id*. at 45 (finding that Oil and Gas EIS's take on average 4.4 years to complete); Karkkainen, *supra* note 112, at 919 (stating that an EIS takes on average 3.6 and up to 12 years to complete).

212. *See, e.g.*, Aidan Mackenzie & Santi Ruiz, *No*, *NEPA Really is a Problem for Clean Energy*, IFP (Aug. 17, 2023), https://ifp.org/no-nepa-really-is-a-problem-for-clean-energy/ [https://perma.cc/3JA6-UBBF] (presenting data that shows how NEPA serves as a significant roadblock to renewable energy projects).

1. Safe Drinking Water Act

Under the Safe Drinking Water Act (SDWA) Amendments of 1996, local water suppliers are required to create and publicize annual "consumer confidence reports (CCRs)."[213] This provision is a classic example of information regulation, requiring disclosure without creating any regulatory burden based on the substance of the information that has been disclosed. CCRs stemmed from the overall "right to know" movement and in theory provide information to the public about their water supply that will better allow them to understand environmental conditions and make informed decisions.[214]

CCRs suffer from the same problems with inaccurate and inaccessible information that characterize other types of information regulation. In a retrospective review of the rule in 2011, the EPA found that the public viewed CCRs as "confusing, misleading, and alarming."[215] The reasons for this confusion are myriad, ranging from the complexity of the tables included in the CCRs to the metrics used for reporting maximum contamination levels.[216]

The accessibility of CCRs should be relatively high, as the CCR rule requires community water suppliers deliver (via mail or digitally) CCRs to consumers annually.[217] This is a much more proactive approach than simply posting information on a government website, as done in TRI and other information regulation. However, even these relatively hands-on delivery methods have flaws for consumers who cannot receive or understand the information.[218]

Little quantitative work has been done on the impact of the SDWA's CCR requirement, but what has been done indicates that it may have led water suppliers to make significant improvements in water quality. In 2008, Bennear and Olmstead found that water suppliers reduced water quality violations by as much as 40 percent in the ten years after the CCR rule went into effect.[219]

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213. Safe Drinking Water Act, 42 U.S.C. §§ 300f–300j-26 (1998). For the CCR implementing Rule, see EPA 816-R-09-010, April 2010.

214. Lori S. Bennear & Sheila M. Olmstead, *The Impacts of the "Right to Know": Information Disclosure and the Violation of Drinking Water Standards*, 56 J. ENVTL. ECON. & MGMT., 117, 118 (2008).

215. EPA, CONSUMER CONFIDENCE REP. (CCR) RULE RETROSPECTIVE REV. SUMMARY 14 (2012), https://www.epa.gov/sites/default/files/2014-05/documents/epa816s12004.pdf [https://perma.cc/VQ3P-ZLHG].

216. *Id*. at 14, 16–18 (highlighting that "[c]ommenters on this issue stated that they found the required detected contaminant table confusing, because the table lacks an easy to understand interpretation of the results that explains what is in the water and what the associated health effects could be" and "[n]umbers greater than 1.0 may give some consumers a false impression of greater contamination").

217. 40 CFR § 141.155.

218. *Id.* at 29.

219. Lori S. Bennear & Sheila M. Olmstead, *The Impacts of the "Right to Know": Information Disclosure and the Violation of Drinking Water Standards*, 56 J. ENVTL. ECON. & MGMT. 117, 118 (2008) ("[M]ailing CCRs reduces total violations for this group by between 30% and 44%, and reduces

Without significant follow-up studies, it is unclear if this effect was sustained over time or simply a short-term impact after the CCR rule was initially enacted.[220] In any case, the significant reductions suggest that CCRs are a relatively successful form of information regulation.

The effectiveness of CCRs, despite issues with the accuracy and accessibility of information, suggest that the mechanism driving behavior changes under the SDWA is not external pressure from the public but some internal decision-making process. This may be a fear of public outcry on the part of water suppliers. It could also be that CCRs require better internal monitoring and enable water suppliers to understand and mitigate issues more quickly.

2. Proposition 65

California's Proposition 65 (Prop 65) is perhaps the most highly visible and controversial example of environmental information regulation. Under Prop 65, businesses are required to warn consumers of the presence of certain toxic chemicals that have been identified to cause cancer or other reproductive harm.[221] The wide swath of chemicals included under this purview, potentially even those in household items like coffee, has made Prop 65 warning labels ubiquitous on consumer products.[222]

Evidence suggests that Prop 65 has been successful at reducing the presence of toxic chemicals in consumer products. Concerns about public reactions or liability have spurred companies to significantly reformulate their products in the wake of Prop 65's enactment.[223] This is due both in part to aggressive litigation, which makes Prop 65 notably distinct from other types of information-forcing regulation, and the information-forcing functions of the law.[224] Under Prop 65, in addition to disclosing the presence of certain toxic chemicals, companies must also provide a "clear and reasonable warning" to consumers that these chemicals are present.[225] These two features—a more active requirement for companies in how they distribute warnings and much

health violations by 40–57%. The requirement to mail information to consumers appears to reduce the annual probability of positive violations (both total and health violations) in the sample by about 50%.").

220. Short term impacts seem to characterize other types of information regulation like TRI. *See*, *e.g.*, Don Grant & Andrew W. Jones, *Do Manufacturers Pollute Less under the Regulation-through-Information Regime? What Plant-Level Data Tell Us*, 45 SOCIO. Q. 471, 471 (2004) (finding no long-term impacts of TRI).

221. Safe Drinking Water and Toxics Enforcement Act of 1986, California Health and Safety Code §§ 25249.5–25249.14, referred to here as Proposition 65.

222. Polsky & Schwarzman, *supra* note 99, at 825 (2021) (discussing the controversy over listing coffee under Prop 65).

223. *Id*. at 836 ("Prop 65 litigation has been widely documented to reduce human exposure to listed chemicals by forcing reformulation of consumer products, process changes that reduce the presence of Prop 65 chemicals in food, adoption of air emissions controls at industrial facilities, and, to a lesser extent, reduction of toxic discharges to drinking water.").

224. *Id.* at 826–28 (summarizing existing research on Prop 65's impacts and arguing also that the indirect information benefits of the law have spurred significant environmental improvements).

225. CAL. HEALTH & SAFETY CODE § 25249.8 (West 1987).

higher incidence of litigation—make Prop 65 distinct from other types of information regulation.

The action mechanism for Prop 65 is likely not consumer persuasion; there is significant evidence that Prop 65's warning system has done little to inform the public or change behavior.[226] Corporate fears about negative public reactions to warnings may account for some of the positive changes spurred by Prop 65, despite the fact that this negative public reaction practically doesn't seem to exist.[227]

Prop 65 is successful because of the legal mechanisms underlying it. In theory, Prop 65 enforcement is limited to ensuring that companies disclose listed products and properly warn consumers of chemical exposures. However, in practice, state officials informally encourage and incentivize companies not to merely disclose chemicals, but to actively reduce their use.[228] Moreover, Prop 65 may have a strong triggering function, helping to identify chemicals for further direct regulation under other environmental laws.[229] This supports the idea that legal mechanisms are important features of successful information-forcing regulations.

Prop 65 does not necessarily provide helpful information to the public, nor does it drive behavior change on the parts of consumers. However, due to legal mechanisms, Prop 65 has been successful in catalyzing behavior change on the parts of firms.

3. Other Consumer Labeling Rules

In the past several decades, consumer labeling has become pervasive throughout the landscape of environmental law, extending far beyond just Prop 65 or the Safe Drinking Water Act. Government regulators enact many disclosure rules, but there is an equally robust market for private certifications and labeling schemes intended to provide consumers with further information on the relative sustainability of products.[230]

On the public side, consumer labeling and disclosure rules generally focus on providing consumers with additional information to help prioritize more environmentally friendly choices. A quintessential example of this is the EPA's

226. *See* Kuh, *supra* note 18, at 627–28 (2022).

227. *Id*. at 630.

228. Rechtschaffen, *supra* note 120, at 343 n.220.

229. Polksy & Schwarzman, *supra* note 99, at 827 (describing chemicals first listed under Prop 65 that then became directly regulated under other state and federal toxics laws as a result of the Prop 65 listings).

230. *See, e.g.*, Jamie Grodsky, *Certified Green: The Law and Future of Environmental Labeling*, YALE J. ON REGUL. (1993) (describing early approaches to private environmental certification programs); Michael P. Vandenbergh, *Disclosure of Private Climate Transition Risks*, 63 WM. & MARY L. REV. 1695 (2022) (discussing private disclosure programs for climate change risks).

lead paint disclosure requirements for real estate sales, which are intended to inform potential property buyers of environmental issues that exist.[231]

On the private side, certification programs are an important example of consumer labeling, where third parties develop sustainability standards for products and then certify products that meet these standards.[232] These standards are widely used across many sectors and have become the norm in some areas. Examples include Leadership in Energy and Environmental Design (LEED) green building certifications, Forest Stewardship Council (FSC) paper certifications, and Marine Stewardship Council (MSC) sustainable seafood certifications.[233] The role of the private sector in driving these sustainability actions is the subject of scholarship on private environmental governance (PEG).[234] PEG scholars have noted that, while certification standards have broad sustainability goals, they focus on changing processes instead of on measurably improving environmental outcomes.[235]

Relatively few studies on the efficacy of these regulations exist. In general, the data needed to evaluate the outcomes of rules over time does not exist. In a few cases, the agencies implementing these rules tried to develop follow-up studies and found that the impact of these regulations on consumer knowledge and action is minimal.[236] Agency attempts to evaluate the effectiveness of information disclosure rules have been undermined by scientifically invalid methods.[237]

III.
DO INFORMATION-FORCING REGULATIONS ACHIEVE THEIR GOALS?

Case studies indicate that a regulatory approach is less successful than previously accepted by the legal community. This Section uses these case studies

231. The Residential Lead-Based Paint Hazard Act of 1992, 42 U.S.C. §§ 4851–4852 (1995). For a general discussion of the impacts of this rule, see Claude Walker, *The Lead-Based Paint Real Estate Notification and Disclosure Rule*, 8 BUFF. ENVTL. L.J. 65 (2000).

232. Jason Czarnezki & Katrina Kuh, *Crafting Next Generation Eco-Label Policy*, 48 ENVTL. L. 409, 417–23 (2018); Michael P. Vandenbergh, *The Emergence of Private Environmental Governance*, 99 VAND. J. PUB. L. & LEGAL THEORY 10125, 10126 (2014).

233. Vandenbergh, *supra* note 232, at 10128–29.

234. Michael P. Vandenbergh, *Private Environmental Governance*, 99 CORNELL L. REV. 129, 188 (2013).

235. Vandenbergh, *supra* note 232, at 10128 ("[C]ertification systems are often designed to advance the adoption of new environmental practices rather than to change environmental conditions or outcomes.").

236. The results of these studies though should be taken with a grain of salt, as some methodological flaws undermine their overall usefulness. *See* Arthur G. Fraas & Randall Lutter, *How Effective Are Federally Mandated Information Disclosures?*, 7 J. BENEFIT-COST ANALYSIS 326, 334–43 (2016) (describing agency reports from the EPA, CFPB, and FTC and the methodological issues with their conclusions).

237. *Id.* at 343 ("Our review, however, finds only a very few cases where agencies have undertaken a quantitative assessment that largely conforms with the best practices identified above, notwithstanding presidential and OMB directives that they conduct high-quality assessments.").

to understand connections between different types of information regulation. It asks whether certain goals are more likely to be achieved than others or if certain features of information regulation are more likely to drive successful outcomes. Existing work on the impacts of information regulation in environmental law has come to seemingly conflicting conclusions. Somehow, information-forcing regulations are facilitating improved environmental outcomes despite the fact that many of their mechanistic underpinnings are failing.[238] This Section shows that while economic and persuasive mechanisms have largely failed to effectively motivate information regulation, legal mechanisms may be more successful in driving positive environmental outcomes.

A. Is Information-Forcing Regulation Successful in Achieving its Goals?

1. Catalyzing Behavior Change

Information regulation's main goal is to change behavior to promote pro-social outcomes. However, the case studies in this Article demonstrate that it is largely failing to achieve this goal across all varieties of information regulation. This failure stems primarily from failures of the economic and persuasive mechanistic pathways at the heart of information regulation. The assumption that the market or the public will react to new information negatively has not played out in practice, creating few incentives for firms to change behavior. When information regulation is successful in improving environmental outcomes, it occurs in cases where strong legal mechanisms create incentives for regulated entities to alter impacts.

For example, TRI is the clearest case. Quantitative evidence shows that information disclosure has not led to the anticipated changes to industry behavior that the regulation aims to achieve. While TRI had some initial economic impacts, these have not been as significant or persistent as regulators had hoped, leading to few incentives for firms to change their behavior. When behavior change effects happen, they are generally limited to the short period after information regulation is first passed.[239]

In the case of the much more complicated NEPA, there is some evidence that the process does ultimately produce changes to projects to mitigate environmental impacts. However, it seems that these changes are motivated not by the information-forcing provisions of NEPA but rather by agency desire to

238. Kuh, *supra* note 18, at 659 ("A clear but somewhat puzzling phenomenon emerges from comparing how informational regulation functions vis a vis the public across a variety of environmental programs: Mandated public disclosure often fails to meaningfully inform the lay public as an audience while nonetheless catalyzing sometimes significant responses by upstream actors.").

239. Karkkainen, *supra* note 112, at 906 ("NEPA transformed the institutional landscape in its revolutionary youth, bringing important and lasting changes to the way government does business. But like many erstwhile revolutionaries, NEPA has now settled into a quiescent and underproductive middle age.").

avoid the lengthy bureaucratic requirements of the formal EIS process.[240] Likewise, Prop 65 has been successful in spurring companies to reformulate products and otherwise reduce toxic chemical use.[241]

These case studies underscore what others have theorized: the success of information regulation depends on the details.[242] Prop 65 and NEPA have been successful in some regards, and this is attributable to the fact that both regulations actually require significant actions beyond mere disclosure. Prop 65, for instance, requires that companies warn consumers if certain concentrations of chemicals are present in their products.[243] In practice, this warning may be little more than information stated in a public-facing way instead of submitted to the government, but it describes a potentially important mechanism for Prop 65's relative success. When companies place Prop 65 warnings directly on packaging or other consumer-facing materials, it puts more of the burden of information disclosure and translation on companies themselves. Instead of handing data over to the EPA to use, companies must do all the work themselves. This potentially incentivizes companies to reduce the times they need to create Prop 65 warnings.

NEPA likewise has characteristics that distinguish it from a pure information disclosure law. For instance, NEPA requires agencies to evaluate environmental impacts. This, in and of itself, goes beyond the mere act of creating and disclosing information. While the EIS process heavily relies on collecting and compiling new data, agencies must extensively analyze this information to determine if it will lead to significant environmental impacts.[244] This analysis requires not just complex models, but also important human judgments about environmental conditions. It is also what differentiates NEPA from other types of disclosure that rely on simpler data outputs.

More importantly, NEPA has built in procedural steps that can act as penalties depending on the type of information disclosed. This creates powerful incentives for agencies to avoid procedural burdens by reducing environmental impacts sufficiently, thereby qualifying for a FONSI or mitigated FONSI outcome instead of undergoing the full EIS process. This procedural burden, and the procedural burden created by Prop 65's consumer warning requirement, provide critical incentives without which these regulations would likely be unsuccessful.

Understanding that simple information regulations like TRI are not catalyzing significant changes in firm behaviors helps to clear up mechanistic uncertainty in the legal community. Academics have long understood that information regulations generally fail to educate and inform the public in their intended ways. However, these academics have also taken the long-held belief

240. Karkkainen, *supra* note 112, at 970.
241. Rechtschaffen, *supra* note 120, at 307.
242. Sunstein, *supra* note 9, at 629.
243. Polsky & Schwarzman, *supra* note 99, at 839.
244. *See generally* Karkkainen, *supra* note 112.

that TRI is a successful regulation as true, leading to confusion about how TRI is mechanistically working. Recognizing instead that TRI has not been particularly successful makes much more sense.

This result is not surprising. Decades of academic study on environmental behavior have illustrated time and again that providing the public with new information only occasionally leads to changes in environmental behavior. In the cases where these changes occurred, it was generally among consumers who already held strong environmental views. In some cases, information disclosure regulations had some impact on consumers' attitudes and ultimately their behavior. In these cases, NGOs or other third-party groups played critical translation roles in turning government information into salient and publicly accessible information.[245] This strategy only works so long as these organizations remain interested and have sufficient resources to continue their programs. All the major nonprofits with TRI-related disclosures have discontinued these projects, presumably from lack of funder interest and perhaps insufficient observed benefits.

A key characteristic distinguishing successful and unsuccessful information disclosure regulations is the type of actor that information is "forced" from. Policies that require disclosure of information from regulated entities have some chance of being successful (TRI being the classic example), while regulation that forces federal or state agencies to generate information in similar ways is much less likely to be successful. This is a relatively intuitive result. The classic economic justifications of disclosure regimes hinge on regulated entities doing the required disclosure, but it's important to point out that people increasingly categorize regulation that requires public information disclosure into the bucket of information-forcing regulation.

Some have recognized that information-based regulation functions more efficiently in situations where the polluter and the pollute are in some kind of well-defined contractual or regulatory relationship.[246] This suggests that information-forcing regulation may be most useful when it functions as a penalty instrument or when the audience is regulatory bodies. Prop 65 is a good example of this. Prop 65 creates a regulatory relationship between firms and regulators, providing a pathway for regulators to work with industry not only to meet the requirements of Prop 65 but potentially to move further toward substantive changes in chemical use.[247]

On the other hand, the unique strength of information regulation may lie in how it broadens regulatory compliance from a relationship between the EPA and

245. *See* Kuh, *supra* note 18, at 664–65.
246. Tietenberg, *supra* note 12, at 589–90.
247. Rechtschaffen, *supra* note 120, at 343 n.220.

firms to one that includes pressure and participation from other institutions and members of the public.[248]

2. Increasing Environmental Information

The environmental information obtained from information-forcing laws is notably flawed. Significant accuracy and completeness issues characterize all types of information regulation. For instance, in the case of TRI, myriad issues undermine the validity and usefulness of toxic release data.[249] There is some evidence that concerns over the accuracy of reported data can be mitigated: in the case of lead disclosures, for example, firms appear to have increased the accuracy of disclosures over time.[250]

Even when the information provided is accurate, it is inherently limited. Disclosure programs tend to focus only on one aspect of environmental performance, such as the quantity of toxics a company releases into the environment.[251] With a lack of more comprehensive understanding of performance, companies can easily game the system by improving their outputs in areas with disclosure regimes without improving performance across the board.[252] This is compounded by government disclosure programs that focus on past environmental performance indicators. Determining risk is a complex calculation,[253] and the information disclosed by firms is not sufficient to establish broader impacts.[254] While more complex regulation like NEPA and private certification programs are more likely to also consider predictive indicators of future environmental performance, these predictions are notably inaccurate.[255]

Disclosure programs are also limited in the actors they cover, primarily targeting corporate actors and other regulated entities where mandating

248. Paul R. Kleindorfer & Eric W. Orts, *Informational Regulation of Environmental Risks*, 18 RISK ANALYSIS 155, 157 (1998) ("The main point to be made about these figures is that a focus on informational disclosure opens up the traditional bilateral relationship between the regulator and the regulated to include other social institutions, most importantly, economic markets and public opinion.").

249. *See, e.g.*, Volokh, *supra* note 8, at 820–38 (detailing many different flaws with TRI data); Dana C. Dolinoy & Marie Lynn Miranda, *GIS Modeling of Air Toxics Releases from TRI-Reporting and Non-TRI-Reporting Facilities: Impacts for Environmental Justice*, 112 ENVTL. HEALTH PERSPS. 1717, 1723–24 (2004) (describing spatial distribution issues inherent in TRI data).

250. *See* Sammy Zahran, Terrence Iverson, Stephan Weiler & Anthony Underwood, *Evidence that the accuracy of self-reported lead emissions data improved: A puzzle and discussion*, 49 J. RISK & UNCERTAINTY 235, 235 (2014).

251. Polsky & Schwarzman, *supra* note 99, at 830–31 (discussing Prop 65's focus on chemicals causing cancer or reproductive health issues); Volokh, *supra* note 8, at 820–24 (describing the limitations of TRI's reporting of toxic chemicals by weight).

252. Cohen, *supra* note 24, at 10428.

253. *See* Tietenberg, *supra* note 12, at 590 (noting that the "environmental risk faced by a community is determined by somewhat complex causation process").

254. Volokh, *supra* note 8, at 839 (discussing the limitations of data provided through TRI in generating accurate risk assessments).

255. Cohen, *supra* note 24, at 10427 (describing the use of predictive indicators in private certification); Karkkainen, *supra* note 112, at 938 (noting that in NEPA "predicted impacts of the proposed action will often turn out to be incomplete or simply erroneous").

disclosure is relatively simple. Despite the simplicity, companies are often concerned about sharing environmental data that may reveal confidential information about their operations.[256] Effective corporate lobbying can make information-forcing regulations politically unpalatable. Other types of actors, from households to nonpoint sources, are subject to different types of information regimes based around baseline governmental monitoring.

The information goals of information-forcing regulation are further undermined by how data is received, stored, and made available by government regulators. In general, outdated data architectures make this information difficult or impossible to access even in intra-agency contexts. This is perhaps nowhere more apparent than in NEPA, where a wealth of environmental information is currently locked in Environmental Impact Statement PDFs, only some of which are readily available to the public.[257] As environmental researchers increasingly use big data and AI advances to gather and analyze large datasets, the siloed and antiquated ways of information disclosure under information regulations prevent this data from being added to large environmental datasets and used in new methods of analysis.[258]

Information regulation assumes an "if you provide it, they will come" attitude toward information. The fundamental belief that more data is better, without fully understanding its ultimate use in other regulatory processes, means that data is being amassed with no clear end purpose in mind. This is a common attitude across government and private sector entities, but collecting data just for the sake of collecting data without clear end uses in mind does not generate useful data.[259]

3. Promoting Public Transparency

Disclosure programs are also not meeting their public transparency goals.[260] Implicit and explicit in the adoption of informational regulation is the idea that these efforts promote transparency and produce public goods by increasing data available to the public. The strongest rationale for the provision

256. *See, e.g.*, Annie Brett, *Information as Power: Democratizing Environmental Data*, 2022 UTAH L. REV. 127, 151–53 (2022) (describing the privacy concerns of fishermen in response to data sharing laws).

257. Wishnie, *supra* note 205, at 648.

258. For a discussion of how emerging technologies and data processing are being applied in environmental law see generally Sonya Ziaja, *How Algorithm Assisted Decision Making Is Influencing Environmental Law and Climate Adaptation*, 48 ECOLOGY L.Q. 899 (2021); Brett, *supra* note 256.

259. *See, e.g.*, *Environmental Data Management Best Practices*, INTERSTATE TECH. REG. C., https://edm-1.itrcweb.org/environmental-data-management-best-practices-overview-of-guidance-documents/ [https://perma.cc/3ZRP-NUU7] (discussing precise data collection as one component of a best-practices protocol for generating useful information for policymakers).

260. Kuh, *supra* note 18, at 662 ("The failure of environmental informational regulation to educate the public as an audience while nonetheless supporting upstream catalyst effects suggests some important insights. First and most plainly, disclosure is not functioning well to directly inform or engage the lay public.").

of information to the public is framed as the public's right to know, though the contours of right to know as a legally established right remain unclear.[261] The hope with TRI, for instance, was not just that it would cause firms to decrease pollution on their own but also that by providing information to the public through right-to-know provisions it would spur communities to monitor conditions in their areas and work with industry to improve environmental outcomes.[262] This has not been the case, and by and large, the data generated from information regulation remains inaccessible to the public. This not only undermines the effectiveness of the regulation, but it can also promote adverse outcomes.[263] This theoretical concern has proven to be well founded, with recent research reiterating how information regulation has largely failed to achieve its transparency goals.[264]

When critiquing information regulation's failure to achieve transparency goals, academics argue these issues stem from biases and the public's lack of understanding or from the government's lack of effective communication.[265] Implicit in this criticism is the assumption that if perfect information was communicated and understood, information regulations would achieve their purposes.[266] Under this view, transmitting information in understandable ways is the only practical barrier that stands in the way of success of information regulation. This Article goes beyond this criticism to argue that even in a world of perfect information transfer, information regulation often fails to achieve its purposes. The cause is not communication or understanding failures, but fundamental flaws in the gaps that information regulation is intended to fill.

The reality of information regulation is that these efforts often benefit a very small set of sophisticated corporate actors and create little environmental transparency for the public. In the case of climate risk disclosures, for instance, investment firms with strong analytical capabilities can leverage disclosed data to make better decisions about structuring investments in the face of climate

261. *See generally* Roesler, *supra* note 83 (describing justifications for the right-to-know based on freedom of speech, liberty interests, and health rationales but noting that the legal status of this right often lacks recognition).

262. *What is EPCRA?*, EPA, https://www.epa.gov/epcra/what-epcra [https://perma.cc/6HWX-T67V] ("The Community Right-to-Know provisions help increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities, working with facilities, can use the information to improve chemical safety and protect public health and the environment.").

263. *See Sunstein*, *supra* note 9, at 627 (noting that "[i]f information is not provided in a clear and usable form, it may actually make people less knowledgeable than they were before, producing overreactions, or underreactions, based on an ability to understand what the information actually means"); JAMES T. HAMILTON, REGULATION THROUGH REVELATION: THE ORIGIN, POLITICS, AND IMPACTS OF THE TOXICS RELEASE INVENTORY PROGRAM 55 (2005) (describing how communities focus on the volume of toxics released and not the degree of toxicity of the chemical in question, leading to negative publicity for companies with relatively minor toxic releases).

264. *See* Kuh, *supra* note 18, at 662.

265. *See* Sunstein, *supra* note 9, at 627.

266. *Id.*

risks.[267] This benefits many firms, which have created entirely new markets in selling these information products to others.[268] Meanwhile, the general public can only access limited and low-quality information, exacerbating existing inequities and raising new environmental justice concerns.[269] Moving beyond the rhetoric of transparency in information regulation to understand its limitations in practice is necessary to begin reevaluating the role of government in the provision of environmental information for the public.

The reach and impact of information on communities influence the actions taken as a result. For instance, radon testing at the home buying stage that shows elevated radon levels leads to high levels of mitigation.[270] Radon testing conducted once homeowners buy their homes leads to very low levels of mitigation.[271] Coupled with this is the question of who information actually reaches.[272] It is likely to be wealthy, more environmentally aware communities.

For information-based regulation to work, it is essential that collected information is disseminated in ways that make it accessible and understandable for impacted parties.[273] Current disclosure programs suffer from widespread data inaccuracies and lengthy timelines before data is made available to the public.[274] When information is made available, it is often done so in formats or venues that are inaccessible or unknown to the majority of the public.[275]

It is worth noting that information regulation may have important indirect impacts beyond these direct goals. Polsky and Schwarzman, for instance, show

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267. *See* Madison Condon, *Climate Services: The Business of Physical Risk*, 55 ARIZ. ST. L.J. 147, 175–76 (2023) (describing investments based on climate information and in-house climate analytics in large companies like Amazon).

268. *Id.* at 151 ("An increasing number of consultancies, financial technology firms, data providers, and investment advisory groups offer information about localized physical climate risks, like floods, hurricanes, and wildfires. The past few years have seen rapid consolidation of companies that offer "environmental, social, and governance" ("ESG") related financial analysis, with more than fifty providers merged into a handful of financial services firms, like ratings agencies and index providers.").

269. *Id*. at 147 ("A growing number of investors, insurers, financial services providers, and nonprofits rely on information about localized physical climate risks, like floods, hurricanes, and wildfires. The outcomes of these risk projections have significant consequences in the economy, including allocating investment capital, impacting housing prices and demographic shifts, and prioritizing adaptation infrastructure projects. The climate risk information available to individual citizens and municipalities, however, is limited and expensive to access.").

270. Tietenberg, *supra* note 12, at 595.

271. *Id.*

272. *See id.* at 600 ("The literature also raises a cautionary note with respect to the distributional impacts of disclosure strategies. Can it be that in certain circumstances disclosure strategies benefit only the more educated victims? When actions taken by victims have a strong regional component (as, for example, with the complaint processes examined in the China study), resources may be diverted from less educated (less vocal) regions and toward the more educated regions which complain more.").

273. *Id*. at 591.

274. Cohen, *supra* note 24, at 10427 (noting that TRI data takes up to eighteen months to release).

275. *Id.* ("[D]isclosure programs are generally designed to provide information to environmentally knowledgeable people rather than to the average citizen attempting to learn about the environment. Emissions information is generally disclosed without related hazard or risk content to place the information in a more meaningful context.").

the extent and importance of these indirect benefits in the case of Prop 65.[276] A holistic look at information-forcing regulation requires grappling with these indirect impacts in addition to the stated goals of the regulations themselves.

B. What Are the Harms of Information Regulation?

Beyond failing to meet their stated goals, unsuccessful information-forcing regulations can have negative impacts that increase environmental and social harms over time.

1. Preventing New Regulation

The largest criticism of information regulation is that these relatively weak laws take the place of necessary, stronger regulations. Information disclosure is a politically palatable approach, making it easier to pass than stricter command and control environmental laws. Thus, when it is infeasible to enact more stringent environmental laws, information regulation becomes an attractive option that scholars argue can provide the basis for more strict regulation in the future.

In practice, weak information regulation does not generally lead to more strict regulation. Moreover, single action bias and other well-described phenomenon show that making one step, even if it is a relatively weak one in the form of a disclosure law, can mitigate the urgency to take additional steps in the future.[277] Having information regulation in place leaves politicians, managers, and the public with the impression that the environment is well regulated through these disclosure mandates. Evidence shows that this is probably a misplaced assumption.[278]

2. Harms to Communities

Professor Katrina Kuh has argued extensively that information regulations often fail to achieve their public accountability goals.[279] The public is generally unaware of information generated as part of information forcing or other information-oriented regulatory programs.[280] The rationale that these mechanisms provide accountability is weak.

Local communities are not using information in the ways that proponents of transparency regulations argue that they will.[281] In other contexts, scholars

276. *See generally* Polsky & Schwarzman, *supra* note 99.

277. Jiaying Zhao & Yu Luo, *A Framework to Address Cognitive Biases of Climate Change*, 109 NEURON 3548, 3549 (2021).

278. *See supra* Part II.

279. *See generally* Kuh, *supra* note 18.

280. *Id*. at 660 ("Interestingly, public disclosure appears to exert a powerful influence despite the fact that individuals typically remain largely unaware of or fail to understand the information subject to disclosure.") (emphasis omitted).

281. *Id*. at 660–61.

have noted that transparency-based accountability attempts in rapidly changing, complex fields often lead to "accountability theater" as opposed to real accountability.[282] Environmental issues, while different than the online platforms that this argument is often applied to, share many similarities in the speed of change and the complexity of the problems that render simple accountability measures meaningless. The presence of these measures though, even if substantively useless, can create an aura of transparency and accountability that ultimately undermines community engagement or future attempts to regulate.

The perverse impacts of information regulation on accountability and engagement arise when, instead of empowering communities with more information, disclosure regulations primarily benefit the most sophisticated private actors. Because of the difficulty of accessing and analyzing new environmental information provided by the government, only relatively large companies with well-trained data scientists or significant resources are able to take advantage of this information. Instead of leveling the information playing field and improving the likelihood of efficient Coasean outcomes, information disclosure regulations simply solidify, and in many cases may exacerbate, existing power imbalances.

Historically, NGOs were important translators of this government information into forms that the public and local communities can use. Though their role in information translation generally remains important, they have become less involved with translating information from disclosure laws over time. This may be attributable to the quirks of philanthropic funding, which make it difficult to get funding for long-term projects that have few attractive, new features. For instance, Funding the Toxics 100 list, which was based on TRI disclosures over the span of several decades, is not something that most NGOs are able to do. Relying on these entities to do translation leads to imperfect outcomes.

The rise of the information economy is leading to concerns about how big data may exacerbate inequities across the board. Although big data holds high potential for "democratization" by increasing public access to information, these concerns recognize that, in practice, data analysis and utilization are being done by sophisticated corporate actors. This heightens information imbalances, as several very large data companies can use vast amounts of data to glean increasingly specific insights about everything from environmental conditions to consumer behavior. Meanwhile, the public not only has no access to this data but often not even an understanding of the breadth of information that is potentially available and being used.

282. *See* Evelyn Douek, *Content Moderation as Systems Thinking*, 136 HARV. L. REV. 526 (2022).

3. High Costs

While some information-forcing regulations, like TRI, have relatively low compliance costs, others, like NEPA, can represent insurmountable hurdles due to the extensive resources needed to comply. In some cases, the costs of compliance may outweigh the benefits of information regulation.[283] High compliance costs are a major drawback to information regulation outside of the environmental industry, such as the FDA's disclosure rules.[284]

Even in cases where information regulation has relatively low economic compliance costs, the burdens these regimes place on regulated entities and regulatory agencies may significantly impact behavior. These "information burdens" are largely unevaluated and may significantly interfere with goals of information regulation.[285] The outdated assumptions about the ease of obtaining information on environmental conditions, embedded into the blockbuster regulations of the 1970s, created many of these burdens. However, even in the face of improving technologies and increased data availability, the assumptions embedded into current disclosure regulations are similarly unrealistic.

IV.
CONSTRUCTING SUCCESSFUL INFORMATION REGULATION

This Section discusses remedies to information regulation's current failures to catalyze environmental outcomes. The false promises of transparency throughout environmental law prevent achieving actual transparency goals, intensify existing environmental justice concerns, and commit government resources to ineffective ends. This Section considers concrete recommendations for better constructing and using information disclosure created by information-forcing regulation.

The most important feature of information-forcing regulation is a deliberate design that lays out the anticipated mechanisms of action, identifies clear pathways to achieve stated environmental goals, and develops procedures to overcome potential points of failure. Information regulation does not rely on a single mechanism to be effective. Thus, it may be necessary to embrace and improve a broad range of mechanistic forces, in different ratios depending on the situation, to drive environmental outcomes.[286]

283. Sunstein, *supra* note 9, at 626.

284. *Id*. at 626.

285. Karkkainen, *supra* note 36, at 1412.

286. Karkkainen, *supra* note 7, at 328 (2001) ("There is reason to be skeptical that TRI's results can be reduced to any mono-causal explanation, or indeed, to the sum of a set of isolated causes. Given the breadth, depth, and rapidity of reductions in TRI-monitored pollutants, the variety of circumstances under which those improvements appear to have occurred, and the apparently interlocking and mutually reinforcing character of the various strands of explanation, it seems far more likely that causation is multiple, consisting of a number of interdependent elements that may nonetheless be present in differing quantities from case to case.").

The case study evidence in this Article suggests that the persuasive and economic mechanisms of information regulation are not particularly effective. Instead, information regulation works when there are strong legal incentives: either through the creation of collaborative pathways between regulators and industry (as in the case of Prop 65) or procedural burdens that incentivize actors to improve environmental outcomes to avoid these burdens (as in the case of NEPA).

Those who have recognized the flaws with information-disclosure regulations largely call for improving these regulations by broadening them, working to improve reported data, and increasing public access to data.[287] This Section argues that broadening information regulations alone will not cure the flaws at the center of these approaches unless the mechanisms underlying information regulation are addressed. It specifically looks at two goals of information regulation—behavior change and information provision—to analyze how information regulation should be altered to better achieve these objectives.

A. Improving Information Through Better Data Systems

It is possible that the information benefits of information regulation can be improved in the future. The potential for information regulation to contribute important new environmental information to regulators and the public remains high. However, current regulations largely fail to fulfill these goals because of poor data quality and ineffective data architectures within the government.[288] Deliberate efforts to improve these data processes and architectures could go a long way in improving the information value of information regulation. Along with improvements to standardized data collection and reporting methodologies, creating incentives and checks to ensure the accuracy of information submissions could improve quality and usability of the generated data.

If agencies adopt a more aggressive role in using information disclosure to shape public opinion and alter regulatory programs, this may be one way of increasing the effectiveness of the information obtained under information regulation.[289] Improving what happens to information once it is disclosed to the government could help to drive improved information regulation outcomes. The accessibility of this information does not seem to be a key determiner of whether information-forcing regulations are successful in improving environmental conditions, but it is an important component in achieving the transparency goals of information regulation. For information-based regulation to work, it is

287. *See, e.g.*, Durham-Hammer, *supra* note 85, at 352–56.

288. *See* Karkkainen, *supra* note 112, at 923 (describing the issues with the way NEPA data is structured and shared).

289. William F. Pedersen, *Regulation and Information Disclosure: Parallel Universes and Beyond*, 25 HARV. ENVTL. L. REV. 151, 153–54 (2001) (advocating for more active agency involvement in gathering and sharing data).

essential that collected information is disseminated in ways are accessible and understandable for impacted parties.[290] Current disclosure programs suffer from widespread data inaccuracies and lengthy timelines before data is made available to the public.[291] When information becomes available, it is generally done so in formats or venues that are inaccessible or unknown to the majority of the public.[292] The reality of informational regulation is that little information is available to the public in accessible or transparent ways, further exacerbating existing environmental justice concerns. These efforts instead often benefit a very small set of sophisticated corporate actors and create minimal environmental transparency for the public.

Increasing information disclosure by the government historically has done little to remedy targeted issues. The takeaway should not be that information cannot be helpful. Cristina Koningisor's robust research, for instance, shows that information initiatives built by the private sector to provide transparency into public sector activities are an important component of improving accountability and spurring positive social outcomes.[293] In these cases, the fact that information originates from outside of the government is a critical component of providing successful accountability.

The provision of information alone is probably insufficient as a mechanism to dramatically alter behavior and subsequent environmental outcomes. Common reasons for the failure of information regulation stem from the assumptions made by regulators that public or private firms will respond to new information and change their viewpoints accordingly. Extensive research shows that new information generally does not lead to dramatic behavior changes, suggesting that this fail-point is entirely unsurprising.

B. Achieving Behavior Change: Recommendations for the SEC

The legal mechanisms of information regulation drive the success of these laws. Information regulation must do more than mandate the simple provision of information to achieve behavior change goals in the future. Market incentives alone are insufficient to motivate environmental improvements, but indirect incentives stemming from the design of information regulation could fill this gap. For example, NEPA creates procedural burdens that incentivize agencies to reduce environmental burdens to avoid triggering them. Similarly, Prop 65 requires companies to create warnings and materials for the public, and while

290. *See* Tom Tietenberg, *Disclosure Strategies for Pollution Control*, 11 ENVTL. & RES. ECON. 587, 591 (1998).

291. Cohen, *supra* note 24, at 10427 (noting that TRI data takes up to eighteen months to release).

292. *Id.* ("[D]isclosure programs are generally designed to provide information to environmentally knowledgeable people rather than to the average citizen attempting to learn about the environment. Emissions information is generally disclosed without related hazard or risk content to place the information in a more meaningful context.").

293. *See generally* Koningisor, *supra* note 32.

more trivial than NEPA's, this burden deters companies choosing whether or not to use listed materials and provides opportunities for private litigation.

Another possibility is coupling better information with market-based regulatory instruments, which move beyond SEC style disclosure, and tie the fluctuation of price signals to environmental attributes by rule rather than relying on the judgment of market actors. Some have noted that emerging approaches to market regulation, from carbon taxes to tradeable emissions permits, rely on good quality information about the environment.[294] If market-based regulation exists in a specific area, information regulation could be used to improve the production of information relevant to the market. In the absence of market or other incentive structures that are tied to the provisions of information regulation, information regulation will continue to fail.

Perhaps the most ambitious environmental disclosure program currently in the process of being implemented is the SEC's new climate disclosure rules.[295] These new rules marry environmental disclosure, which the case studies demonstrate is largely ineffective, with SEC disclosure requirements, which are widely believed to be an extremely effective tool. Understanding the limits of information disclosure in environmental law presents several important lessons for the SEC's approach to climate risk disclosure.

In 2010, the SEC released the first round of climate risk disclosure guidance.[296] Interestingly, while not the focus of this Article's evaluation of effectiveness, early evidence suggests that these pre-2010 disclosure guidelines have not produced significant outcomes.[297] Driven by general public and investor concern and a tidal wave of voluntary environmental, social, and governance (ESG) disclosure programs, the SEC in 2022 announced a new, more comprehensive rule intended to require disclosure of climate risks in addition to other material risk disclosures.[298]

In general, SEC disclosures are required for material risks. The "material" limitation is foundational to the effectiveness of the SEC's disclosure requirements. Investors are interested in, and will directly act against, material risks because such risks may impact the economic viability of a firm. Materiality ensures there is a direct link between the information disclosed and the

294. Karkkainen, *supra* note 7, at 271–74 (describing how better environmental information is important to market-based regulation).

295. Declan Harty, *SEC Nears Final Vote on Landmark Climate Risk Reporting Rule*, POLITICO (Feb. 16, 2024), https://subscriber.politicopro.com/article/2024/02/sec-nears-final-vote-on-landmark-climate-risk-reporting-rule-00141996 [https://perma.cc/8888-Q8AA] (describing the SEC rule as "among the most ambitious rulemaking efforts underway").

296. Commission Guidance Regarding Disclosure Related to Climate Change, 75 Fed. Reg. 6290, 6291 (Feb. 8, 2010).

297. Perhaps because they did not create legally binding requirements. Lisa Benjamin, *The SEC and Climate Risk*, 40 UCLA J. ENVTL. L. & POL'Y 1, 21, 21–24 (2021).

298. The Enhancement and Standardization of Climate-Related Disclosures for Investors, 87 Fed. Reg. 21334 (proposed Apr. 11, 2022) (to be codified at 17 CFR 210, 229, 232, 239, and 249) https://www.sec.gov/files/rules/proposed/2022/33-11042.pdf [https://perma.cc/ZYN9-KRJY].

responsive action. There are several types of material risks from climate change: physical risks to commercial infrastructure, transition risks as regulatory regimes shift, and possibly private environmental governance (PEG) transition risks as firms increasingly take part in voluntary sustainability standards and initiatives.[299] However, scholars recognize that climate and other environmental risks are often not material risks under the traditional SEC view.[300] Instead, the overall threat of climate change warrants rethinking the materiality standard to support broad societal action.[301]

Moreover, the promulgation of an information-forcing standard that would achieve environmental goals may require the SEC to look beyond economic pathways as a medium for spurring regulated actors. If information disclosure rules require some kind of mechanistic penalty, such as the procedural burdens imposed by NEPA and Prop 65 when companies engage in environmentally undesirable behavior, then the SEC's climate rules, which apply to all companies regardless of their overall impacts, are unlikely to successfully drive major shifts in corporate behavior. Instead, as in the case of TRI, the SEC's rules rely on the assumption that the market will react effectively to new information. This analysis shows the weakness of this approach. Without other indirect incentives for companies to reduce their climate risk, such as a reduced reporting burden, it seems unlikely that the SEC's requirement will have significant impacts over time on company behavior.

The SEC's climate rules also suffer from the same data quality and heterogeneity issues that plague TRI, NEPA, and other forms of environmental information disclosure. Disclosures are only useful to market participants if they provide some kind of actionable information. In the case of the SEC's climate risk disclosures, a key element for investors is understanding relatively how risk compares between different companies. Unfortunately, heterogeneity in disclosures between firms already limits the utility of the SEC's 2010 rules.[302] Without minimal required methods or benchmarks for reporting, it is up to companies to determine what they disclose.[303] This makes comparing firms essentially impossible. Moreover, climate risk is an extremely complex topic. The seemingly simple choice of which climate models and assumptions to use is

299. For a broad overview of these categories, see Vandenbergh, *supra* note 230, at 1701–02.

300. *See* Cynthia A. Williams, *The Securities and Exchange Commission and Corporate Social Transparency*, 112 HARV. L. REV. 1197, 1263–73 (1999); Jill E. Fisch, *Making Sustainability Disclosure Sustainable*, 107 GEO. L.J. 923, 950–51 (2019).

301. Vandenbergh, *supra* note 230, at 1700.

302. Vandenbergh, *supra* note 230, at 1698–99 (providing concrete examples of heterogenous disclosures).

303. While the SEC is likely to use TCFD as a reporting framework for new disclosure requirements, see SEC, *The Enhancement and Standardization of Climate-Related Disclosures for Investors* (Apr. 11, 2022), https://www.federalregister.gov/documents/2022/04/11/2022-06342/the-enhancement-and-standardization-of-climate-related-disclosures-for-investors, this framework presents many issues for reporting. Paul Griffin & Amy Myers Jaffe, *Challenges for a Climate Risk Disclosure Mandate*, 7 NAT. ENERGY 2 (2021).

likely to have dramatic impacts on the potential risk reported by a company. Yet only the most sophisticated investors are likely able to understand these choices and interpret their implications.

Moving forward, other scholars have called for the standardization of the SEC's climate disclosures.[304] This would certainly align climate rules with best practices in information disclosure. However, it is unlikely that the climate rules, even with good and comparable data, will lead to meaningful investor action unless clearer penalties are tied to disclosed information.

CONCLUSION

Information-forcing regulations are not having the sweeping, positive impacts on behavior that legal academics and managers have long accepted as true. Instead, information regulation is much more of mixed bag. Under closer scrutiny, TRI, the paradigmatic example of information regulation's success, turns out to have no durable impacts on environmental performance. This extends not only to the behavior-change goals of information regulation, but also to its goals of improving environmental information availability and increasing transparency for the public. Information regulation as a whole is largely failing to meet these goals, throwing into question long-held assumptions about the efficacy of disclosure in environmental law. However, there are discrete instances of success that show the path forward for information regulation.

An in-depth look at the mechanisms underlying information regulation reveals that the failures of TRI and other information regulation relying solely on market incentives are predictable. Consumer opinion and behavior are less susceptible to new information than was once believed as true when many disclosure laws were initially passed. However, other legal mechanisms are driving positive results under information-forcing laws. These legal mechanisms create both new pathways for collaboration between regulators and regulated entities and informal incentives that can prove powerful in changing behavior.

Moving forward, information regulation must capitalize on these mechanisms if it hopes to be successful. New disclosure regulations motivated by technological advances of big data are blossoming, yet few adequately address the illustrated failures of previous information regulations. If policies like the SEC's proposed climate risk disclosure rules are to be successful, they must be redesigned to take advantage of effective information mechanisms.

304. Madison Condon, Sarah Ladin, Jack Lienke, Michael Panfil & Alexander Song, *Mandating Disclosure of Climate-Related Financial Risk*, 23 LEG. & PUB. POL'Y 745, 789 (2021).