

DYNAMIC GOVERNANCE IN THEORY AND APPLICATION, PART I

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This Article is the first of two that grapple with a central policy challenge facing the administrative state: how to govern in times of dynamic change when challenges, and opportunities to address them, are both shifting rapidly. It suggests that, conceptually, process design that is likely to produce effective regulatory governance requires attention to three key distinct but interrelated variables: (1) the actors who are or should be involved in program implementation in different capacities; (2) the mechanisms (legal and otherwise) available to promote good governance; and (3) the tools available to advance desired results. To demonstrate the value of this conceptual framework, this Article assesses the federal Environmental Protection Agency's ("EPA") ongoing experiment in transforming its approach to regulatory enforcement. It explores the reasons for EPA's judgment that a dramatically altered regulatory landscape requires it to transform its enforcement strategies. It then analyzes what EPA has characterized as a new enforcement and compliance paradigm, which the agency calls Next Generation Compliance. This Article demonstrates how use of our conceptual framework to systematically consider the roles of the relevant actors, mechanisms, and tools, individually and in combination with one another, helps to identify beneficial regulatory options that alternative frameworks like the one EPA has used in designing Next Generation Compliance may overlook. The companion Article will further document how our framework will help promote more systematic regulatory design when policymakers believe that a transformation or a new paradigm is needed, such as the situation EPA faces in environmental enforcement. Our analysis underscores the value of our three-pronged conceptual framework in areas that extend well beyond environmental regulation.

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INTRODUCTION

“Change is constant in nature and society.”¹ In particular, “institutional change is constant and inevitable.”² Indeed, some have characterized the constancy and inevitability of change as “the organizing principle of democracy.”³ The unceasing nature of change poses challenges to governance regimes, including government regulatory programs. In some instances, the policymakers who created these programs built into them processes and standards for responding to changes in the scope or nature of the problems these programs are designed to address. In other instances, policymakers have not foreseen change, or at least have not foreseen the particular shifts in circumstances that confront government officials responsible for implementing the programs.⁴ In such instances, the risk that change will frustrate policymakers’ goals is likely to increase, especially if it is abrupt or unprecedented.

This Article grapples with this central and recurring policy challenge: how to structure and administer regulatory programs in times of dynamic change, when challenges, and opportunities to address them, are both shifting rapidly. We believe it is incontrovertible that regulatory design has the potential to facilitate or thwart policymakers’ efforts to implement regulatory programs in the face of change in a manner consistent with programmatic goals identified by legislators.⁵ We further believe that the recent scholarly attention to the adaptability of legal regimes, and to the use of *ex ante* versus *ex post* decision-making approaches,

1. Moonhawk River Stone, *Approaching Critical Mass: An Exploration of the Role of Intersex Allies in Creating Positive Education, Advocacy and Change*, 12 *CARDOZO J.L. & GENDER* 353, 358 (2005); see also Guyora Binder, *Representing Nazism: Advocacy and Identity at the Trial of Klaus Barbie*, 98 *YALE L.J.* 1321, 1369 n.293 (1989) (citing 1 *SELECTED WORKS OF MAO TSE TUNG* 341–42 (1965)) (stability is ephemeral, change is constant); Steven Johnston Knopp, *More Change and New Directions*, 2008 *W. VA. L. (APR.)* 4 (2008) (“If there is one unchanging truth in the universe, it is that change is constant.”). This insight is not new. See, e.g., WILLIAM SHAKESPEARE, *THE SECOND PART OF KING HENRY THE FOURTH*, act 3, sc. 1 (“[H]ow chances mock/And changes fill the cup of alteration/With divers liquors!”).

2. Michael Halberstam, *The Myth of “Conquered Provinces”: Probing the Extent of the VRA’s Encroachment on State and Local Autonomy*, 62 *HASTINGS L.J.* 923, 947–48 (2011).

3. Steven G. Gey, *Is Moral Relativism a Constitutional Command?*, 70 *IND. L.J.* 331, 368 (1995).

4. There may be considerable uncertainty about the adaptability of a legal regime to address new challenges. See, e.g., *Massachusetts v. EPA*, 549 U.S. 497, 528–33 (2007) (discussing competing perspectives offered by different EPA General Counsels).

5. In *Massachusetts v. EPA*, for example, the Court concluded that Congress intended to delegate to EPA the authority to address particular forms of air pollution whose potential adverse impacts Congress was unaware of when it adopted the Clean Air Act. 549 U.S. 497, 528–34 (2007). The case illustrates the capacity of a regulatory design to give regulators the authority to forge ahead in new directions that were unanticipated at the time of program formation but that advance statutory goals.

offers considerable insight concerning the issues policymakers and others need to consider in dynamic times.⁶

Our purpose in this Article is to suggest a three-part conceptual framework to assist policymakers seeking to design regulatory structures likely to produce effective governance in dynamic circumstances. The framework identifies as key regulatory design considerations the roles of each of: (1) the *actors* who are or should be involved in different capacities in administering the governance regime; (2) the *mechanisms* (legal and otherwise) available to promote regulatory goals; and (3) the *tools* available to policymakers and other stakeholders to advance desired results. Policymakers should be cognizant of the manner in which options for addressing each of these three variables are likely to affect the desired functioning of the other two. Thus, for example, a legal mechanism for advancing regulatory goals, such as the use of enforcement actions to induce compliance with regulatory standards, may work better if it is controlled by one actor or a combination of actors. Similarly, the availability of new regulatory tools may suggest the need for a shift in the roles played by the actors involved in

6. There is an emerging literature on adaptive governance and adaptive management, and on the use of *ex ante* versus *ex post* decision-making processes. *See, e.g.*, Brian C. Chaffin et al., *A Decade of Adaptive Governance Scholarship: Synthesis and Future Directions*, 19 *ECOL. & SOC'Y*, no. 3, 2014, art. 56, <http://www.ecologyandsociety.org/vol19/iss3/art56/>; Robin Kundis Craig & J.B. Ruhl, *Designing Administrative Law for Adaptive Management*, 67 *VAND. L. REV.* 1 (2014); Kirsten H. Engel, *Policy Innovation Under Dynamic, Adaptive Federalism and Democratic Experimentalism Compared: Lessons for Federalism and Climate Change Adaptation Policy* 2 (Ariz. Legal Stud., Discussion Paper No. 16-01), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2710760 (describing democratic experimentalism as a “theory of governance intended to encourage continuous improvement in the problem-solving capabilities of local governing units in a federal or decentralized system of government”); David L. Markell, *Emerging Legal and Institutional Responses to Sea-Level Rise in Florida and Beyond*, 42 *COLUM. J. OF ENVTL. L.* (forthcoming 2016) (text at notes 9–11, 201–09) (identifying adaptive governance, adaptive management, resilience scholarship, and democratic experimentalism as scholarly literatures that address dynamism in the context of sea-level rise). The literature on resilience theory applies the science of complex adaptive systems to the natural and social sciences. J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems—with Applications to Climate Change Adaptation*, 89 *N.C. L. REV.* 1373, 1379 (2011) (considering “how we might map resilience theory principles onto legal systems in order to better understand when legal systems are and are not resilient”). Professor Cosens describes resilience theory as follows:

Resilience theory provides a framework for understanding complexity within an ecological system and for developing governance to enhance the resilience, and thus sustainability, of the social-ecological system. When applied to ecological systems without a human component, resilience theory focuses on the capacity of the system to return to its prior level of self-organization following a disturbance.

Barbara Cosens, *Transboundary River Governance in the Face of Uncertainty: Resilience Theory and the Columbia River Treaty*, 30 *J. LAND RESOURCES & ENVTL. L.* 229, 237 (2010).

implementing or affected by the program, as well as the opportunities that such a shift presents.⁷

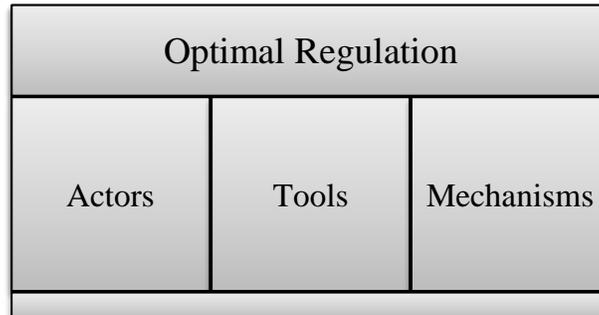


Figure 1

There is, of course, an important threshold question: Who should have the capacity to make the normative calls on whether and how to respond to change? Ideally, Congress, the most accountable policymaking body, in tandem with the President, would direct agency responses. Multiple factors make that outcome unrealistic, however, including the multiple veto gates in the legislative process,⁸ the legislative gridlock that has characterized recent legislative sessions,⁹ and the significant gap that often (and currently) exists between the policy agendas of Congress and the President. If Congress and the President fail to jointly take the bull by the horns through the adoption of legislation, decisions to effect transformations are left to the President acting unilaterally (such as by an executive order reorganizing agency structures) or agencies exercising delegated discretionary authority.¹⁰ If agencies take on the task of anticipating or responding to change in the absence of such action by the elected branches of government, a further question is whether they can be held accountable for the choices they make.

7. We demonstrate the value of this framework in both this Article, in which we introduce the framework and briefly consider its application to one aspect of environmental regulatory enforcement, and a second article on dynamic governance, in which we engage in a thorough application of each of the framework's components to EPA's effort to transform its approach to compliance and enforcement. See David L. Markell & Robert L. Glicksman, *Dynamic Governance in Theory and Application, Part II* (forthcoming) (on file with authors).

8. WILLIAM N. ESKRIDGE, JR. ET AL., *LEGISLATION AND STATUTORY INTERPRETATION* 79–81 (2d ed. 2006) (discussing veto gates); see also McNollgast, *Positive Canons: The Role of Legislative Bargains in Statutory Interpretation*, 80 GEO. L.J. 705, 720 (1992) (coining the term “veto gates” to describe the multiple kill points for national legislation).

9. See generally, e.g., Michael J. Teter, *Gridlock, Legislative Supremacy, and the Problem of Arbitrary Inaction*, 88 NOTRE DAME L. REV. 2217 (2013).

10. See generally, e.g., Abbe R. Gluck et al., *Essay, Unorthodox Lawmaking, Unorthodox Rulemaking*, 115 COLUM. L. REV. 1789 (2015) (discussing unorthodox lawmaking strategies in response to partisan gridlock, among other factors).

Agencies themselves can enhance their own accountability,¹¹ but the courts often provide the ultimate mechanism for ensuring that agency action conforms to legislative mandates and the rule of law when they resolve challenges to agency action.¹²

Regardless of whether Congress, the President, or an agency (or some combination of them) decides that regulatory redesign is needed in the face of change, policymakers will need to decide which actors should participate in effecting the transformation and what their respective roles should be. Accordingly, the first element in our framework, the actors, is designed to highlight the importance of identifying all of the relevant actors in any particular regulatory program and determining (or at least considering) the roles that each should play. In addition to federal officials, policymakers should account for the significant role that state actors may play. Environmental regulation, for example, is typically undertaken through a “cooperative federalism” institutional structure that carves out roles for both EPA and the states.¹³ Both citizens and regulated parties also have a role to play in this regulatory compliance regime, and in some cases, local governments may as well.

Policy design needs to consider how each of these actors can promote regulatory objectives in light of factors such as their respective capacities and the legitimacy of allocating implementation authority to each of them. For example, in previous work we have demonstrated that use of a cooperative federalism system in the environmental laws has at times compromised the legitimacy of the regulatory state by undermining accountability and transparency.¹⁴ Policy design that is based on a cooperative federalism approach should reflect an awareness of the potential for such a scheme to generate unintended consequences and

11. See Emily Hammond & David L. Markell, *Administrative Proxies for Judicial Review: Building Legitimacy from the Inside-Out*, 37 HARV. ENVTL. L. REV. 313, 319 (2013) (discussing the concept of inside-out governance when agency accountability through judicial review is likely to be limited).

12. See, e.g., *Texas v. United States*, 809 F.3d 134, 168–71 (5th Cir. 2015), *aff’d by an equally divided court*, 136 S. Ct. 2271 (2016) (raising questions about the parameters for different actors to pursue policy initiatives in the administration and enforcement of the immigration laws). Congress can still try to play a role, such as by using its oversight authority or by enacting appropriations bills. Further, it also may influence agency efforts to respond to change through the nature of the delegation it provides, but only if it adopts legislation that the President is willing to sign or if it is able to override a presidential veto. This Article addresses the ensuing question of how the responsible policymaking entity should design regulatory programs to enhance their effectiveness and does not focus in detail on the issues discussed in the text.

13. For a description of these respective roles under the Clean Air Act, and how some judges have grossly mischaracterized them, see Robert L. Glicksman & Jessica A. Wentz, *Debunking Revisionist Understandings of Environmental Cooperative Federalism: Collective Action Responses to Air Pollution*, in *THE LAW AND POLICY OF ENVIRONMENTAL FEDERALISM: A COMPARATIVE ANALYSIS* 3–27 (Kalyani Robbins & Erin Ryan eds., 2016).

14. See David Markell, “Slack” in the Administrative State and Its Implications for Governance: *The Issue of Accountability*, 84 OR. L. REV. 1, 44–46 (2005) [hereinafter Markell, *Slack*].

presumably should include efforts to ameliorate those concerns. Similarly, the use of private lawsuits to supplement government enforcement—including the “controversial . . . marked shift . . . away from administrative . . . enforcement and toward the use of private lawsuits”—has raised questions about the implications of such a shift for both regulatory effectiveness and accountability.¹⁵ Increasing reliance on regulated parties to monitor their own behavior similarly carries risks as well as benefits. These examples illustrate the importance of considering in policy design both the full range of potential actors and also the features of the mechanisms that enable different actors to participate.

The second element of our framework, the mechanisms, implicates the legal mechanisms available to an agency under its statutory authority in accomplishing transformational change in regulatory design. The mechanisms potentially available to an agency include planning, budgeting, issuing regulations, the adoption of policy statements or the exercise of policy discretion (such as a policy announcing the agency’s intention to reduce penalties for self-reporting of regulatory violations), issuing permits, and the use of adjudication and settlements to enforce regulatory violations.¹⁶ Those responsible for regulatory design should consider all of the available mechanisms. Further, they should evaluate the potential roles of different actors in implementing each available mechanism. For example, the significant shift from public to private enforcement as a regulatory tool reflects the importance of considering the types of enforcement mechanisms that should be included in a legal regime, including the features that each such mechanism should possess.¹⁷

A third set of questions involves an assessment of the tools at policymakers’ disposal to advance regulatory transformation in response to the dynamic character of challenges and opportunities. These are the activities used pursuant to the available legal mechanisms to help achieve the agency’s goals. In the context of agency enforcement programs, for example, the relevant tools are likely to include monitoring regimes, as well as features to enhance the transparency of compliance status. Electronic or other forms of reporting and third-

15. See, e.g., David F. Engstrom, *Agencies as Litigation Gatekeepers*, 123 *YALE L.J.* 616, 619 (2013); Mark Seidenfeld, *Empowering Stakeholders: Limits on Collaboration as the Basis for Flexible Regulation*, 41 *WM. & MARY L. REV.* 411, 459–66 (2000). We examine below citizens’ capacity to participate in governance through enforcement adjudication and other mechanisms. See *infra* Part IV.

16. See, e.g., Edward Rubin, *It’s Time to Make the Administrative Procedure Act Administrative*, 89 *CORNELL L. REV.* 95, 97 (2003) (listing priority setting, resource allocation, research, planning, targeting, guidance, and strategic enforcement, in addition to rulemaking and adjudication, as “modes of governance”).

17. The citizen-suit provisions of many of the federal environmental statutes illustrate the nuanced nature of this issue. Features include the possibility of recouping attorneys’ and other fees in certain circumstances, the possibility of preemption, the need for adequate notice, and the possibility of mootness, among others. For a two-part symposium on this topic, see generally Symposium, *Environmental Citizen Suits at Thirtysomething: A Celebration and Summit, Parts I & II*, 10 *WIDENER L. REV.* (ISSUES I & 2) 1 (2003–2004).

party verification are other tools that an agency such as EPA may encourage or require through a variety of mechanisms, including regulations, permits, and enforcement settlements. In other regulatory contexts, the tools will necessarily differ. In planning, for example, an agency might use a computer-modeling program to determine the impact of natural phenomena, agency actions, or regulated activities on progress toward identified agency goals. Further, tools that have served regulatory objectives well may be inadequate if the regulatory environment has shifted, and new or more sophisticated versions of old tools may become available as a result of technological changes or other innovations. The types of tools available may well affect the roles that different actors, including government officials, regulated parties, and citizens, should be expected and empowered to play. Similarly, an agency engaged in redesign should consider how best to use available legal and nonlegal mechanisms to promote desired use of different tools by different actors. Thus, all three variables in our framework need to be considered both independently and in tandem.

To illustrate the value of this three-pronged framework for designing regulatory programs and other governance mechanisms in ways that accommodate change, we begin, in Part I, by reviewing the ubiquity of change that implicates regulatory regimes and several of its triggers. In Parts II and III, we then ground our conceptual framework by applying it to the ongoing efforts of the Environmental Protection Agency (“EPA”) to transform its approach to regulatory enforcement because of the agency’s perception that changing circumstances required dramatic changes in governance approaches. Part II reviews some of the more significant traditional challenges EPA has faced in promoting compliance with the environmental laws, as well as some of the emerging challenges that are causing the regulatory landscape to shift beneath its feet. Part III briefly summarizes EPA’s recent, and still evolving, Next Generation Compliance (“Next Gen”) initiative to transform EPA enforcement in light of these traditional and emerging challenges. EPA describes Next Gen as embodying a new paradigm for promoting compliance.¹⁸ In Part IV we describe in general terms the advantages of the three-pronged conceptual framework we offer in regulatory policy design. We also show how use of our framework to consider the roles of citizens provides insights about design that might not otherwise emerge in the policy discussion about regulatory redesign. This case study demonstrates our framework’s conceptual advantages and its utility for real-world policy design. The discussion in Part IV sets the stage for the more detailed review of actors, mechanisms, and tools in the second of our two articles on *Dynamic Governance*. In that article, we continue to explore EPA’s Next Gen effort more thoroughly, using it as a case study to illustrate how the use of our framework might improve administration of that (and other) regulatory programs by identifying insights as to the proper combination of actors, mechanisms, and tools that are less likely to emerge from EPA’s reconceptualization of environmental compliance and enforcement structures.

18. Cynthia Giles, *Next Generation Compliance*, ENVTL. F., Sept.–Oct. 2013 at 22, 22.

I. REGULATORY DYNAMISM TRIGGERS

Effective regulatory design, including the design of enforcement programs, requires an understanding of the manner in which the regulatory environment, within and outside the agency, has shifted or is likely to shift over time and how those shifts affect the capacity of existing structures, programs, and strategies to achieve regulatory goals through the roles assigned to relevant actors, mechanisms, and tools.¹⁹ Several factors may account for the existence of a dynamic regulatory environment, any of which may present challenges to policymakers seeking to craft and administer effective regulatory programs.²⁰ This Part introduces some of the most important triggers for regulatory dynamism.

A. *Changes in the Physical World*

Changes in the physical world may create a need for changes in regulatory strategies.²¹ These changes are obviously of critical importance to the development of environmental law. As Professor Blake Hudson has recognized,

Our world is composed of dynamic natural resources. In the natural environment forests burn, rivers flood, sea levels rise, and climate changes Instead of continuing to allow dynamic shifts in resource use and preservation to outpace legal and policy solutions, a key challenge faced by modern society is to find congruity between the shifts and the solutions.²²

Hudson argues, for example, that new threats facing forest resources in the United States have triggered a need for an overhaul of the legal regulatory framework for forest management and that an appropriate response is the creation of minimum federal forest management standards.²³

19. See David L. Markell & Robert L. Glicksman, *A Holistic Look at Agency Enforcement*, 93 N.C. L. REV. 1, 40 (2014).

20. See David M. Driesen, *Legal Theory Lessons from the Financial Crisis*, 40 J. IOWA CORP. L. 55, 91 (2014) (“[O]ne cannot optimize the regulation of a dynamic system that makes frequent changes.”).

21. Under the “population ecology strain” of organizational theory, “an organization’s behaviors are understood primarily as responses to external stimuli which encourage the organization to find a niche.” Gwen Arnold & Forrest D. Fleischman, *The Influence of Organizations and Institutions on Wetland Policy Stability: The Rapanos Case*, 41 POL’Y STUD. J. 343, 350 (2013). These stimuli can include changes in the physical environment that affect the need for regulation to address impacts on regulated entities’ behavior or the manner in which regulation should operate.

22. Blake Hudson, *Dynamic Forest Federalism*, 71 WASH. & LEE L. REV. 1643, 1645–46 (2014).

23. *Id.* at 1647–51; see also *id.* at 1668 (calling for “a new wave of regulatory dynamism”); cf. John Robinson, Jr., *Rural Ozone Pollution: New Science, Old Rules*, 8 APPALACHIAN NAT. RESOURCES L.J. 149, 174 (2014) (“Dynamic regulations that can adjust quickly in response to new science, or to meet new public-health-related goals, should be the target.”); Christopher Serkin, *Passive Takings: The State’s Affirmative Duty to Protect Property*, 113 MICH. L. REV. 345, 371 (2014) (“[When] community needs are dynamic, the

Recent scholarship concerning climate change has also highlighted the challenges that changes in the physical world pose for legal regimes and institutional structures. As Professors Robert Deyle and William Butler put it, “Assumptions of stationarity are eroding”²⁴ As a result, environmental governance “must be[come] highly adaptive because of the[se] uncertainties.”²⁵ Legal scholars have begun to sound the same call, notably that climate change-related stresses are likely to trigger the need for significant reform.²⁶ Professor J.B. Ruhl predicts that “[d]emands on the legal system will be

state’s role in constituting property rights must also be dynamic. Regulations and obligations that were not justifiable before may become so over time”).

24. Robert E. Deyle & William H. Butler, *Resilience Planning in the Face of Uncertainty: Adapting to Climate Change Effects on Coastal Hazards in DISASTER RESILIENCY: INTERDISCIPLINARY PERSPECTIVES* 178, 178 (Naim Kapucu et al. eds., 2013); see also P.C.D. Milly et al., *Stationarity Is Dead: Whither Water Management?*, 319 *SCIENCE* 573, 573 (2008) (describing “stationarity” as “the idea that natural systems fluctuate within an unchanging envelope of variability,” and concluding that, because of climate change, “[s]tationarity is dead”).

Physical changes that trigger the need for regulatory responses can also be gradual. EPA, for example, identified hydrologic change, which may be gradual or abrupt. See Charles Rougé, Yan Ge & Ximing Cai, *Detecting Gradual and Abrupt Changes in Hydrological Records*, 53 *ADVANCES IN WATER RESOURCES* 33 (Mar. 2013), as a reason, among others, to alter a 30-year-old set of regulations governing the establishment and review of state water quality standards under the Clean Water Act. EPA, Water Quality Standards (“WQS”) Regulatory Revisions; Final rule, 80 Fed. Reg. 51,020, 51,021 (Aug. 21, 2015) (to be codified at 40 C.F.R. pt. 131) (“Since 1983 . . . diverse and complex challenges have arisen, including new types of contaminants, pollution stemming from multiple sources, extreme weather events, hydrologic alteration, and climate change-related impacts. These challenges necessitate a more effective, flexible, and practicable approach for the implementation of WQS and protecting water quality. Additionally, extensive experience with WQS implementation by states, authorized tribes, and EPA revealed a need to update the regulation to help meet these challenges.”).

25. Chaffin et al., *supra* note 6, at no. 3, art. 56.

26. Ann E. Carlson, *Iterative Federalism and Climate Change*, 103 *Nw. U. L. REV.* 1097, 1160–61 (2009) (calling for iterative governance); Engel, *supra* note 6, at 2; Alice Kaswan, *Climate Adaptation and Land Use Governance: The Vertical Axis*, 39 *COLUM. J. ENVTL. L.* 390, 395–96, 436 (2014) (recommending a “multi-level governance approach”); J.B. Ruhl, *Climate Change Adaptation and the Structural Transformation of Environmental Law*, 40 *ENVTL. L.* 363, 376 (2010) (suggesting that climate change will “exert tremendous structural pressures on the very design and implementation of the law itself.”).

intense and long term”²⁷ and anticipates that, as a consequence, climate change is likely to effect a “structural transformation” of the field of environmental law.²⁸

B. Newly Discovered Challenges and Mid-Course Corrections

Congress may amend existing statutory programs or create new ones even in the absence of physical change. Policymakers’ assessments that existing statutory programs are not effectively achieving preexisting legislative goals may spur statutory or regulatory changes.²⁹ Congress adopted the Comprehensive Environmental Response, Compensation, and Liability Act in 1980 largely because of its belief that the laws in effect did not provide the necessary firepower to respond to the discovery that the Love Canal and other sites were contaminated

27. Ruhl, *supra* note 26, at 374. Scholarship in other disciplines has sounded the same warning. *See, e.g.,* William H. Butler et al., *Low-Regrets Incrementalism: Land Use Planning Adaptation to Accelerating Sea Level Rise in Florida’s Coastal Communities*, J. PLANNING EDUC. & RES. 1 (forthcoming 2016) (on file with author) (manuscript at 1) (noting that “[c]limate change poses immense challenges to conventional land use planning practice”).

28. Ruhl, *supra* note 26, at 377. For similar assessments, see, e.g., Kaswan, *supra* note 26, at 392 (concluding that “[t]he scale of anticipated climate change poses profound challenges to existing governance norms,” including the “norm of local control over land use”).

29. *See, e.g.,* Markell & Glicksman, *supra* note 19, at 39 (identifying “reality checks” by policymakers assessing past regulatory performance as a key aspect of regulatory design).

After [a] program has been in effect for a number of years, Congress may revisit the organic statute to reauthorize it or to make midcourse corrections. Alternatively, a new crisis may force the program back onto the legislative agenda, causing the industry and beneficiary groups to rejoin the battle in the legislative arena.

Thomas O. McGarity, *Administrative Law as Blood Sport: Policy Erosion in a Highly Partisan Age*, 61 DUKE L.J. 1671, 1677–78 (2012). Congress and agencies have engaged in mid-course corrections in a variety of regulatory contexts. *See, e.g.,* Thomas L. Greaney, *Medicare Advantage, Accountable Care Organizations, and Traditional Medicare: Synchronization or Collision?*, 15 YALE J. HEALTH POL’Y, L. & ETHICS 37, 42 (2015) (Medicare program); Rob Frieden, *The Rise of Quasi-Common Carriers and Conduit Convergence*, 9 I/S: J.L. & POL’Y FOR INFO. SOC’Y 471, 490 (2014) (describing Federal Communication Commission’s mid-course corrections in regulation of information services “in the face of technological and marketplace changes, as well as remedies to its own miscalculations and misreading of statutory mandates”); Janna Mouret, *Shelter from the Retaliation Storm*, 52 HOUS. L. REV. 1529, 1538 (2015) (describing the Dodd–Frank Act as a response to the perception of a “broken financial regulatory system . . . and the ensuing financial meltdown”); Nizan Geslevich Packin, *Supersize Them? Large Banks, Taxpayers and the Subsidies that Lay Between*, 35 NW. J. INT’L L. & BUS. 229, 278 (2015) (discussing Senator Elizabeth Warren’s efforts to restore Glass–Steagall’s prohibition on combining banking and commercial activity); Ganesh Sitaraman, *The Origins of Legislation*, 91 NOTRE DAME L. REV. 79, 94 (2015) (discussing the partial repeal of the Glass–Steagall Act in response to the erosion of the distinctions among different kinds of financial institutions, and consideration of its reenactment after the financial crash of 2008).

with hazardous waste.³⁰ Another well-known example is Congress' decision in 1972 after nearly 25 years of experience to expand its regulatory approach from a regime centered on water-quality-based approaches to controlling pollution to a regime that gave initial emphasis to technology-based regulatory standards. Congress made this shift because implementation of the original 1948 legislation highlighted the difficulty of proving cause-and-effect relationships between particular discharges and receiving water quality, for purposes of both adoption and enforcement of standards.³¹ Even if legislatures do not respond to change by altering statutes, agency officials may decide that they need to alter their strategies to redress deficiencies in existing regulatory practices, including but not limited to enforcement matters.³²

Crisis has repeatedly spurred the adoption of new laws or regulations or the revision of existing laws that represent significant mid-course corrections and shift the focus of regulators (often by expanding their responsibilities). Certainly this dynamic is reflected in the development of environmental law. Congress enacted the Oil Pollution Act of 1990 after the *Exxon Valdez* oil spill in Alaska in 1989.³³ The massive Deepwater Horizon oil spill in the Gulf of Mexico in 2010 prompted the Obama Administration to reorganize the agencies responsible for permitting and regulating offshore oil exploration and production.³⁴ It also impelled Congress to adopt the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act of 2012 (the RESTORE Act),³⁵ which, among other things, requires the Treasury Secretary to deposit 80% of administrative and civil penalties paid under the Clean Water Act by responsible parties in connection with the Deepwater Horizon incident into a

30. RICHARD J. LAZARUS, *THE MAKING OF ENVIRONMENTAL LAW* 108 (2004); David L. Markell, *The Federal Superfund Program: Proposals for Strengthening the Federal/State Relationship*, 18 WM. & MARY J. ENVTL. L. 1, 7–8 (1993).

31. See Robert L. Glicksman & Mathew R. Batzel, *Science, Politics, Law, and the Arc of the Clean Water Act: The Role of Assumptions in the Adoption of a Pollution Control Landmark*, 32 WASH. U. J.L. & POL'Y 99, 118–21 (2010); *infra* text accompanying note 200. Other examples of this kind of mid-course correction in regulatory programs based on past regulatory deficiencies are legion. See, e.g., ROBERT L. GLICKSMAN ET AL., *ENVIRONMENTAL PROTECTION: LAW AND POLICY* 434–35 (7th ed. 2015) (describing deadline extensions, overhaul of existing regulatory provisions, and the creation of supplemental air pollution control programs in the 1977 and 1990 amendments to the Clean Air Act).

32. See, e.g., Julia Lopez, *Formalizing the Segmentation of Workers' Rights: Tensions Among Regulatory Levels*, 36 COMP. LAB. L. & POL'Y J. 281, 282 (2015) (discussing the effects of the rise of soft law strategies).

33. GLICKSMAN ET AL., *supra* note 31, at 990.

34. David Hults, *Environmental Regulation at the Frontier: Government Oversight of Offshore Oil Drilling North of Alaska*, 44 ENVTL. L. 761, 763 n.7 (2014); Michael LeVine et al., *Oil and Gas in America's Arctic Ocean: Past Problems Counsel Precaution*, 37 SEATTLE U. L. REV. 1271, 1308 n.198 (2014).

35. Pub. L. No. 112–141, §§ 1601–1608, 126 Stat. 405, 588–607 (codified at 33 U.S.C. § 1321 note (2012)).

trust fund that will finance activities relating to ecological and economic restoration in the Gulf states.³⁶

C. Changes in the Nature or Operation of the Regulated Community

An additional driver of regulatory dynamism is change in the industry being regulated, whether it takes the form of unprecedented, dramatic change or ongoing, less revolutionary change. Such changes may be the product of shifts in the operation of relevant product or service markets such as the entry of new product or service providers into those markets or the development of new technologies.³⁷ It is accepted wisdom that regulatory agencies often have a difficult time keeping pace with technological change, particularly when it is rapid.³⁸ Such change has the potential to disrupt the functioning of regulatory programs if they alter the manner in which regulated entities operate in ways that were not anticipated by regulation or that do not fit current regulatory assumptions,³⁹ models, or objectives.⁴⁰ For example, the application of existing laws to new

36. See Gerald J. Pels & Julia C. Rinne, *The RESTORE Act: Legislation that Works for the Gulf Coast*, NAT. RESOURCES & ENV'T, Spring 2013, at 40, 40.

37. Cf. Kerri Lynn Stone, *Teaching the Post-Sex Generation*, 58 ST. LOUIS U. L.J. 223, 230 (2013) (“Since employment discrimination jurisprudence is always trying to outpace the behavior that it regulates, it remains dynamic and continually evolves.”).

38. Gregory N. Mandel & Gary E. Marchant, *The Living Regulatory Challenges of Synthetic Biology*, 100 IOWA L. REV. 155, 162 (2014) (“Regulatory systems, almost always, are designed for technologies existing at the time of the regulatory systems’ formation and are based on the then-current understanding of that technology. Such systems often face difficulty and disruption when applied to newly emerging technologies.”); see also Rebecca M. Bratspies, *A Regulatory Wake-Up Call: Lessons from BP’s Deepwater Horizon Disaster*, 5 GOLDEN GATE U. ENVTL. L.J. 7, 60 (2011) (discussing Minerals Management Service failure “to keep up with the technological innovations developed in the private sector”); Urs Gasser, *Regulating Search Engines: Taking Stock and Looking Ahead*, 8 YALE J. L. & TECH. 201, 224–25 (2006) (“The history of technology-regulation is rich with examples of outdated laws.”); Alan Heinrich et al., *At the Crossroads of Law and Technology*, 33 LOY. L.A. L. REV. 1035, 1042 (2000) (“[T]he rapid and dynamic pace of change undermines the effectiveness of traditional legislative solutions.”); Joseph J. Norton, “International Financial Law,” an Increasingly Important Component of “International Economic Law”: A Tribute to Professor John H. Jackson, 20 MICH. J. INT’L L. 133, 143 (1999) (discussing regulators’ need to “catch up” with international financial market developments, “which are coming about with an almost unnerving speed as a result of the accelerated rate of technological innovation”); Christopher S. Yoo, *Rethinking the Commitment to Free, Local Television*, 52 EMORY L.J. 1579, 1583, 1663 (2003) (“[D]rastic changes in the technological and business environment surrounding television have yet to effect corresponding changes in the regulatory approach taken by Congress and the FCC.”).

39. See Ronald F. Wright, *Letters from Beyond the Regulatory State After the Rights Revolution: Reconceiving the Regulatory State*, 100 YALE L.J. 825, 831 n.38 (1990) (book review) (“The factual assumptions regarding some regulatory statutes, such as banking or telecommunications laws, may be undermined by technological or social changes.”).

40. See William Boyd, *Public Utility and the Low-Carbon Future*, 61 UCLA L. REV. 1614, 1616 (2014) (arguing that “disruptive technologies and deregulation have dramatically reduced the importance of the basic public utility model”); Dominic E.

technologies may be unclear, creating uncertainty as to the nature of regulatory obligations.⁴¹ EPA has recognized the need for clarity as an important feature if it is to hope for high levels of regulatory compliance, as we discuss below.⁴²

The telecommunications, information technology, finance, chemical, and energy industries are obvious examples of industries undergoing recent upheavals that have created challenges for regulators.⁴³ In the telecommunications industry, among others, the arrival of new technologies has created products or services that

Markwordt, *More Folly Than Fairness: The Fairness Doctrine, the First Amendment, and the Internet Age*, 22 REGENT U. L. REV. 405, 450 n.352 (2009–2010) (discussing the weakening of the Fairness Doctrine's rationale due to technological change); Saule Omarova & Adam Feibelman, *Risks, Rules, and Institutions: A Process for Reforming Financial Regulation*, 39 U. MEM. L. REV. 881, 906 (2009) (noting that assumptions built into the framework for financial services regulation remained unquestioned, and that “the full regulatory implications of the radical transformation in the risk profile of modern financial institutions were not sufficiently understood or even acknowledged”); Timothy Wu, *Application-Centered Internet Analysis*, 85 VA. L. REV. 1163, 1200-01 (1999) (“[A] change in a technological ‘fact,’ even if apparently unrelated to the law, may nonetheless have large unexpected effects on the operation of that law.”).

41. See, e.g., Olufunmilayo B. Arewa, *Securities Regulation of Private Offerings in the Cyberspace Era: Legal Translation, Advertising and Business Context*, 37 U. TOL. L. REV. 331, 363 (2006) (discussing securities regulation).

42. See *infra* Section IVB. Among other things, uncertainty can interfere with the intended deterrent effect of available sanctions. See Lyria Bennett Moses, *Understanding Legal Responses to Technological Change: The Example of in Vitro Fertilization*, 6 MINN. J.L. SCI. & TECH. 505, 569 (2005) (“In the context of technological change, there is a risk that application of existing rules will appear uncertain (reducing their deterrent effect) or existing rules will, on their terms, be under-inclusive. In either case, rules designed to address a particular problem may fail to prevent similar problems because they were not crafted in contemplation of future technological changes.”).

43. See, e.g., Thomas J. Brennan & Andrew W. Lo, *Dynamic Loss Probabilities and Implications for Financial Regulation*, 31 YALE J. ON REG. 667, 678, 692 (2014) (citing “the need for dynamic leverage regulation that takes into account feedback effects and the endogeneity of volatility to the regulated financial system”); Andrew Erber, *The Effective Prohibition Preemption in Modern Wireless Tower Siting*, 66 FED. COMM. L.J. 357, 386 (2014) (referring to the telecommunications industry as “an increasingly dynamic and convergent sector”); Wulf A. Kaal, *Dynamic Regulation of the Financial Services Industry*, 48 WAKE FOREST L. REV. 791, 800, 816–19 (2013) (discussing possible role of dynamic elements in financial regulation); Joseph D. Kearney, *Will the FCC Go the Way of the ICC?*, 71 U. COLO. L. REV. 1153, 1154 (2000) (referring to “paradigm shifts in regulation” of the telecommunications and energy industries “from promoting a monopoly or oligopoly model to emphasizing competition”); Thomas W. Merrill & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, 98 MINN. L. REV. 145, 201 (2013) (calling for dynamic regulation in the face of “the shale revolution”); Jamie Darin Prenkert & Scott J. Shackelford, *Business, Human Rights, and the Promise of Polycentricity*, 47 VAND. J. TRANSNAT’L L. 451, 455 (2014) (citing scholarship favoring the adoption of dynamic regulatory models in cyberlaw); Christopher S. Yoo, *Technological Determinism and Its Discontents*, 127 HARV. L. REV. 914, 938 (2014) (referring to the industry as one “undergoing . . . dynamic change”) (book review).

blurred the jurisdictional boundaries of multiple regulators,⁴⁴ created “open regulatory space” that attracted the attention of regulators,⁴⁵ and unified local markets into broader national and international markets, making businesses accountable to a larger number of regulatory regimes.⁴⁶ The development of nanotechnology is another example of technology-driven shifts in the nature of products subject to regulation. It has posed significant problems for environmental regulatory programs that were not crafted to deal with chemical substances with the properties of nanomaterials.⁴⁷ Technological innovation may expand the range of entities able to offer products or services, such as banking services, which are subject to regulation.⁴⁸ Technological changes in other “networked industries,” such as energy, have spurred innovations in regulatory ventures involving both federal and state agencies. The significant expansion in the scale and geography of shale gas development made possible by advances in exploratory and horizontal drilling technologies, among other factors, has required many states to “rapidly ramp up regulatory abilities” and triggered other governance reactions intended to

44. K.A.D. Camara, *Costs of Sovereignty*, 107 W. VA. L. REV. 385, 432 (2005) (referring to increase in frequency and intensity of conflicts between state regulatory interests as technological change expands the geographic impact of conduct); William E. Kovacic, *The Federal Trade Commission as Convenor: Developing Regulatory Policy Norms Without Litigation or Rulemaking*, 13 COLO. TECH. L.J. 17, 24 (2015) (jurisdictional conflict between the FCC and FTC due to the development of broadband).

45. The development of the Internet is one example. See Babette E.L. Boliek, *FCC Regulation Versus Antitrust: How Net Neutrality Is Defining the Boundaries*, 52 B.C. L. REV. 1627, 1648 (2011); Lyombe Eko, *American Exceptionalism, the French Exception, Intellectual Property Law, and Peer-to-Peer File Sharing on the Internet*, 10 J. MARSHALL REV. INTELL. PROP. L. 95, 108 (2010).

46. See Bob Rowe, *Substance Plus Process—Telecom Regulation Reforms to Protect Consumers, Preserve Universal Service, and Promote Competition*, 71 U. COLO. L. REV. 879, 889–90 (2000). The same phenomenon has occurred in other industries. See, e.g., Kovacic, *supra* note 44, at 24; cf. John T. Soma & Eric K. Weingarten, *Multinational Economic Network Effects and the Need for an International Antitrust Response from the World Trade Organization: A Case Study in Broadcast-Media and News Corporation*, 21 U. PA. J. INT’L ECON. L. 41, 43 (2000) (“The rapid pace of technological innovation often blurs once separate product markets into cohesive wholes.”).

47. See Jeffery T. Morris, *A Case for the Commonplace: Locating Nanotechnology Within Existing Regulatory Frameworks*, 55 JURIMETRICS J. 179, 179 (2015) (noting novel governance issues resulting from the emergence of nanotechnology). Morris adds that “the notion of treating the same chemical substance differently if it is produced at the nanoscale remains an unresolved issue—even after more than a decade of discussion.” *Id.* at 182.

48. See Vivienne A. Lawack, *Mobile Money, Financial Inclusion and Financial Integrity: The South African Case*, 8 WASH. J.L. TECH. & ARTS 317, 343 (2013); Shanthi Elizabeth Senthe, *Transformative Technology in Microfinance: Delivering Hope Electronically?*, 13 U. PITT. J. TECH. L. POL’Y 1, 39 (2012). Technological innovation, however, can also promote deregulation. See, e.g., Steven M. Spaeth, *The Deregulation of Transportation and Natural Gas Production in the United States and Its Relevance to the Soviet Union and Eastern Europe in the 1990’s*, 12 U. BRIDGEPORT L. REV. 43, 44 n.9 (1991) (referring to communications deregulation).

keep pace with a rapidly evolving industry.⁴⁹ In short, as scholars have recognized, “a dynamic industry requires dynamic regulation.”⁵⁰

D. Changes in Technological and Other Forms of Governance Capacity

As noted in the previous section, changes in the nature of the regulated community, linked to technological developments or otherwise, can pose significant challenges for agencies. Technological change and other forms of change in governance capacity can affect regulatory programs in other ways, both positive and negative. In some cases, improved capacity, through advances in technology and otherwise, may create significant opportunities for the government to improve its practices. In the enforcement arena, for example, the beneficial regulatory byproducts of technological change can include improved (more thorough, more accurate, and more timely) identification of compliance issues, better communication internally and externally about compliance concerns, and more rational enforcement response when necessary.

New technologies that facilitate monitoring of or reporting on the effects of regulated activities may facilitate regulators’ ability to turn a dynamic regulatory environment to their advantage by providing access to previously unavailable information relevant to compliance. By enabling the government to identify violations that otherwise likely would have remained undiscovered, and to develop cases much more easily, such information can lead to improved and better informed exercise of prosecutorial discretion in deciding whether and how to address violations.⁵¹

49. Mitchell J. Small et al., *Risks and Risk Governance in Unconventional Shale Gas Development*, 48 ENVTL. SCI. & TECH. 8289, 8290–93 (2014) (discussing the changes in technology that have contributed to improved capacity to develop shale gas deposits and accompanying regulatory issues); Hannah J. Wiseman, *Remedying Regulatory Diseconomies of Scale*, 94 B.U. L. REV. 235 *passim* (2014) (discussing the enormous changes in scale in fracturing); Hannah J. Wiseman, *Risk and Response in Fracturing Policy*, 84 U. COLO. L. REV. 729, 778–79 (2013).

50. Michael S. Greve & Ashley C. Parrish, *Administrative Law without Congress*, 22 GEO. MASON L. REV. 501, 537 (2015); *see also* Adam Adler, *High Frequency Regulation: A New Model for Market Monitoring*, 39 VT. L. REV. 161, 164–65 (2014) (urging development of complex, dynamic, and flexible regulation algorithms in response to problems caused by dynamic trading algorithms); Deirdre McCann & Jill Murray, *Prompting Formalisation Through Labour Market Regulation: A “Framed Flexibility” Model for Domestic Work*, 43 INDUS. L.J. 319, 320–21, 335 (2014) (changes in informal labor markets). Regulatory responses to technological changes may be ineffective in achieving regulatory goals if policymakers do not fully appreciate their implications. *See, e.g.*, Eli P. Fenichel et al., *Measuring the Value of Groundwater and Other Forms of Natural Capital*, 113 PROC. NAT’L ACAD. SCI. U.S. 2382, 2386 (2016) (concluding that “[b]y failing to anticipate and mitigate the perverse consequences” of farmers’ technological transition to a new, high-efficiency irrigation nozzle, “statewide ‘investments’ in improved technology” resulted in less conservation-oriented agricultural practices and “destroyed wealth”).

51. *See, e.g.*, Wulf A. Kaal & Timothy A. Lacine, *The Effect of Deferred and Non-Prosecution Agreements on Corporate Governance: Evidence from 1993-2013*, 70

Environmental regulatory enforcement demonstrates this development. Gathering information sufficient to support enforcement actions has always been a challenge.⁵² Recent advances in areas such as electrical engineering can mitigate these challenges in the enforcement context by revolutionizing pollution monitoring.⁵³ These technologies produce data that are more finely grained than cruder, previously available data and that can be more helpful in identifying environmental conditions, violations, and violators.⁵⁴ Geographic information systems, global positioning satellite technologies, and remote sensing devices already support the investigation and enforcement of environmental laws in ways that were not previously possible.⁵⁵ EPA has begun to institutionalize the use of enhanced monitoring technology through ventures such as its E-Enterprise for the Environment, which is a joint EPA–state effort that includes applying advanced information to streamline information collection.⁵⁶

BUS. LAW. 61, 116 (2015); *cf.* David A. Hyman & William E. Kovacic, *Why Who Does What Matters: Governmental Design and Agency Performance*, 82 GEO. WASH. L. REV. 1446, 1466 (2014) (“Technological dynamism creates new regulatory issues—and an opportunity for ambitious regulators to expand their domain.”). For further discussion of the effects of new technology on enforcement, see *infra* Sections II.B.2–4.

52. See *infra* Section II.A.1.

53. These include microfabrication techniques; microelectro-mechanical systems that can incorporate microfluidic, optical, and nanotube elements; energy efficient radios and sensor circuits that have extremely low power consumption; and advanced computing power suitable for handling extremely large databases. See Emily G. Snyder et al., *The Changing Paradigm of Air Pollution Monitoring*, 47 ENVTL. SCI. & TECH. 11369, 11369 (2013). Dave Owen suggests that “increased data availability, new software systems, and exponentially greater computer power have combined to turn spatial analysis—that is quantitative analysis of data coded to specific geographic coordinates—into the coin of the environmental realm.” Dave Owen, *Mapping, Modeling, and the Fragmentation of Environmental Law*, 2013 UTAH L. REV. 219, 222 (2013).

54. For discussion of the challenges facing the collection and use of ambient monitoring data, see Eric Biber, *The Challenge of Collecting and Using Environmental Monitoring Data*, 18 ECOLOGY & SOC’Y Art. 68 (2013).

55. See Peter Stokely, *Using Aerial Photography, Geospatial Data, and GIS to Support the Enforcement of Environmental Statutes*, 28 NAT. RESOURCES & ENV’T, Summer 2013, at 38, 38. Remote sensing is “the science and art of obtaining information about an object, area, or phenomenon through the analysis of data acquired by a device not in contact with the object, area, or phenomenon under investigation.” Kenneth J. Markowitz, *Legal Challenges and Market Rewards to the Use and Acceptance of Remote Sensing and Digital Information as Evidence*, 12 DUKE ENVTL. L. & POL’Y F. 219, 221 (2002); see also Gregg P. Macey, *The Architecture of Ignorance*, 2013 UTAH L. REV. 1627, 1648–51 (2013) [hereinafter Macey, *Architecture*]; Nate Seltenrich, *Remote-Sensing Applications for Environmental Health Research*, 122 ENVTL. HEALTH PERSP. A269, A273–74 (2014).

56. U.S. EPA, *About E-Enterprise for the Environment*, WWW.EPA.GOV, <http://www2.epa.gov/e-enterprise/about-e-enterprise-environment#Core> of E-Enterprise (last updated Feb. 2, 2016); see also Snyder et al., *supra* note 53, at 11375 (discussing the role of advances in air pollution sensors in E-Enterprise); U.S. EPA, EPA BUDGET IN BRIEF FY 2016, 63, http://www2.epa.gov/sites/production/files/2015-02/documents/fy_2016_bib_combined_v5.pdf [hereinafter EPA BUDGET IN BRIEF] (noting that the “Next Generation

Advances in monitoring and reporting technology can strengthen the capacity of not only regulators, but also regulated entities and nongovernmental entities to detect and address violations. This enhanced third-party capacity presents opportunities for regulators to transform the shape of governance by improving coordination among a wide range of stakeholders in identifying and addressing noncompliance. EPA has historically relied heavily on compliance self-reporting, including discharge-monitoring reports that point sources must submit under the Clean Water Act (“CWA”)’s National Pollutant Discharge Elimination System (“NPDES”) permit program⁵⁷ and the hazardous waste manifests that those handling hazardous waste must prepare under the Resource Conservation and Recovery Act (“RCRA”).⁵⁸ Congress recently required EPA to establish a new electronic manifest reporting system.⁵⁹ According to EPA, the new system will “yield significant savings over the current paper manifest and will ease the reporting burden” for regulated entities.⁶⁰ It will “establish for the first time a national repository of manifest data, and a means to efficiently share manifest data with our RCRA authorized state partners and with the public.”⁶¹ EPA identified the following benefits of the new system:

- (1) Improved access to higher quality and more timely waste shipment data;
- (2) nearly real-time shipment tracking capabilities for users;
- (3) enhanced manifest inspection and enforcement capabilities for regulators;
- (4) more rapid notification and responses to problems or discrepancies encountered with shipments or deliveries;
- (5) greater access for emergency responders about the types and sources of hazardous waste that are in movement between generator sites and waste management facilities;
- (6) one-stop manifest copy submission to EPA and to all interested states through the Exchange Network architecture;
- (7) greater transparency for the public about completed hazardous waste shipments to or from their communities; and
- (8) new data management possibilities that could ultimately simplify the RCRA biennial reporting requirements and consolidate various federal and state reporting requirements for domestic and transboundary shipments.⁶²

Greater reliance on self-reporting by regulated entities to identify violations also poses risks, however. The prospect of increased reliance on regulated entities to supply and interpret information relating to compliance status,

Compliance initiative [discussed in Parts III and IV of this Article] is aligned with the larger EPA E-Enterprise business strategy, which is jointly managed with the states”).

57. See 40 C.F.R. § 122.41(l)(4)(i) (2016).

58. See 40 C.F.R. § 262.20(a)(1) (2016).

59. Hazardous Waste Electronic Manifest Establishment Act, Pub. L. No. 112-195, 126 Stat. 1452 (2012) (codified at 42 U.S.C. §6939g). EPA’s implementing regulations are codified at 40 C.F.R. §§ 262.24–262.25 (2016).

60. U.S. EPA, Hazardous Waste Management System; Modification of the Hazardous Waste Manifest System; Electronic Manifests, 79 Fed. Reg. 7518, 7523 (Feb. 7, 2014).

61. *Id.*

62. *Id.*

which is likely as a result of increased use of advanced monitoring techniques, may be perceived as exacerbating a “fox guarding the henhouse” problem. The predecessor of the Government Accountability Office (“GAO”) raised concerns decades ago that EPA’s water pollution and hazardous waste management programs lacked adequate controls to detect error or fraud in sampling data.⁶³ Others have raised similar concerns.⁶⁴ Results from a recent study from Norway, for example, show evidence of a severe underreporting to Norway’s EPA of violations when regulated parties self-audit, a substantial specific deterrence effect on parties that were audited by regulators (resulting in reduction in likelihood of noncompliance the next year by 37%), and a lack of any evidence suggesting that announcing higher audit frequency improves compliance behavior.⁶⁵ The study emphasizes that the evidence of underreporting in self-audits raises serious concerns that a shift toward reliance on self-reporting by environmental agencies could undermine regulatory compliance.⁶⁶ To the extent that new monitoring and reporting technology is more reliable, less capable of being manipulated, and more easily replicated because of reductions in cost, greater mobility, and other factors, it may operate to increase the accuracy, reliability, and credibility of self-reporting and diminish the risks associated with a regulatory regime that depends on heavy (and growing) quasi-privatized monitoring.

Technological advances also provide opportunities to better integrate the public into the regulatory enforcement process, yielding a variety of benefits. If citizens and communities assist in data collection, they become more educated about environmental issues, which assists them in developing community-based strategies to protect public health.⁶⁷ The same is true for use of enhanced monitoring technology at the “fenceline” of regulated sources, which increases community understanding of potential pollution risks. EPA and state agencies have already begun to require regulated facilities to set up passive monitoring systems to measure environmental conditions at the fenceline by incorporating such

63. U.S. GEN. ACCOUNTING OFF., ENVIRONMENTAL ENFORCEMENT: EPA CANNOT ASSURE THE ACCURACY OF SELF-REPORTED COMPLIANCE MONITORING DATA 3 (1993), <http://www.gao.gov/assets/160/153286.pdf>.

64. EPA’s Office of Inspector General (“OIG”) has criticized EPA’s oversight mechanisms to prevent the submission of fraudulent data by external laboratories with which it contracts to provide environmental testing data. OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 14-P-0270, EPA HAS NOT IMPLEMENTED ADEQUATE MANAGEMENT PROCEDURES TO ADDRESS POTENTIAL FRAUDULENT ENVIRONMENTAL DATA 4–7 (2014), <http://www.epa.gov/oig/reports/2014/20140529-14-P-0270.pdf> [hereinafter FRAUDULENT DATA]; see also U.S. GOV’T ACCOUNTABILITY OFF., GAO-14-289, PESTICIDE SAFETY: IMPROVEMENTS NEEDED IN EPA’S GOOD LABORATORY PRACTICES INSPECTION PROGRAM 5–33 (2014), <http://www.gao.gov/products/GAO-14-289>.

65. Kjetil Telle, *Monitoring and Enforcement of Environmental Regulations: Lessons from a Natural Field Experiment in Norway*, 99 J. PUBL. ECON. 24, 24–26 (2013).

66. *Id.* at 24, 30.

67. See Snyder et al., *supra* note 53, at 11373 (discussing crowd sourcing to develop “citizen science”).

requirements into consent decrees and other settlements,⁶⁸ and EPA has used its regulatory authority to establish fenceline-monitoring requirements for sources that emit hazardous air pollutants as well.⁶⁹ This monitoring can strengthen the deterrent impact of regulations, improve environmental performance, and foster higher compliance levels if regulated entities recognize that the data make it easier for enforcers, public and private, to prove violations or if they simply want to avoid the adverse public reaction stemming from disclosure of regulatory violations or high ambient concentrations of potentially dangerous pollutants.⁷⁰

68. Alec C. Zacaroli, *Clean Air Act: New Developments that Are Redefining the Enforcement Landscape*, 45 ENV'T REP. (BNA) 3108, 3109–10 (2014). A recent EPA OIG report highlights the need for monitoring of commitments embodied in consent decrees. OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 15-P-0277, EPA CAN REDUCE RISK OF UNDETECTED CLEAN AIR ACT VIOLATIONS THROUGH BETTER MONITORING OF SETTLEMENTS AGREEMENTS 16 (Sept. 10, 2015) [hereinafter OIG, REDUCE RISK] (concluding that EPA had not “ensure[d]” compliance with requirements embodied in the consent decrees the OIG reviewed); see also Gregg P. Macey, *Boundary Work in Environmental Law*, 53 HOUS. L. REV. 103, 110 n.44 (2015) [hereinafter Macey, *Boundary Work*] (“Fenceline monitoring is a cottage industry” that is “used to second-guess safety assurances by state and federal agencies.”) (citing *United States v. Flint Hills Res. Port Arthur, LLC*, No. 1:14CV169, slip op. at 6 (E.D. Tex. Feb. 18, 2015) (consent decree)).

69. See Petroleum Refinery Sector Risk and Technology Review and New Source Performance Standards, 80 Fed. Reg. 75,178, 75,191–200, 75,254–57 (Dec. 1, 2015) (codified at 40 C.F.R. §§ 60, 63) (requiring refineries to deploy passive fenceline monitoring for benzene). Under that rule, the owner or operator of a regulated facility must place monitors on the facility fenceline to measure emissions from the facility. The regulations specify procedures for “subtract[ing] background concentrations and contributions to the fenceline benzene concentrations from nonrefinery emission sources, so that the benzene concentrations measured are attributable to the refinery.” *Id.* at 75,192. Further, refineries must perform corrective action if an applicable fenceline benzene concentration action level is exceeded, by “ensur[ing] that fugitive emission sources on the property are not emitting HAP [hazardous air pollutants] at levels that will result in exceedances of the fenceline benzene concentration action level. In other words, the purpose of the fenceline monitoring work practice is to ensure that sources are limiting HAP emissions at the fenceline, which are solely attributable to emissions from sources within the facility.” *Id.* For analysis of EPA’s approach at the proposed rulemaking stage, see Ralph Smith, Comment, *Detect Them Before They Get Away: Fenceline Monitoring’s Potential to Improve Fugitive Emissions Management*, 28 TUL. ENVTL. L.J. 433, 434 (2015). “Fenceline monitoring grew out of a similar need to provide data near homes and schools that are far removed from agency monitors, which, along with dispersion models and technology-based controls, accommodate data gaps in air toxics regulation.” Macey, *Architecture*, *supra* note 55, at 1646–47. One observer speculated at the time this rule was proposed that it “likely will become standard for other sources as well.” Zacaroli, *supra* note 68, at 3110; see also Macey, *Boundary Work*, *supra* note 68, at 109–10 (“Fenceline monitoring is a cottage industry” that is “used to second-guess safety assurances by state and federal agencies.”).

70. See Zacaroli, *supra* note 68, at 3108 (“[C]ommunities that have the ability to gather air quality data create a ‘big motivator’ for companies to more closely monitor their own emissions.”); see also Markowitz, *supra* note 55, at 228–29. Earlier iterations of improved data collection technologies have had that effect. See, e.g., Lesley K. McAllister, *Enforcing Cap-and-Trade: A Tale of Two Programs*, 2 SAN DIEGO J. CLIMATE & ENERGY L. 1, 4–8 (2010) (describing how continuous emissions monitoring equipment and automatic

Some contend that, even in a time of declining EPA and state enforcement resources,⁷¹ the emergence of new monitoring technology will increase the chance that regulatory violations will be detected, as enforcement activity shifts from the government to broader networks that include community groups and other nongovernmental entities.⁷² Some of the new monitoring technology is available to the public at little or no cost from federal or state agencies,⁷³ creating community “bucket brigades.”⁷⁴ In addition, EPA has provided technical assistance to help individuals and citizen groups (as well as regulated sources) use the new monitoring technology.⁷⁵ This dynamic will allow EPA to rely more on new governance mechanisms that integrate nongovernmental entities into compliance and enforcement processes.⁷⁶ New information technologies will also affect federalism choices, such as by facilitating coordination among jurisdictions through easier information sharing.⁷⁷

As with greater reliance on regulated entities’ self-monitoring, increased reliance on citizens for such monitoring poses risks as well as benefits. A lack of capacity to use technology properly or to interpret information correctly may lead to misunderstandings and false positives, and divert attention from more important concerns. Also, as we discuss below,⁷⁸ new data that lead to a more substantial level of citizen suit enforcement activity will pose coordination challenges for agency lawyers and other personnel. Agency enforcers will need to design regulatory enforcement programs in ways that maximize the benefits and minimize the risks arising from the use of new monitoring and reporting technologies.

verification systems bolstered compliance levels under the Clean Air Act’s (“CAA”) acid rain program).

71. See *infra* Section II.B.1.

72. See Zacaroli, *supra* note 68, at 3108–10.

73. Daniel C. Esty, *Environmental Protection in the Information Age*, 79 N.Y.U. L. REV. 115, 156–57 (2004) (noting that new monitoring technologies may revolutionize responses to environmental problems); see also Peter Grabosky, *Beyond Responsive Regulation: The Expanding Role of Non-State Actors in the Regulatory Process*, 7 REG. & GOVERNANCE 114, 1117–18 (2013); Snyder et al., *supra* note 53, at 11369.

74. Biber, *supra* note 54, at 6. Biber warns, however, that “many monitoring technologies are too expensive for most volunteer groups.” *Id.*; see also Macey, *Architecture*, *supra* note 55, at 1663 (“[N]etworked data render[s] the public vital to government response.”).

75. See, e.g., U.S. EPA, *EPA’s Air Sensor Toolbox for Citizen Scientists*, WWW.EPA.GOV, <http://www.epa.gov/head/airsensortoolbox/> (last updated May 10, 2016); see also U.S. EPA, AIR SENSOR GUIDEBOOK vii (2014) (referring to new technology that may assist those interested in using lower cost air quality sensor technologies).

76. See Macey, *Architecture*, *supra* note 55, at 1665 (“The public’s historic role as true first responders will widen Peer networks will provide data redundancy, and vulnerable populations will be motivated to share locational and contextual information.”); Owen, *supra* note 53, at 247 (“[T]echnological advances also can promote participation and inclusion.”).

77. See Owen, *supra* note 53, at 273–78.

78. See *infra* Section IV.A.

More generally, technological advances in compliance monitoring and reporting pose additional challenges for regulators, including enforcement personnel. One challenge relates to privacy concerns that often accompany the accumulation of data not previously available.⁷⁹ A second is the possibility that legislators or other policymakers concerned about shrinking resources in an era of budget cutting will depict expenditures on monitoring as unnecessary and unjustified.⁸⁰ A third is that, inherent in the increased use of quantitative data of any sort is the danger of manipulability, lack of transparency due to concealed modeling assumptions, and “false certainty.”⁸¹

E. The Implications of Dynamism for Regulatory Design

In the face of changes in regulatory landscapes in many fields, some of which have been dramatic, scholars have urged modification of the structure as well as the content of regulatory programs to accommodate change. To take but one example, some scholars and policymakers have supported increased reliance on adaptive management, a decision-making methodology crafted specifically to deal with change. Adaptive management seeks “to reduce uncertainty through integrative learning fostered in a structured, iterative decision-making process. This approach is most relevant for dynamic regulatory contexts . . . in which uncertainty and controllability are high and risk is low.”⁸² Two proponents of adaptive management describe it as follows:

The idea of adaptive management is that agencies should be free to make more decisions, but that the timing of those decisions is spread out into a continuous process that makes differentiating between the “front end” and the “back end” of decision[-]making much less relevant. Rather than make one grand decision and move on, agencies employing adaptive management engage in a program of iterative decision[-]making following a structured, multistep protocol: (1) definition of the problem, (2) determination of goals and objectives for management, (3) determination of the baseline, (4) development of conceptual models, (5) selection of future actions, (6) implementation and management actions, (7) monitoring, and (8) evaluation and return to step (1) With deep roots in natural resources management theory, the adaptive management protocol has begun to make inroads in public lands management in particular, though it has been applied or proposed in other policy contexts, including pollution control, financial

79. See Macey, *Architecture*, *supra* note 55, at 1669 (discussing privacy and data security concerns stemming from the use of advanced monitoring technology).

80. See Biber, *supra* note 54, at 3 (referring to the vulnerability of politically meaningful monitoring to “asymmetric political pressure”).

81. See Owen, *supra* note 53, at 225, 250 (identifying “opacity, manipulability, and false certainty that plague any complex and quantitative mode of analysis” and “concealed subjective choices” as limitations of spatial data).

82. Craig & Ruhl, *supra* note 6, at 20.

regulation, environmental impact assessment, public health and safety, civil rights, and social welfare.⁸³

Other scholars have responded to the dynamism inherent in many contemporary governance issues, and the challenges dynamic conditions create for regulators, by urging other large-scale changes in governance approaches, such as greater reliance on self-regulation (a form of “reflexive regulation”),⁸⁴ shifts in federal-state or international-organization relationships,⁸⁵ or greater use of incentives for the development of still more effective new technologies.⁸⁶

The challenges and opportunities facing regulators as they respond to changes of the kind identified in this Part give rise to a plethora of issues relating to regulatory design. The remainder of this Article offers a framework intended to advance the effort to think critically about the governance challenges posed by dynamic regulatory environments and to address them effectively. It does so by focusing on efforts to promote regulatory compliance, using environmental regulatory programs to illustrate the value of our framework.⁸⁷ Our analysis is motivated in part by recent efforts by EPA to grapple with some of the challenges noted above, primarily under the auspices of its Next Gen initiative.⁸⁸ To further set the stage for this analysis, Part II discusses the regulatory dynamism triggers

83. *Id.* at 7–8.

84. *See, e.g.*, Michael P. Vandenberg, *Private Environmental Governance*, 99 CORNELL L. REV. 129, 173 (2013); Robert F. Weber, *An Alternative Story of the Law and Regulation of Risk Management*, 15 U. PA. J. BUS. L. 1005, 1017 (2013) (discussing devolution of discretion to the banking industry to address a dynamic and volatile regulatory environment).

85. *See, e.g.*, Blake Hudson & Jonathan Rosenbloom, *Uncommon Approaches to Commons Problems: Nested Governance Commons and Climate Change*, 64 HASTINGS L.J. 1273, 1293 n.58 (2013) (citing calls for various versions of dynamic regulatory federalism in areas such as climate change regulation); Scott J. Shackelford, *Toward Cyberpeace: Managing Cyberattacks through Polycentric Governance*, 62 AM. U. L. REV. 1273, 1359–60 (2013) (referring to dynamic, multilevel regulation to enhance cybersecurity).

86. *See, e.g.*, Keith Hawkins, *Enforcing Regulation: Robert Kagan’s Contribution—And Some Questions*, 38 L. & SOC. INQUIRY 950, 963 (2013). Still others have recommended frequent updating of regulatory standards. *See, e.g.*, Wendy Wagner, *Racing to the Top: How Regulation Can Be Used to Create Incentives for Industry to Improve Environmental Quality*, 29 J. LAND USE & ENVTL. L. 1, 12 (2013); *cf.* Kaal, *supra* note 43, at 819 (“[R]ulemaking in a dynamic framework increasingly utilizes institution-specific and decentralized information reflecting preceding events and attempting to anticipate succeeding future contingencies.”). The discussion in the text is intended to identify a handful of strategies for enhancing the adaptive capacity of governance. For reference to several others, see *supra* note 6 and accompanying text.

87. Our focus is on the major federal pollution control statutes, the CAA, Clean Water Act (“CWA”), and Resource Conservation and Recovery Act (“RCRA”).

88. EPA is also using other initiatives, such as e-Reporting, to address the emergence of new monitoring and reporting technologies. *See infra* Sections III.A.3 and IV.A. In its proposed fiscal year 2016 budget, EPA identified as one of its five strategic goals protecting health and the environment through the use of Next Gen tools to achieve vigorous and targeted civil and criminal enforcement. EPA BUDGET IN BRIEF, *supra* note 56, at 61–69.

affecting EPA's enforcement and compliance programs and the challenges that these changes have posed to EPA's administration of those programs.

II. TRADITIONAL AND EMERGING CHALLENGES TO EFFECTIVE COMPLIANCE AND ENFORCEMENT

The purpose of this Part is to ground our theoretical framework through a case study of one agency's regulatory landscape. Our focus in this Article is on environmental compliance, which has traditionally been EPA's domain. We begin by taking account of how well or poorly EPA's current enforcement program is functioning. This Part reviews the challenges EPA has faced and will face in pursuing its own enforcement agenda and in overseeing state enforcement under delegated environmental programs. Section A surveys four longstanding sets of challenges to state and federal enforcement of the environmental laws. Section B addresses four more-recent sets of challenges that have made the task of enforcing environmental laws all the more daunting.⁸⁹ As part of our evaluation of EPA's claim that transformation of its enforcement program is needed, this Part summarizes the baseline circumstances that EPA confronts.

A. Traditional Enforcement Challenges

1. Data Gaps

"Data gaps haunt every scale of regulatory interest in environmental law"⁹⁰ According to Daniel Esty, these gaps affect problem identification, causal specification, evaluation of health and environmental impacts, valuation of harm, identification of rights, the nature of policy intervention, implementation, monitoring and enforcement, and updating and refinement.⁹¹ Information deficiencies certainly plague efforts to enforce the environmental laws and assessments of whether current enforcement strategies need to be improved and, if so, what fixes to adopt. EPA and state agencies sometimes lack complete information on the universe of regulated entities.⁹² They may not be aware of all

89. The distinction between traditional and emerging challenges is somewhat artificial. For example, resource constraints, discussed in Section III.B as an emerging challenge, have long been an issue. See JOEL A. MINTZ, ENFORCEMENT AT THE EPA: HIGH STAKES AND HARD CHOICES 194–96 (rev. ed. 2014) (suggesting that EPA may no longer place as high a priority on internal budgetary allocations on enforcement as compared to other agency functions as it once did).

90. Macey, *Architecture*, *supra* note 55, at 1651. See generally Robert L. Glicksman, *Bridging Data Gaps Through Modeling and Evaluation of Surrogates: Use of the Best Available Science to Protect Biological Diversity Under the National Forest Management Act*, 83 IND. L.J. 465 (2008) (exploring the use of modeling by agencies to address data gaps).

91. Esty, *supra* note 73, at 139 tbl.1.

92. See OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 2005-P-00024, LIMITED KNOWLEDGE OF THE UNIVERSE OF REGULATED ENTITIES IMPEDES EPA'S ABILITY TO DEMONSTRATE CHANGES IN REGULATORY COMPLIANCE 7 (Sept. 19, 2005), <https://www.epa.gov/office-inspector-general/report-limited-knowledge-universe-regulated-entities-impedes-epas-ability> [hereinafter OIG, LIMITED KNOWLEDGE] ("With the exception

the facilities that are covered by regulatory programs and, even when they have identified facilities subject to regulation, they may not be aware of all of the activities taking place at those facilities that trigger regulatory duties.

Both EPA's OIG and the GAO have noted these data deficiencies.⁹³ The OIG reported in 2005 that the Office of Enforcement and Compliance Assurance ("OECA") "has limited knowledge of the regulated universe for which it maintains responsibility."⁹⁴ Nearly a decade later, the OIG noted continuing problems in this area, finding that "EPA does not know the location of all regulated facilities. This results in underreporting for the facility universe."⁹⁵ The GAO provided a specific example of EPA's incomplete knowledge of the identity and location of sources subject to the regulatory programs it is responsible for enforcing. EPA does not maintain complete information on New Source Review ("NSR") permits issued to fossil fuel electricity generating units under the CAA. Although state and local permitting agencies track the NSR permits they issue, for at least some source categories, such as fossil fuel electricity generating units, "EPA does not maintain data on these permits in a complete and centralized source of information, which limits the agency's ability to assess the impact of NSR."⁹⁶

Relatedly, agencies often lack needed information about the compliance status of even those facilities they know fall within the scope of regulatory programs.⁹⁷ EPA itself has acknowledged as much.⁹⁸ EPA's ignorance of the

of the [Safe Drinking Water Act], we found [EPA's] universe data for the sampled program areas was not reliable.").

93. For citations to additional OIG and GAO reports substantiating data deficiencies that hampered performance of EPA's enforcement functions, see Markell, *Slack*, *supra* note 14, at 31–32 nn.132–33.

94. OIG, LIMITED KNOWLEDGE, *supra* note 92, at 6. This conclusion was based on an assessment of EPA's state of knowledge of the scope of the regulated universe under the CAA, the CWA, the Federal Insecticide, Fungicide, and Rodenticide Act ("FIFRA"), the Toxic Substances Control Act ("TSCA"), the Safe Drinking Water Act ("SDWA"), and the RCRA. *Id.* at 4 tbl. 1-2. Of these, the OIG found that EPA had reliable and current data only for sources regulated under the SDWA. *Id.* at 8 tbl. 2-2. For a description of the benefits of full knowledge of the regulated universe, see *id.* at 2 tbl. 1-1; *see also id.* at 7 ("Without reliable universe information, OECA lacks both a definitive baseline on the number, size, and character of entities subject to regulation, as well as the information necessary to provide a denominator for compliance rates.").

95. OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 13-P-0168, RESPONSE TO CONGRESSIONAL REQUEST ON EPA ENFORCEMENT 6 (Feb. 28, 2013), <https://www.epa.gov/office-inspector-general/report-response-congressional-request-epa-enforcement> (finding that "EPA relies on the number of permits issued as a proxy for the number of facilities regulated by the agency. However, a single facility may have multiple permits, so the permit count is higher than the facility count . . .").

96. U.S. GOV'T ACCOUNTABILITY OFF., GAO-12-590, AIR POLLUTION: EPA NEEDS BETTER INFORMATION ON NEW SOURCE REVIEW PERMITS 7 (June 2012), <http://www.gao.gov/products/GAO-12-590>; *see also* Casey Roberts, *New York v. EPA: State Response to A Federal Regulatory Rollback*, 33 *ECOLOGY L.Q.* 613, 640–42, 652 (2006).

97. *See* OIG, LIMITED KNOWLEDGE, *supra* note 92, at 16 ("OECA could not determine or report on the levels of compliance with environmental regulations for five of

compliance status of regulated entities appears to extend to a host of statutory programs. For example, the OIG found that EPA lacks a systematic framework for identifying violations of the dredge and fill permit program under Section 404 of the CWA.⁹⁹ The OIG attributed this problem to “a limited field presence,” finding that “EPA identifies violations through a passive, reactive method of relying on complaints and referrals from external sources. An incomplete national data system and sporadic coordination with federal and state partners further impair EPA’s ability to maintain an effective Section 404 enforcement program.”¹⁰⁰ The GAO found that data provided by states to EPA failed to provide reliable information on the frequency of community water systems’ violations of the SDWA’s national drinking water standards, and that “the data did not reliably reflect the frequency of monitoring violations, which are a predictor of health-based violations.”¹⁰¹ A third example is the agency’s inability to effectively

our six sample regulatory areas.”). The problem is longstanding. *See* Victor B. Flatt, *A Dirty River Runs Through It (The Failure of Enforcement in the Clean Water Act)*, 25 B.C. ENVTL. AFF. L. REV. 1, 32 (1997) (calling flawed or incomplete data systems or tracking methods “a severe problem that calls into question EPA’s ability and desire” to monitor compliance at the state level).

98. *See, e.g.*, FRAUDULENT DATA, *supra* note 64, at 4 (“The EPA lacks a due diligence process for potential fraudulent environmental data. Although the EPA has three instruments that address how to respond to instances of fraudulent data, each instrument is out of date or unimplemented.”). OECA has agreed with the OIG’s assessment, finding data deficiencies concerning important categories of sources subject to CWA regulation. OFF. ENF’T & COMPLIANCE ASSURANCE, U.S. EPA, CLEAN WATER ACT ACTION PLAN 4 (Oct. 15, 2009) [hereinafter EPA, CWAP], <http://www.epa.gov/sites/production/files/documents/actionplan101409.pdf>. OECA confessed that it lacked critical information on the compliance status of the biggest facilities, adding that “[i]f a facility isn’t reporting, we don’t know whether it is violating its permit limits.” *Id.* at 3. In the face of these and other deficiencies, OECA promised to work with states to fill these gaps to help make informed decisions on how best to deploy limited enforcement resources. *Id.* at 7.

99. 33 U.S.C. § 1344 (2012).

100. OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 10-P-0009, EPA NEEDS A BETTER STRATEGY TO IDENTIFY VIOLATIONS OF SECTION 404 OF THE CLEAN WATER ACT 6–7 (Oct. 26, 2009), <http://www.epa.gov/oig/reports/2010/20091026-10-P-0009.pdf>. EPA shares authority to enforce the dredge and fill permit program with the U.S. Army Corps of Engineers. *See* 33 U.S.C. § 1344(b), (c), (n), (s) (2012).

101. U.S. GOV’T ACCOUNTABILITY OFF., GAO-11-381, DRINKING WATER: UNRELIABLE STATE DATA LIMIT EPA’S ABILITY TO TARGET ENFORCEMENT PRIORITIES AND COMMUNICATE WATER SYSTEMS’ PERFORMANCE 13 (June 2011), <http://www.gao.gov/assets/320/319780.pdf>; *see also id.* at 17 (“[T]he total number of monitoring violations is much higher than indicated by the SDWIS/Fed data, suggesting that the total number of health-based violations is also larger than indicated.”); U.S. GOV’T ACCOUNTABILITY OFF., GAO-13-115, ENVIRONMENTAL PROTECTION: EPA SHOULD DEVELOP A STRATEGIC PLAN FOR ITS NEW COMPLIANCE INITIATIVE 2 (2012) [hereinafter GAO, STRATEGIC PLAN], <http://www.gao.gov/assets/660/650711.pdf> (“[U]nreliable data in EPA’s drinking water program limits EPA’s ability to identify violations.”). Initial reports provide evidence that the water contamination crisis in Flint, Michigan in 2015–16 was a dramatic illustration of regulatory failure at multiple governmental levels. *See* Julie Mack et al., *As Flint Was Slowly Poisoned, Snyder’s Inner Circle Failed to Act*, MLIVE (May 3, 2016),

monitor high priority violations under the CAA, assess results, and make informed policy changes due to data deficiencies.¹⁰²

The GAO summarized this first challenge well several years ago. It concluded that, notwithstanding EPA's efforts to plug data gaps that hindered its own enforcement initiatives and its oversight of state enforcement, EPA "still needs comprehensive, accurate, and reliable data that would allow it to better target limited resources to those regions and potential pollution problems of the greatest concern."¹⁰³ It echoed this conclusion more recently, finding that "because of incomplete or unreliable data on compliance in some programs, such as the NPDES, EPA cannot determine the full extent of entities' compliance."¹⁰⁴

http://www.mlive.com/news/index.ssf/page/flint_water_crisis_leads_to_snyder.html#incart_big-photo; Sara Ganim & Linh Tran, *How Tap Water Became Toxic in Flint, Michigan*, CNN (Jan. 13, 2016, 10:53 AM), <http://www.cnn.com/2016/01/11/health/toxic-tap-water-flint-michigan/>; Merritt Kennedy, *Lead-Laced Water In Flint: A Step-By-Step Look at the Makings of a Crisis*, NPR (Apr. 20, 2016, 6:39 PM), <http://www.npr.org/sections/thetwo-way/2016/04/20/465545378/lead-laced-water-in-flint-a-step-by-step-look-at-the-makings-of-a-crisis>; Renee Schoof, *EPA Fully Engaged Now on Flint Crisis, But Tougher Actions Unlikely, Experts Say*, 47 ENV'T REP. (BNA) 770, 770 (March 11, 2016) (quoting Professor Robert Percival as stating that EPA is "getting a lot of grief that [it should have acted] much sooner.").

102. OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 10-P-0007, EPA OVERSIGHT AND POLICY FOR HIGH PRIORITY VIOLATIONS OF CLEAN AIR ACT NEED IMPROVEMENT 7 (Oct. 14, 2009) [hereinafter OIG, PRIORITY], <http://www.epa.gov/oig/reports/2010/20091014-10-P-0007.pdf>. Data deficiencies have hampered other environmental programs. See, e.g., Joanna Lau, *Nothing but Unconditional Love for Conditional Registrations: The Conditional Registration Loophole in the Federal Insecticide, Fungicide, and Rodenticide Act*, 44 ENVTL. L. 1177, 1195 (2014) (discussing EPA's acknowledgment that data-tracking for pesticide registrations is out of date and inaccurate); Vanessa Zborek, "Yes, in Your Backyard!" *Model Legislative Efforts to Prevent Communities from Excluding CAFOs*, 5 WAKE FOREST J.L. & POL'Y 147, 165 (2015) (referring to enforcement of air quality standards against confined animal feedlot operations); cf. Shannon M. Roesler, *The Nature of the Environmental Right to Know*, 39 ECOLOGY L.Q. 989, 1019 (2012) (referring to incomplete and inadequate information in the toxic release inventory).

103. U.S. GOV'T ACCOUNTABILITY OFF., GAO-10-165T, CLEAN WATER ACT: LONGSTANDING ISSUES IMPACT EPA'S AND STATES' ENFORCEMENT EFFORTS: STATEMENT OF ANU K. MITTAL, NATURAL RESOURCES AND ENVIRONMENT TEAM 14 (Oct. 15, 2009), [hereinafter GAO, MITTAL], <http://www.gao.gov/assets/130/123559.pdf>; see also Mary L. Lyndon, *Secrecy and Access in an Innovation Intensive Economy: Reordering Information Privileges in Environmental, Health, and Safety Law*, 78 U. COLO. L. REV. 465, 501 (2007) ("[D]ata gaps' continue to undermine regulatory efforts.").

104. GAO, STRATEGIC PLAN, *supra* note 101, at 2; see also OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 16-P-0164, CLEAN AIR ACT FACILITY EVALUATIONS ARE CONDUCTED, BUT INACCURATE DATA HINDER EPA OVERSIGHT AND PUBLIC AWARENESS 9 (May 3, 2016) ("Inaccurate data hinder the EPA's ability to use databases as a tool to oversee delegated agencies, and hinder the agency's ability to provide reasonable assurance that compliance monitoring activities are being conducted. Moreover, inaccurate data . . . [that is] publicly available . . . could misinform the public about the status of CAA facilities."), <https://www.epa.gov/sites/production/files/2016-05/documents/20160503-16-p-0164.pdf>; Joel A. Mintz, *Scrutinizing Environmental Enforcement: A Comment on A Recent*

2. Significant Noncompliance

A second challenge facing state and federal enforcement officials is the high incidence of noncompliance with regulatory obligations. As two scholars of environmental policy noted in 2014, “Substantial rates of non-compliance with traditional regulation have persisted even after decades of regulatory control.”¹⁰⁵ The GAO found, for example, in a 2012 report that EPA data for 2010 showed that 45% of certain point sources subject to effluent limitations in NPDES permits reported violations.¹⁰⁶ The OIG had concluded in an earlier report that EPA Headquarters failed to provide effective oversight of state enforcement under delegated environmental programs, resulting in sources subject to high priority CAA obligations remaining out of compliance “longer than they should, leaving the potential for excess pollutants to be emitted.”¹⁰⁷ This, too, is a problem that has been documented for years.¹⁰⁸

Moreover, too much of this noncompliance is significant.¹⁰⁹ EPA itself has acknowledged the problem. Former EPA Administrator Lisa Jackson, for example, in a memorandum to the head of EPA’s enforcement program, noted that

[w]e are . . . falling short of this Administration’s expectations for the effectiveness of our clean water enforcement programs. Data available to EPA show that, in many parts of the country, the level of significant noncompliance with permitting

Discussion at the AALS, 17 J. LAND USE & ENVTL. L. 127, 143 (2001) (concluding that “partial and incomplete data” hinder efforts to evaluate EPA’s enforcement success). Increasing the severity of sanctions is one way to address weak general deterrence arising from failure to identify violators; *cf.* Paul H. Robinson, *Hybrid Principals for the Distribution of Criminal Sanctions*, 82 NW. U. L. REV. 19, 23–24, 38 (1987) (identifying adjustments in the allocation of investigatory, enforcement, or prosecution resources and changes in the distribution of sanctions as alternative ways to increase the general deterrence). Such increases may not be the preferred approach for a variety of reasons, including a possible lack of political salience.

105. Cary Coglianese & Jennifer Nash, *Performance Track’s Postmortem: Lessons from the Rise and Fall of EPA’s “Flagship” Voluntary Program*, 38 HARV. ENVTL. L. REV. 1, 84 (2014).

106. GAO, STRATEGIC PLAN, *supra* note 101, at 1.

107. OIG, PRIORITY, *supra* note 102, at 5.

108. For example, the OIG concluded in 2000 that regional officials lacked reporting procedures to identify whole effluent toxicity (“WET”) violations by CWA permittees in North Carolina. As a result, “the Region could not work with the State to improve water quality in those important areas.” OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 2000-P-00025, AUDIT REPORT: NORTH CAROLINA NPDES ENFORCEMENT AND EPA REGION 4 OVERSIGHT 9 (Sept. 28, 2000), <http://www.epa.gov/sites/production/files/2015-12/documents/ncfile4.pdf>.

109. See Daniel A. Farber, *Taking Slippage Seriously: Noncompliance and Creative Compliance in Environmental Law*, 23 HARV. ENVTL. L. REV. 297, 304 (1999) (identifying high rates of significant noncompliance under the CWA); James Salzman et al., *Regulatory Traffic Jams*, 2 WYO. L. REV. 253, 253 (2002) (“Studies by the General Accounting Office have consistently found significant noncompliance with the Clean Water Act.”).

requirements is unacceptably high and the level of enforcement activity is unacceptably low.¹¹⁰

Shortly thereafter, OECA issued a Clean Water Act Action Plan¹¹¹ in which it characterized violations as “too widespread” and enforcement as “uneven.”¹¹² OECA concluded that it needed to overhaul its enforcement approach to meet this set of challenges.¹¹³

3. Shortcomings in State Enforcement

As indicated above, the principal enforcers of the cooperative federalism environmental programs are the states, exercising authority delegated to them with EPA’s approval.¹¹⁴ Faced with the kind of significant noncompliance described above, at least some states have performed inadequately and EPA’s oversight of state enforcement has been problematic.¹¹⁵ In a report published in 2011, EPA’s OIG described these failings in considerable detail.¹¹⁶ According to the OIG:

[S]tate enforcement programs frequently do not meet national goals and states do not always take necessary enforcement actions. State enforcement programs are underperforming: EPA data indicate that noncompliance is high and the level of enforcement is low. EPA does not consistently hold states accountable for meeting enforcement standards, has not set clear and consistent national benchmarks, and does not act effectively to curtail weak and inconsistent enforcement by states.¹¹⁷

110. Memorandum from Lisa Jackson, Adm’r EPA, to Cynthia Giles, Assistant Adm’r Enf’t and Compliance Assurance (July 2, 2009), <http://web.archive.org/web/20090710022624/http://www.epa.gov/compliance/data/results/performance/cwa/jackson-ltr-cwa-enf.html>.

111. For discussion of the Plan, see Markell & Glicksman, *supra* note 19, at 64–75.

112. EPA, CWAP, *supra* note 98, at 22.

113. *Id.* at 1 *passim*.

114. See *supra* notes 13–15 and accompanying text; see also OFF. INSPECTOR GEN., U.S. EPA., REP. NO. 15-N-164, FY 2015 EPA MANAGEMENT CHALLENGES 1 (May 28, 2015), [hereinafter OIG, CHALLENGES], <http://www.epa.gov/oig/reports/2015/20150528-15-N-0164.pdf> (“The EPA relies heavily on authorized states to obtain environmental program performance data and implement compliance and enforcement programs.”).

115. See Lesley K. McAllister, *The Enforcement Challenge of Cap-and-Trade Regulation*, 40 ENVTL. L. 1195, 1221–22 (2010) (“Studies have suggested that the environmental enforcement conducted by many states in the past has been weak and inadequate.”).

116. See GAO, STRATEGIC PLAN, *supra* note 101, at 2 (finding underperformance by state enforcement programs).

117. OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 12-P-0113, EPA MUST IMPROVE OVERSIGHT OF STATE ENFORCEMENT, at iii (Dec. 9, 2011) [hereinafter OIG, IMPROVE], https://www.epa.gov/sites/production/files/2015-10/documents/20111209-12-p-0113_glance.pdf; see also *id.* (“[S]tate performance remains inconsistent across the country, providing unequal environmental benefits to the public and an unlevel playing field for regulated industries.”).

Deficiencies in state enforcement performance, and in EPA's oversight of state performance, ranged across a broad array of delegated programs.¹¹⁸ The OIG compared state performance with OECA's national enforcement goals, finding that all but one EPA region included at least one state that performed in the bottom quartile in one or more programs, apparently indicating that the problem was widespread, not just concentrated in one state or region.¹¹⁹ EPA's goal was that states inspect 100% of major CAA emitters every 2 years, but only 8 states met that goal.¹²⁰ EPA set a national goal that states enter 100% of high-priority CAA violations into EPA data systems within 60 days, but only 2 states met that goal.¹²¹ Similar problems arose under the CWA. Only one state met EPA's 2006 goal of inspecting 100% of major point sources each year.¹²² The next year, EPA issued a new Compliance Monitoring Strategy that reduced the goal to inspection of 100% of major sources every 2 years, beginning in 2009. But the national average in 2010 was only 61%. Only 2 states met this inspection goal, while 13 states inspected fewer than 50% of major facilities.¹²³ EPA set a goal under RCRA that state agencies inspect 100% of large quantity waste generators every 5 years, but in 2010, states on average inspected only 62% of these facilities, and only 2 states met the 100% goal.¹²⁴

The OIG found that state performance varied widely, by as much as 50% for CAA enforcement. "[S]ome states inspected facilities, identified violations, and/or assessed penalties for violations at a much higher rate than other states."¹²⁵ Moreover, EPA did not consistently hold regions accountable for ensuring that states adequately enforce environmental laws, failing to set clear and consistent benchmarks for state performance,¹²⁶ and to ensure that the regional offices followed national oversight guidance.¹²⁷ Among other things, even though OECA, regional, and state enforcement officials all agreed that states were underperforming, these reporting and accountability failures precluded EPA's national headquarters from "objectively know[ing] which states require immediate intervention," and EPA regions "did not consistently intervene to correct deficient state performance."¹²⁸

The OIG report represents a snapshot of federal and state enforcement failings at a particular point in time. The OIG, however, has reported similar

118. See, e.g., OIG, CHALLENGES, *supra*, note 114, at 2–4 (describing deficiencies in state enforcement and in EPA oversight across a host of regulatory programs).

119. OIG, IMPROVE, *supra* note 117, at 8.

120. *Id.* at 9.

121. *Id.*

122. *Id.*

123. *Id.*

124. *Id.* at 10.

125. *Id.*

126. "Most of the performance requirements established in the laws and regulations are not easily measurable. For example, the regulations require appropriate penalties, but do not define 'appropriate.'" *Id.* at 12.

127. *Id.* at 11.

128. *Id.* at 12, 15.

problems more recently. It concluded in 2015, for example, that regional oversight of inspections of facilities regulated under FIFRA was plagued by inadequate guidance and training. According to the OIG, “Improvements are needed to increase assurance that pesticides are not misused and do not pose unnecessary risks to human health and the environment.”¹²⁹ Moreover, these examples are consistent with recurring concerns expressed by some. One commentator, citing studies from the 1990s and early 2000s, concluded that “states are not enforcing environmental laws as stringently as would the federal government—in effect, state agents are shirking their enforcement responsibilities.”¹³⁰

4. *Linking Enforcement Choices to Environmental Conditions (Metrics)*

One final challenge that has long plagued agency enforcement officials is the difficulty of ascertaining what impact different enforcement choices would have on public health and environmental quality. Environmental law has grappled with the difficulty of drawing cause-and-effect linkages between particular activities, such as the activities of a polluter or group of polluters, and an environmental quality problem, such as ambient concentrations that exceed regulatory standards. As Todd Aagaard describes, complex lines of causation are an important characteristic of environmental law, and one that creates considerable difficulties for environmental lawmaking.¹³¹

Similar causal conundrums apply in the enforcement context. Michael Vandenberg has described the problem cogently:

EPA recently has attempted to link reports of environmental performance to human health and environmental harms and to coordinate this effort with state enforcement agencies through a variety of initiatives. Nevertheless, activity counts (e.g., the number of orders issued or cases filed) still dominate the data collection and

129. OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 15-P-0156, EPA’S OVERSIGHT OF STATE PESTICIDE INSPECTIONS NEEDS IMPROVEMENT TO BETTER ENSURE SAFEGUARDS FOR WORKERS, PUBLIC AND ENVIRONMENT ARE ENFORCED 6 (May 15, 2015), <https://www.epa.gov/sites/production/files/2015-09/documents/20150515-15-p-0156.pdf>.

130. Mark Atlas, *Enforcement Principles and Environmental Agencies: Principal-Agent Relationships in A Delegated Environmental Program*, 41 LAW & SOC’Y REV. 939, 941 (2007). For book-length treatment of concerns about state enforcement and EPA oversight, see generally CLIFFORD RECHTSCHAFFEN & DAVID L. MARKELL, *REINVENTING ENVIRONMENTAL ENFORCEMENT AND THE FEDERAL–STATE RELATIONSHIP* (2003) (discussing concerns about state enforcement and EPA oversight).

131. Todd S. Aagaard, *Environmental Law as a Legal Field: An Inquiry in Legal Taxonomy*, 95 CORNELL L. REV. 221, 270–71 (2010) (“[I]t is still unclear whether humans have the capacity to understand and plan over the scope required for effective environmental lawmaking.”); see also Richard J. Lazarus, *Human Nature, the Laws of Nature, and the Nature of Environmental Law*, 24 VA. ENVTL. L.J. 231, 240 (2005) (arguing that scientific uncertainty will increase as “the laws of nature spread cause and effect out over time and space”); Richard J. Lazarus, *Restoring What’s Environmental About Environmental Law in the Supreme Court*, 47 UCLA L. REV. 703, 744–48 (2000) (describing attributes of ecological injury that make it difficult to establish cause and effect linkages).

reporting efforts. The linkage between enforcement and human health and environmental quality is extremely difficult to make, and in most cases EPA has only been able to identify the amount of pollutants reduced by an enforcement action, not the corresponding effect on human health or the environment. In addition, the tort liability implications of linking a specific release to human health or environmental harms may create strong incentives for firms to dispute government assertions of linkages.¹³²

Vandenbergh concluded that inadequate monitoring capacity hampers the ability of enforcement officials to link reductions in noncompliance rates or in pollutants emitted to changes in health and environmental quality.¹³³ Ultimately, Vandenbergh asserts, “The allocation of enforcement resources to those environmental violations that cause the greatest harm to human health or the environment is obviously an important objective, but the added benefit of increasing compliance through the use of the information on the harms caused by noncompliance has received little attention.”¹³⁴

B. Emerging Enforcement Challenges

EPA and state agencies have grappled for years with the traditional challenges described above, which pose obstacles to effective enforcement of environmental laws. This section describes a nonexhaustive array of notable additional challenges of more recent vintage, which exacerbate the difficulties created by the traditional challenges. These include declining resources, increased responsibilities, differentiation of regulated entities’ duties, and a recognition that enforcement officials need to focus more attention on small sources.

1. Declining Resources

Effective enforcement requires sufficient resources to investigate potential regulatory violations and pursue enforcement actions against those responsible for committing them. It is no secret that both EPA and the states in recent years have cut funding for environmental programs. EPA’s funding has waxed and waned over the years. Adjusting for inflation, EPA’s funding in fiscal

132. Michael P. Vandenbergh, *Beyond Elegance: A Testable Typology of Social Norms in Corporate Environmental Compliance*, 22 STAN. ENVTL. L.J. 55, 91–92 (2003).

133. *Id.* at 93. A limited number of studies purport to link levels of pollution reduction to differences in environmental enforcement approaches, but the task is challenging. See Lesley K. McAllister, *Rainforests and Regulation: New Directions in Brazilian Environmental Law and Legal Institutions: On Environmental Enforcement and Compliance: A Reply to Professor Crawford’s Review of Making Law Matter: Environmental Protection and Legal Institutions in Brazil*, 40 GEO. WASH. INT’L L. REV. 649, 673 (2009) (first citing Kathryn Harrison, *Is Cooperation the Answer? Canadian Environmental Enforcement in Comparative Context*, 14 J. POL’Y ANALYSIS & MGMT. 221, 221 (1995); and then citing NEIL GUNNINGHAM, ROBERT A. KAGAN & DOROTHY THORNTON, *SHADES OF GREEN: REGULATION, BUSINESS, ENVIRONMENT* (2003)).

134. Vandenbergh, *supra* note 132, at 92–93.

year 2009 (\$7.2 billion)¹³⁵ was slightly lower than in fiscal year 1978.¹³⁶ Between fiscal years 2000 and 2010, the agency's budget rose in nominal terms from \$7.8 billion to \$10.4 billion, but remained relatively flat over this period in real terms.¹³⁷ Adjusted for inflation, the 2014 funding level was still slightly below the level provided in fiscal year 1977.¹³⁸ Funding was cut by an additional \$60 million for fiscal year 2015.¹³⁹ Thus, the agency's funding fell during a period in which, as described in the next section, its responsibilities increased significantly.

Funding for EPA's Environmental Programs and Management, which includes enforcement activities,¹⁴⁰ also fell from \$2.9 billion in fiscal year 2010 to \$2.6 billion in fiscal year 2014.¹⁴¹ Inflation-adjusted funding for OECA specifically fell significantly between 1994 (about \$690 million) and 2000 (about \$605 million) and then wavered slightly up or down between 2000 and 2013 (\$620

135. EPA received \$14.8 billion in appropriated funds in fiscal year 2009, but about half took the form of emergency supplemental appropriations under the American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115. ROBERT ESWORTHY ET AL., CONG. RESEARCH SERV., R42520, ENVIRONMENTAL PROTECTION AGENCY (EPA): APPROPRIATIONS FOR FY2013 2, 39, 41 (2012), <https://www.fas.org/sgp/crs/misc/R42520.pdf> [hereinafter ESWORTHY, FY2013].

136. *Id.* at 39.

137. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-12-149T, ENVIRONMENTAL PROTECTION AGENCY: MANAGEMENT CHALLENGES AND BUDGET OBSERVATIONS 1 (Oct. 12, 2011), <http://www.gao.gov/assets/590/585707.pdf>.

138. ROBERT ESWORTHY & DAVID M. BEARDEN, CONG. RESEARCH SERV., R43689, ENVIRONMENTAL PROTECTION AGENCY (EPA): APPROPRIATIONS FOR FY2014 IN P.L. 113-76, at 28 fig.A-1 (2014) (Figure A-1), <https://www.fas.org/sgp/crs/misc/R43689.pdf>. EPA's website provides funding numbers that differ slightly from those described above. For example, EPA indicates its budget in 2013 was only \$7.9 billion and only \$8.2 billion in 2014. *See EPA's Budget and Spending*, U.S. EPA, <http://www2.epa.gov/planandbudget/budget> (last updated July 12, 2016).

139. Nancy Ognanovich, *Obama Signs 2015 Spending Bill that Would Cut \$60 Million from EPA*, 45 ENV'T REP. (BNA) 3657, 3657 (Dec. 19, 2014).

140. ESWORTHY & BEARDEN, *supra* note 138, at 30–31 tbl.B-1. Declines in resources from other sources, such as permitting fees, can indirectly affect the agency's enforcement activities. Shortfalls in fees generated by CAA permitting caused EPA to shift non-Title V revenue to fund Title V programs, making those funds unavailable for other purposes. OFF. INSPECTOR GEN., U.S. EPA, REP. NO. 15-P-0006, ENHANCED EPA OVERSIGHT NEEDED TO ADDRESS RISKS FROM DECLINING CLEAN AIR ACT TITLE V REVENUES 9 (Oct. 20, 2014), <https://www.epa.gov/sites/production/files/2015-09/documents/20141020-15-p-0006.pdf>. EPA's OIG, like those of other federal agencies, has experienced its own budget cuts, adversely affecting the capacity to oversee agency activities. *See* KEARNEY & CO., ACCELERATING CHANGE: THE 2015 INSPECTOR GENERAL SURVEY 4, 9, 18 (Sept. 2015), <https://www.agacgfm.org/getattachment/Resources/Online-Library/Survey-Series/AGA-IG-Survey-2015.pdf.aspx>.

141. ESWORTHY & BEARDEN, *supra* note 138, at 26 tbl.A-1. The OIG reports that “[i]n fiscal years 2013 and 2014, the EPA directed almost one-tenth of its enacted annual budget to enforcing environmental laws and promoting compliance. This amounts to almost \$1.5 billion in fiscal years 2013 and 2014 combined.” OIG, REDUCE RISK, *supra* note 68, at 1.

million).¹⁴² OECA's budget for fiscal year 2015 was almost 9% lower than it was in 2010.¹⁴³

The real decline in EPA's budget over the last decade or more has forced the agency to cut back on the size of its workforce. EPA's peak staffing occurred in fiscal year 1999, when it employed 18,110 people. That number declined to 17,106 in 2012 and to 15,408 in 2014, a figure lower than any year since 1990.¹⁴⁴ Staffing levels fell below 15,000 by early 2015.¹⁴⁵ These workforce reductions affected enforcement staffing. EPA also reduced the size of the regional workforce, which is responsible for most of the agency's enforcement activity, by about 5% between fiscal years 1997 and 2006 from 2,568 full-time equivalent ("FTE") staff to 2,434 FTEs. The OECA headquarters workforce declined 1% during this same period.¹⁴⁶

The decline in resources available to the federal government for environmental protection programs generally, and for enforcement functions specifically, impacts state enforcement under delegated programs.¹⁴⁷ Fewer dollars flowing to EPA makes it more difficult for EPA to subsidize the operation of state programs. Total state and tribal assistance grants fell from \$4.9 billion in fiscal year 2010 to \$3.5 billion in fiscal year 2014, a 29% decline.¹⁴⁸ Between fiscal years 2008 and 2014, annual appropriations for EPA categorical grants to assist states in implementing delegated programs shrunk by about \$24 million.¹⁴⁹ The Environmental Council of the States ("ECOS") has expressed concern about reductions in federal funding for state environmental programs.¹⁵⁰ It has concluded, for example, that "[i]nsufficient resources hinder adequate State field presence at water systems" covered by the SDWA, rendering the states "unable to

142. Jay P. Shimshack, *The Economics of Environmental Monitoring and Enforcement*, 6 ANN. REV. RESOURCE ECON. 339, 344 fig.1 (2014); see also James Alm & Jay Shimshack, *Environmental Enforcement and Compliance: Lessons from Pollution, Safety, and Tax Settings*, 10 FOUND. & TRENDS IN MICROECONOMICS 209, 217 (2014).

143. Renee Schoof, *Air Toxics, Hazardous Waste Top EPA Enforcement Priorities*, 47 ENV'T REP. (BNA) S-62 (Jan. 15, 2016).

144. See *EPA's Budget and Spending*, *supra* note 138.

145. Robin Bravender, *EPA: Workforce Shrinks to Level Last Seen in Late 1980s*, E & E NEWS PM (Mar. 2, 2015), <http://www.eenews.net/eenewspm/stories/1060014311/>.

146. GAO, MITTAL, *supra* note 103, at 7–8.

147. See, e.g., Will Reisinger et al., *Environmental Enforcement and the Limits of Cooperative Federalism: Will Courts Allow Citizen Suits to Pick up the Slack?*, 20 DUKE ENVTL. L. & POL'Y F. 1, 21 (2010) (noting that state budget cuts and shortfalls threaten the effectiveness of cooperative federalism).

148. ESWORTHY & BEARDEN, *supra* note 138, at 27 tbl.A-1.

149. *Id.*; see also GOV'T ACCOUNTABILITY OFF., GAO-13-504R, FUNDING FOR 10 STATES' PROGRAMS SUPPORTED BY ENVIRONMENTAL PROTECTION AGENCY CATEGORICAL GRANTS 4–5 fig.1 (May 6, 2013) [hereinafter GAO, CATEGORICAL], <http://www.gao.gov/products/gao-13-504r>.

150. Markell & Glicksman, *supra* note 19, at 53–54 (citation omitted). ECOS is a nonprofit organization working to improve the operation of state environmental agencies. ENVTL. COUNCIL OF THE STATES, ORGANIZATIONAL STRUCTURE AND BYLAWS 1 (March 18, 2015).

adequately follow up on any significant deficiencies discovered during [so-called sanitary surveys] or to prepare the necessary enforcement orders.”¹⁵¹

To make matters even more challenging, many states cut their own budgets for environmental agencies at the same time that federal funding for EPA programs and delegated state programs fell. ECOS concluded in 2009 and 2010 that reductions in state budgets for environmental enforcement threatened the viability of state enforcement programs.¹⁵² Between fiscal years 2011 and 2012, 24 states reduced funding for their environmental agencies,¹⁵³ reflecting a trend of decreasing funding for state environmental agencies, which, according to ECOS, jeopardizes state implementation of federally delegated programs.¹⁵⁴ The GAO emphasized the growing importance of federal grants in the face of state reductions in funding for environmental programs.¹⁵⁵ Some states responded to reduced funding for environmental programs by reducing staff levels and cutting outreach and technical-assistance programs that can facilitate compliance.¹⁵⁶ State environmental officials have reported to the GAO that resource constraints have resulted in hiring freezes, staff attrition and layoffs, and, ultimately, the diminished capacity of the states to conduct permitting, inspections, and monitoring, all of which are critical to effective enforcement.¹⁵⁷

EPA has acknowledged the adverse impacts of declining resources, albeit in some cases by putting a positive gloss on the problem. In an article describing its Next Gen initiative, Cynthia Giles, the Assistant Administrator for OECA, noted that “[e]ven in a time of declining budgets, we are developing more innovative approaches [such as Next Gen] to help us get better protection.”¹⁵⁸ In its 2014–2018 Strategic Plan, EPA describes Next Gen as “the right direction for the agency regardless of resources because it will increase effectiveness, and it

151. ENVTL. COUNCIL OF THE STATES, THE STATE ENVIRONMENTAL AGENCIES’ STATEMENT OF NEED AND BUDGET PROPOSAL FOR EPA’S 2013 CATEGORICAL GRANTS STAG BUDGET (STATE AND TRIBAL ASSISTANCE GRANTS) 21 (2011), http://www.4cleanair.org/sites/default/files/062011-ECOSProposalforEPAs2013STAGBudget_0.pdf.

152. Markell & Glicksman, *supra* note 19, at 54.

153. R. STEVEN BROWN, ENVTL. COUNCIL OF THE STATES, STATUS OF STATE ENVIRONMENTAL AGENCY BUDGETS, 2011-2013 1 (Sept. 2012), <http://www.ecos.org/wp-content/uploads/2016/02/September-2012-Green-Report.pdf>. The 24 states with decreasing budgets experienced larger changes than the 25 states with increasing budgets, and the total decline in state environmental agency budgets from FY2011 to FY2012 averaged \$357,015 per state. *Id.*

154. *See id.* at 2, 5.

155. GAO, CATEGORICAL, *supra* note 149, at 1.

156. *Id.* at 4, 9. For a discussion on the potential value of technical assistance and outreach by regulators, see Carol Foley & Michael Elliott, *Systems Design and the Promotion of Pollution Prevention: Building More Effective Technical Assistance Programs*, 29 GA. L. REV. 449, 450 (1995).

157. GAO, CATEGORICAL, *supra* note 149, at 4, 9–10.

158. Giles, *supra* note 18, at 26.

becomes more urgent in a time of challenging budgets”¹⁵⁹ Even more to the point, EPA officials told the GAO that it has become increasingly difficult to rely primarily on its traditional approach of inspecting individual entities to increase compliance with the nation’s environmental laws and regulations.¹⁶⁰ They also told the agency’s OIG that, in terms of compliance monitoring strategy, EPA’s enforcement office has “sought to balance . . . the need to continue to maintain a credible enforcement presence . . . , the multi-year decline in resources . . . available for all enforcement activities, and the increasing complexity of matters covered by EPA’s settlement agreements.”¹⁶¹ As one prominent scholar of EPA enforcement noted even before the funding cuts of the last several years began, EPA “has suffered from a regulatory agenda and work load that far exceeds the size of its staff and available funding.”¹⁶² Scholars have made similar assessments about state enforcement capacity.¹⁶³

One sign of the likely impact of declining resources on enforcement capacity is the anticipated number of enforcement activities EPA will initiate in the coming years. Output measures are not a definitive measure of the impact of environmental enforcement.¹⁶⁴ EPA has explained, for example, that its commitment to pursuing large, complex cases that will have the biggest environmental impact necessarily requires a reduction in the number of cases overall. According to the agency, this shift toward bigger but fewer cases will not reduce the protective impact of its enforcement activities.¹⁶⁵ Nevertheless, the numbers provided in EPA’s latest five-year strategic plan seem to presage a significant decline in enforcement activity. EPA projects that over the period 2014–2018, it will conduct an average of 15,800 inspections and evaluations each year.¹⁶⁶ This is a 25% decline from the period 2005–2009, when that number was 21,000.¹⁶⁷ The agency projected similar declines in other enforcement activities, including initiation of civil judicial and administrative enforcement cases (2,800,

159. U.S. EPA, FISCAL YEAR 2014–2018 EPA STRATEGIC PLAN 39 (2014), http://www2.epa.gov/sites/production/files/2014-09/documents/epa_strategic_plan_fy14-18.pdf [hereinafter EPA, FY 2014–2018].

160. GAO, STRATEGIC PLAN, *supra* note 101, at 2.

161. OIG, REDUCE RISK, *supra* note 68, at 25.

162. William L. Andreen, *Federal Climate Change Legislation and Preemption*, 3 ENVTL. & ENERGY L. & POL’Y J. 261, 298 (2008); *see also* MINTZ, *supra* note 89, at 173–75, 194–96.

163. *See, e.g.*, Donald T. Hornstein, *Complexity Theory, Adaptation, and Administrative Law*, 54 DUKE L.J. 913, 956 (2005) (referring to inadequate “budgetary and manpower capability [the states] felt were necessary to do their jobs”).

164. *See, e.g.*, Joel A. Mintz, *Measuring Environmental Enforcement Success: The Elusive Search for Objectivity*, 44 ENVTL. L. REP. 10751, 10753 (2014) (discussing shortcomings of output measures).

165. EPA, FY 2014–2018, *supra* note 159, at 38; *see also* EPA BUDGET IN BRIEF, *supra* note 56, at 62 (noting the agency’s intention to allocate resources to noncompliance having the most significant impact, which will lead EPA to pursue higher-impact, “large, complex[,] cases that require significant investment and a long-term commitment”).

166. EPA, FY 2014–2018, *supra* note 159, at 73.

167. *Id.*

as compared to 3,900 during the baseline period, a 29% decline) and conclusions of civil judicial and administrative enforcement cases (to 2,720 from 3,800; a 29% decline).¹⁶⁸

In addition, EPA projects declines in the real-world impacts of enforcement-related activities. Over the five-year period covered by the latest plan, EPA expects to reduce, treat, or eliminate an average of 318 million estimated pounds of air pollutants each year as a result of concluded enforcement actions. For the period 2005–2009, that number was 480 million pounds, 33% more than for the period 2014–2018.¹⁶⁹ The agency projects similar declines in pollution reduced from other media, including pounds of water pollutants reduced, treated, or eliminated (to 256 million from 320 million; 20% decline), pounds of hazardous waste treated, minimized, or properly disposed of (to 2,920 million from 6,500 million; 55% decline), commitments to clean up contaminated solid and groundwater media as a result of corrective action under RCRA and the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”) (to 205 million cubic yards from 300 million; 31% decline), and pounds of toxic and pesticide pollutants reduced, treated, or eliminated (to 2.8 million from 4.6 million, a 29% decline).¹⁷⁰

In announcing EPA’s annual enforcement and compliance data for 2014, Assistant Administrator Giles referred again to the “challenges posed by budget cuts.”¹⁷¹ A former OECA Assistant Administrator remarked more bluntly in 2015 that “[t]he reduction in the enforcement budget and staff for [EPA] is impacting the ability to do enforcement actions”¹⁷² The trend lines, which appear to have been affected by resource declines, are hard to misunderstand. The numbers for civil enforcement case initiations and conclusions and for federal inspections and evaluations, for example, are down in each case for virtually every year from 2009 to 2014.¹⁷³

The numbers for civil case initiations and conclusions rose slightly in fiscal year 2015 (2,380 as compared to 2,268 initiations in 2014; 2,360 as compared to 2,275 for conclusions), but not enough to match 2013 figures. They

168. *Id.*

169. *Id.* at 74

170. *Id.* at 73–74. We arrived at the average annual figures for the period 2014–2018 by dividing the cumulative numbers provided in EPA’s plan for the entire five-year period by five.

171. She also attributed declining enforcement numbers in part to the government shutdown that occurred in 2014. Robin Bravender, *Enforcement Actions Decline Again; Agency Blames Shutdown, Budget Woes*, GREENWIRE (Dec. 18, 2014). Giles also referred again to the agency’s pursuit of large, high impact cases. *Id.*

172. John Henry Stam, *Reduced Budget and Staff Impacting Office of Enforcement and Compliance*, 46 ENV’T REP. (BNA) 1028 (March 30, 2015) (quoting Granta Nakayama).

173. OFF. ENF’T & COMPLIANCE ASSURANCE, U.S. EPA, FISCAL YEAR 2014 EPA ENFORCEMENT AND COMPLIANCE ANNUAL RESULTS 8–9 (2014), <http://www2.epa.gov/sites/production/files/2014-12/documents/fy-2014-enforcement-annual-results-charts-12-08-14.pdf#page=8>.

were still almost 1,000 below 2011 figures (when the number for both initiations and conclusions was about 3,300).¹⁷⁴ The number of federal inspections and evaluations fell by 200 (to about 15,400) in 2015, which EPA again specifically attributed to budgetary cuts.¹⁷⁵ In other respects, however, the numbers improved in 2015, including for administrative and civil judicial penalties assessed (which doubled from 2014 to 2015 but still fell slightly below the figure for 2012) and the monetary value of supplemental environmental projects resulting from EPA enforcement actions (an increase from \$17 million in 2014 to \$39 million in 2015, the highest figure since 2012).¹⁷⁶

2. Increased Regulatory Responsibilities

Another challenge to federal and state enforcement officials, which has exacerbated the adverse effects of declining budgets, has been an increase in the number of entities subject to environmental regulation and in EPA and state environmental responsibilities.¹⁷⁷ Regulatory responsibilities expanded through much of the 1980s and early 1990s as a result of the enactment of new statutory programs (such as CERCLA in 1980¹⁷⁸ and the Emergency Planning and Community Right-to-Know Act in 1986¹⁷⁹) and the dramatic expansion of existing regulatory programs, which drew many new sources within the scope of those

174. OFF. ENF'T & COMPLIANCE ASSURANCE, U.S. EPA, FISCAL YEAR 2014 EPA ENFORCEMENT AND COMPLIANCE ANNUAL RESULTS 11 (2015), http://www.epa.gov/sites/production/files/2015-12/documents/fy-2015-enforcement-annual-results-charts_0.pdf#page=3.

175. *Id.* at 12.

176. *Id.* at 4, 13. The value of fines and restitution and court-ordered environmental projects in criminal cases also rose significantly in 2015, mostly due to a single criminal case involving Duke Energy. *Id.* at 6. Of the approximately \$4 billion in court-ordered environmental projects, the Duke Energy case accounted for about \$3.4 billion. DEP'T OF JUSTICE, OFF. PUB. AFF., DUKE ENERGY SUBSIDIARIES PLEAD GUILTY AND SENTENCED TO PAY \$102 MILLION FOR CLEAN WATER ACT CRIMES (May 14, 2015), <http://www.justice.gov/opa/pr/duke-energy-subsidiaries-plead-guilty-and-sentenced-pay-102-million-clean-water-act-crimes>.

177. See, e.g., M. Bruce Harper, *Trust but Verify: Innovation in Compliance Monitoring as a Response to the Privatization of Utilities in Developed Nations*, 48 ADMIN. L. REV. 593, 614 (1996) ("An increase in the number of generators alone holds some potential to make environmental enforcement more difficult."); see also EPA BUDGET IN BRIEF, *supra* note 56, at 62 ("The sheer number of regulated facilities, the contributions of large numbers of smaller sources, and limited resources means that EPA cannot rely on the traditional single facility inspection and enforcement approaches to ensure widespread compliance."). See generally Linda K. Breggin, *Increasing Federal Outreach to States*, 32 ENVTL F. 10 (2015) (referring to simultaneous increase in EPA responsibilities and dramatic resource decline).

178. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Pub. L. No. 96-510, 94 Stat. 2767.

179. Superfund Amendments and Reauthorization Act of 1986, Pub. L. No. 99-499, 100 Stat. 1613, 1729.

programs—through amendments to RCRA in 1984,¹⁸⁰ the CWA in 1987,¹⁸¹ and the CAA in 1990.¹⁸²

Recent changes in interpretation of the scope of the CWA and in EPA implementation strategies are illustrative. EPA noted in 2015 that “[t]he NPDES permitted universe has grown and diversified over the last 25 years without comparable increases in resources.”¹⁸³ Between 1972 and 2001, for example, “the number of facilities required to have NPDES permits has quadrupled.”¹⁸⁴ An appellate court decision held, for example, that pesticide applications that allow chemical residues to enter surface water bodies may trigger regulation under that statute, a position contrary to the one EPA had taken.¹⁸⁵ The court held that “it is clear that under the meaning of the CWA, pesticide residue or excess pesticide—even if treated as distinct from pesticide—is a pollutant discharged from a point source because the pollutant is ‘introduced into a water from the ‘outside world’ by’ the pesticide applicator from a ‘point source.’”¹⁸⁶ Stormwater permitting has also increased the size of the regulated community.¹⁸⁷ An increase in the number

180. Hazardous and Solid Waster Amendments of 1984, Pub. L. No. 98-616, 98 Stat. 3221.

181. Water Quality Act of 1987, Pub. L. No. 100-4, 101 Stat. 7.

182. Clean Air Act Amendments of 1989, Pub. L. No. 101-549, 104 Stat. 2399 (1990). An OIG report found a 35% increase in the number of sources covered by six statutory programs between 2001 and 2005. *See* OIG, LIMITED KNOWLEDGE, *supra* note 92, at 7 tbl.2-1.

183. OFF. WATER, U.S. EPA, REP. NO. 420-R-15-008, FY 2016–17 NATIONAL WATER PROGRAM GUIDANCE 48 (2015), http://www2.epa.gov/sites/production/files/2015-04/documents/2016-2017_nwpg_final.pdf. EPA had referred to the “breadth and expanding scope of the National Pollutant Discharge Elimination System (NPDES) regulated universe” as one of the challenges it faces in improving its enforcement performance. EPA, CWAP, *supra* note 98, at 10; *see also* OFF. ENF’T & COMPLIANCE ASSURANCE, U.S. EPA, CWA ACTION PLAN IMPLEMENTATION PRIORITIES: CHANGES TO IMPROVE WATER QUALITY, INCREASE COMPLIANCE AND EXPAND TRANSPARENCY 3 (2011), <https://www.epa.gov/sites/production/files/documents/cwa-action-plan-implementation-priorities-may-2011.pdf> (“The NPDES regulated universe has expanded from the roughly 100,000 traditional point sources to approximately one million dispersed and sometimes transient sources, such as CAFOs, construction sites, and other types of storm water dischargers. Many of these sources discharge pollutants that cause serious water quality problems.”).

184. OFF. WATER, U.S. EPA, PROTECTING THE NATION’S WATERS THROUGH EFFECTIVE NPDES PERMITS 1 (2001), <https://www3.epa.gov/npdes/pubs/strategicplan.pdf>.

185. *See Nat’l Cotton Council of Am. v. U.S. EPA*, 553 F.3d 927, 940 (6th Cir. 2009).

186. *Id.* at 940.

187. *See, e.g.*, OIG, LIMITED KNOWLEDGE, *supra* note 92, at 7 tbl.2-1 (identifying 45% increase in sources requiring CWA stormwater permits between 2001 and 2005); *see also* EPA, CWAP, *supra* note 98, at 22. During the same period, the number of manufacturers covered by TSCA increased by 61%. OIG, LIMITED KNOWLEDGE, *supra* note 92, at 7 tbl.2-1. Likewise, discharges from expanding hydraulic fracturing activities may trigger CWA requirements. *See* Robin Kundis Craig, *Hydraulic Fracturing (Fracking), Federalism, and the Water-Energy Nexus*, 49 IDAHO L. REV. 241, 249 (2013).

of regulated sources necessarily increases federal responsibilities as well as state responsibilities under delegated programs such as the NPDES permit program.

The expanding universe of regulated activities can burden federal and state regulators.¹⁸⁸ Under the CWA, NPDES permits are for a fixed term that may not exceed five years.¹⁸⁹ Over the years, EPA and state environmental agencies have developed a backlog in responding to requests to issue permits that should have expired, a problem to which declining resources and an expanded regulatory community likely contributed. In one case, environmental groups sought a writ of mandamus requiring EPA to reissue permits issued to two steam electric power plants. The Court of Appeals for the First Circuit denied the request, ruling that the groups failed to meet the requirements for mandamus relief, which is “a drastic remedy” reserved for “extraordinary situations.”¹⁹⁰ The court acknowledged that “EPA’s delays in reissuing the NPDES permits are concerning and extensive,” but concluded that EPA was entitled to “balance competing priorities with its limited resources, . . . and that it has prioritized permits that have greater environmental impacts.”¹⁹¹ The court noted with approval EPA’s projection that it would get to the expired permits in another three years.¹⁹² This example is consistent with the findings reflected in a GAO report published in 2009, which found that “our work over the past 9 years has shown that the Clean Water Act has significantly increased EPA’s and the states’ enforcement responsibilities, available resources have not kept pace with these increased needs, and actions are needed to further strengthen the enforcement program.”¹⁹³

One way to reduce these kinds of burdens is the creation of general permits, such as the ones available under the CWA’s dredge and fill¹⁹⁴ and

188. See Kara Cook, Note, *The Middle Ground of Pesticide Regulation: Why EPA Should Use a Watershed-Based Permitting Scheme in Its New Aquatic Pesticides Rule*, 37 *ECOLOGY L.Q.* 451, 486 (2010) (noting “significant monitoring and enforcement challenges” due to “the sudden explosion in permitting applicants”).

189. 33 U.S.C. § 1342(b) (2012) (state permits); 33 U.S.C. § 1342(a)(3) (EPA-issued permits).

190. *In re Sierra Club, Inc.*, No. 12-1860, 2013 WL 1955877, at *1 (1st Cir. May 8, 2013).

191. *Id.*

192. *Id.*; see also Amanda Palleschi, *EPA Eyes Changing Benchmark for Measuring Outdated CWA Permits*, ENVTL. POL. ALERT, INSIDE EPA at 21 (April 15, 2015).

193. GAO, MITTAL, *supra* note 103, at 14; see also ESWORTHY, FY2013, *supra* note 135, at 39 (noting that funding for enforcement had not kept pace with the increasing number of mandates and regulations, or with inflation).

194. 33 U.S.C. § 1344(e) (2012).

Other programs have the agency issue a permit on its own initiative, with no particular applicant before it, that defines a broad category of activity and allows the entities engaging in that activity to take advantage of the permit with little or no effort on their part, and limited agency review of specific facts in any particular case unless the agency finds good cause to condition or withdraw the general approval.

NPDES¹⁹⁵ permit programs. Indeed, EPA has developed a general permit for pesticide and herbicide applications over surface waters.¹⁹⁶ Although general permits reduce the resource commitment a government agency must make at the permit approval stage, agencies still have an ongoing responsibility to monitor, oversee reporting, inspect, and enforce.¹⁹⁷ If agencies accompany a switch from source-specific to general permitting with efforts to minimize oversight of sources covered by general permits such as through reduced inspections or enforcement, the result is likely to be a decline in verifiability and accountability and, most likely, compliance.¹⁹⁸

3. Differential Treatment of Regulated Entities

A third enforcement challenge of increasing significance involves changes in the nature of regulatory approaches. One reason for shifting regulatory strategies is the failure of the first generation of approaches to solve environmental problems. For example, although the technology-based approach to controlling water pollution discharges resulted in significant reductions in water pollution levels, many water bodies remained too polluted to support desired uses such as fishing or swimming. As a result, EPA has expanded its focus in implementing the CWA to include not only enforcement of technology-based effluent limitations applicable to point sources, but also to achieving state water-quality standards through the implementation of ambient quality-based effluent limitations.¹⁹⁹

Eric Biber & J.B. Ruhl, *The Permit Power Revisited: The Theory and Practice of Regulatory Permits in the Administrative State*, 64 DUKE L.J. 133, 140 (2014).

195. See 40 C.F.R. § 122.28(a) (2016); see also *Cal. Sportfishing Prot. All. v. Chico Scrap Metal, Inc.*, 728 F.3d 868 (9th Cir. 2013) (addressing California's Industrial Activities Storm Water General Permit); For a discussion of the legality of NPDES permits, see generally Jeffrey M. Gaba, *Generally Illegal: NPDES General Permits Under the Clean Water Act*, 31 HARV. ENVTL. L. REV. 409, 413 (2007).

196. See, e.g., Final National Pollutant Discharge Elimination System (NPDES) Pesticide General Permit for Point Source Discharges From the Application of Pesticides, 76 Fed. Reg. 68,750 (Nov. 7, 2011).

197. See, e.g., *id.* at 68,755 (listing among Pesticide General Permit requirements the duties of applicators to monitor adverse incidents and document visual monitoring activities). General NPDES permits may regulate one or more discharge categories, provided all sources within a category are subject to the same or similar monitoring requirements. 40 C.F.R. § 122.28(a)(2)(ii)(D) (2015).

198. The literature on compliance is unsettled on many issues, but there is considerable support for the notion that, other things being equal, lack of monitoring and sanctions is likely to reduce compliance. Jodi L. Short & Michael W. Toffel, *Making Self-Regulation More than Merely Symbolic: The Critical Role of the Legal Environment*, 55 ADMIN. SCI. Q. 361, 388 (2010); cf. Alm & Shimshack, *supra* note 142, at 210 (“[T]he overall effectiveness and cost-effectiveness of environmental monitoring and enforcement are controversial and incompletely understood.”).

199. See, e.g., GLICKSMAN ET AL., *supra* note 31, at 673 (noting increase in the role of water quality standards); Robert W. Adler, *Resilience, Restoration, and Sustainability: Revisiting the Fundamental Principles of the Clean Water Act*, 32 WASH. U. J.L. & POL'Y 139, 151 (2010) (“The current CWA focus on maintenance is reflected most clearly in the water quality standards provisions.”); Oliver A. Houck, *The Clean Water Act*

One of the problems with this shift, however, is that it reintroduces some of the difficult causation problems that Congress sought to minimize when it adopted the CWA in 1972.²⁰⁰ Implementation of water quality standards in waters with ambient concentrations above those allowed by the standards requires a state environmental agency to establish, and allocate among sources of pollution, a total maximum daily load (“TMDL”), which is an aggregate amount of pollution that may be discharged into a surface water body without resulting in concentrations of regulated pollutants in excess of those allowed by a state water-quality standard.²⁰¹ Establishing the TMDL, allocating allowable discharge amounts, monitoring whether allowed loadings (clearly enforceable or less so) are producing desired environmental results, and adapting to the findings are all resource-intensive enterprises, perhaps especially if the target is a vague narrative standard rather than a numerical target.²⁰² Determining whether a point source violated technology-based effluent limits, which are often expressed as caps on end-of-pipe discharges, is a relatively simple matter by comparison. Agency efforts to improve water quality by restoring and maintaining ecologically functioning ecosystems will likely create similar ripple effects on enforcement strategies.²⁰³ Expansion of the CWA permit program to cover stormwater permitting may make regulators’ enforcement tasks more difficult because regulation of stormwater discharges often takes the form of best management practices rather than end-of-pipe discharge limits.²⁰⁴ It may be harder to track compliance status with mandates that take the form of ongoing operating practices than it is with numerical discharge

Returns (Again): Part I, TMDLs and the Chesapeake Bay, 41 ENVTL. L. REP. NEWS & ANALYSIS 10208 *passim* (2011)..

200. For discussion of the impact that the difficulty of proving cause-and-effect relationships between discharges and ambient water quality had on implementation of the 1948 federal water pollution control legislation, and how Congress sought to avoid the need to demonstrate such relationships in the 1972 Federal Water Pollution Control Act Amendments, see Glicksman & Batzel, *supra* note 31, at 119–21.

201. *Upper Blackstone Water Pollution Abatement Dist. v. U.S. EPA*, 690 F.3d 9, 14 n.8 (1st Cir. 2012) (quoting 33 U.S.C. § 1313(d)(1)(C) (2012)). The focus on enforcement of TMDLs is largely the result of citizen suits resulting in court decrees requiring the establishment of delinquent TMDLs. See Oliver A. Houck, *Cooperative Federalism, Nutrients, and the Clean Water Act: Three Cases Revisited*, 44 ENVTL. L. REP. NEWS & ANALYSIS 10426, 10429 (2014) (“[The] TMDL program lay dormant for a decade and a half until awakened by EPA intervention (stimulated in turn by environmental citizen suits).”). This example illustrates the need for policymakers engaged in regulatory design to consider how one aspect of a regulatory program (such as the availability of citizen enforcement) may affect other such aspects (such as the task of regulators to translate TMDLs into source-specific effluent limitations).

202. The regulatory and nonregulatory enterprise of seeking to bring an impaired water up to a desired state is complex. Cf. Sarah Birkeland, *EPA’s TMDL Program*, 28 ECOLOGY L.Q. 297, 300 (2001) (referring to “the implementation and enforcement challenges faced by the EPA’s TMDL program”).

203. GLICKSMAN ET AL., *supra* note 31, at 606 (describing new objectives geared toward restoration and maintenance of functioning ecosystems and toward control of nonpoint source pollution).

204. See, e.g., *Decker v. Nw. Env’tl. Def. Ctr.*, 133 S. Ct. 1326, 1338 (2013).

limits that can be monitored.²⁰⁵ As regulatory challenges change, so do enforcement challenges.

Another change in regulatory approach that is likely to create new enforcement challenges is the shift from traditional regulatory techniques such as technology-based limits that apply to classes of regulated sources to strategies that tailor regulatory duties to the circumstances of individual regulated entities, including the use of inter-source transactions to shift responsibilities among regulated entities.²⁰⁶ In the early years of the pollution control statutes, EPA asserted its authority to establish the responsibilities of regulated entities through the issuance of nationally applicable regulations that would impose uniform requirements for categories of sources, such as polluting facilities in the same industry.²⁰⁷ One of the reasons for taking this approach was EPA's recognition that it could implement statutory programs such as the CWA's effluent limitation program much more quickly if it could tackle entire categories of sources with one fell swoop rather than having to establish such requirements on a source-by-source basis.²⁰⁸ Over the years, many critics of this approach argued that it resulted in inefficient regulation because, for instance, it required equal levels of control for sources with different impacts on the ambient environment.²⁰⁹

In time, EPA responded by moving toward a more source-specific focus and toward greater reliance on market-based mechanisms such as emissions

205. See Robert L. Fischman & Jeffrey B. Hyman, *The Legal Challenge of Protecting Animal Migrations as Phenomena of Abundance*, 28 VA. ENVTL. L.J. 173, 223 (2010) ("BMPs are harder to monitor and enforce than traditional technology-based limitations because the BMPs are more widely dispersed across the landscape.").

206. U.S. environmental law has long been criticized for reliance on traditional regulatory approaches that fail to recognize differences among sources in the costs of controlling pollution. See, e.g., Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333 (1985). Policymakers have responded by incorporating market-based mechanisms such as tradeable permits into statutes such as the CAA. See, e.g., 42 U.S.C. §7651b(b) (2012) (acid rain allowance trading programs). Although performance standards are more efficient than design standards in terms of regulated entity compliance costs, design standards may be easier and cheaper to enforce. See STEPHEN G. BREYER, *REGULATION AND ITS REFORM* 105 (1982); Howard Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and 'Fine-Tuning' Regulatory Reforms*, 37 STAN. L. REV. 1267, 1271 (1985).

207. See, e.g., *E.I. du Pont de Nemours & Co. v. Train*, 430 U.S. 112, 136 (1977) (holding that EPA may issue effluent limitation regulations applicable to categories of industrial point sources under the CWA).

208. See William Funk, *The Exception that Approves the Rule: FDF Variances Under the Clean Water Act*, 13 B.C. ENVTL. AFF. L. REV. 1, 8–9 (1985) ("Of course, industry was well aware that bifurcating the effluent limitation decision, by requiring guidelines initially, would substantially delay the date any limitation would become enforceable.").

209. See, e.g., Ackerman & Stewart, *supra* note 206, at 1335 ("Uniform BAT requirements waste many billions of dollars annually by ignoring variations among plants and industries in the cost of reducing pollution and by ignoring geographic variations in pollution effects. A more cost-effective strategy of risk reduction could free enormous resources for additional pollution reduction or other purposes.").

trading that have the potential to increase the efficiency of pollution reductions. Cynthia Giles remarked in describing EPA's Next Gen program that "market strategies that set standards but allow companies to decide how best to get there can be simple and effective in the right circumstances, reducing costs and providing flexibility for industry while achieving better results."²¹⁰ She cited as a successful example of market-based programs the acid-rain control program adopted in the 1990 CAA amendments.

The adoption of a market-based approach does not necessarily require the adopting agency to craft different requirements for each individual discharger. An agency, for example, could rely on a technology-based approach in imposing initial uniform obligations on all sources within a particular industry and allocate tradeable allowances based on those obligations. If the agency authorized emission trading, sources would be free to over-comply and sell allowances or under-comply and buy allowances, creating a regime in which emission caps vary from discharger to discharger. Such an approach, however, may impose burdens on the agency at the enforcement stage, as it would need to ascertain the nature and extent of enforceable duties of individual regulated entities based on their participation (or lack of participation) in the trading regime.²¹¹ In addition, some emissions trading markets have been exploited through the sale of credits for environmental improvements that would have occurred even without regulation, credits for which sellers have already been fully paid either in the same or another market, or credits that did not occur at all except on paper.²¹² Colorado noted that the burden on agencies to improve compliance may increase when requirements are tailored rather than consistent across an industry, not only because it will be more difficult for government inspectors to determine compliance, but also because "it may be

210. Giles, *supra* note 18, at 24. Market-based strategies are neither the only nor the first approach EPA has relied on in affording regulated entities flexibility in choosing the means of complying with regulatory duties. Performance, not design standards, have long been the norm in federal pollution control regulation. Sidney A. Shapiro & Robert L. Glicksman, *Goals, Instruments, and Environmental Policy Choice*, 10 DUKE ENVTL. L. & POL'Y F. 297, 306 (2000).

211. See, e.g., Dennis D. Hirsch, *Protecting the Inner Environment: What Privacy Regulation Can Learn from Environmental Law*, 41 GA. L. REV. 1, 39 (2006) ("[I]t is easier to keep track of a uniform technology than to police facility-specific pollution reduction strategies. Second-generation strategies encourage differentiation. They accordingly offer less in the way of strict accountability and enforceability and open the door to bad-faith attempts to game the system."). To the extent that trades are reflected in a numerical cap on emissions or discharges in a facility's permit, this problem would be mitigated.

212. See Philip Womble & Martin Doyle, *The Geography of Trading Ecosystem Services: A Case Study of Wetland and Stream Compensatory Mitigation Markets*, 36 HARV. ENVTL. L. REV. 229, 291-92 (2012). For descriptions of exploitations of environmental regulatory markets, see Richard Toshiyuki Drury et al., *Pollution Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 DUKE ENVTL. L. & POL'Y F. 231, 251-83 (1999); Robert L. Glicksman, *Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development*, 62 U. KAN. L. REV. 943, 951-55 (2014); see also Nicklas A. Akers, *New Tools for Environmental Justice: Articulating a Net Health Effects Challenge to Emissions Trading Markets*, 7 HASTINGS W.-N.W. J. ENVTL. L. & POL'Y 203 (2001).

more difficult to implement a self-certification program where individualized permits determine unique facility-specific compliance requirements.²¹³

4. *The Need to Address Small Sources*

A final enforcement challenge is the effort to identify significant environmental threats from sources that are emitting or discharging relatively small amounts, but whose violations may be cumulatively significant. As indicated above, programs like the NPDES permit program under the CWA have recently begun to account more closely for numerous small sources.²¹⁴ Small sources have not typically been the focus of agency enforcement attention.²¹⁵ As EPA's OIG has reported, "OECA concentrates most of its compliance monitoring and enforcement activities on large entities, and knows little about the identities or cumulative pollution effects of small entities."²¹⁶ In particular, at least as of 2005, OECA had failed to analyze the cumulative impact of entities emitting pollution below the threshold of major or large sources.²¹⁷ Yet some data show significant noncompliance rates among such sources.²¹⁸ EPA has acknowledged the problem and seems determined to address it.²¹⁹ One recent step has been the agency's September 2015 electronic reporting rule, which requires state-authorized NPDES programs to share program data with EPA for nonmajor facilities, and is intended to "improve the ability of existing state and federal programs to target the most serious water-quality and compliance problems"²²⁰ If enforcement initiatives

213. JOE SCHIEFFELIN ET AL., COLO. DEP'T OF PUB. HEALTH & ENV'T, COLORADO'S HAZARDOUS WASTE SMALL QUANTITY GENERATOR (SQG) SELF-CERTIFICATION PROGRAM 18 (2013), https://www.colorado.gov/pacific/sites/default/files/HM_hw-sqg-self-certification-report_0.pdf.

214. See *supra* note 183 and accompanying text.

215. Cf. OIG, LIMITED KNOWLEDGE, *supra* note 92, at 14 (reporting that, in multiple program areas, "OECA does not know the cumulative effects of pollution from small entities"). The OIG also reported that "some states and EPA regions have argued that RCRA small quantity generator facility inspections represent some of the most environmentally significant activities that regions and states conduct." *Id.*

216. *Id.* at 6; see also *id.* at 14 ("In most program areas in our sample, OECA does not know the cumulative effects of pollution from small entities.").

217. *Id.* at 11.

218. EPA, CWAP, *supra* note 98, at 3 ("28 states (and 4 territories and the District of Columbia) . . . show a rate of serious noncompliance at these facilities of around 45%; states report taking enforcement action against less than 6% of these facilities with a serious noncompliance problem."); see also OIG, LIMITED KNOWLEDGE, *supra* note 92, at 11 ("[G]iven the much greater number of small entities in the sample, and the potential cumulative impact from this vast part of the regulated universe, we find it is important for OECA to know the cumulative environmental impact of entities that fall below the major or large threshold. Information on small entities could help OECA better prioritize where to focus resources and facilitate effective management.").

219. EPA, CWAP, *supra* note 98, at 3 ("EPA and states need consistent, national data to be able to formulate appropriate strategies for ensuring compliance from [small] facilities, and to target enforcement resources to the sources most affecting water quality.").

220. National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, 80 Fed. Reg. 64,064–65, 79–81 (Oct. 22, 2015) (reporting that under the

target small sources, enforcers may have to initiate more actions and commit more resources to enforcement just to achieve the same level of environmental improvement through enhanced compliance.²²¹ In addition, data relevant to compliance status may not be available to the same extent for small as for larger sources,²²² making it more difficult to enforce against those sources, or at least more expensive as agencies must amass a database that does not exist or is incomplete.²²³

III. EPA'S NEXT GEN FRAMEWORK

As summarized above, EPA's efforts have been subject to very substantial criticisms, including pointed criticism by its own leaders,²²⁴ covering the gamut of enforcement and compliance promotion activity since the agency's creation more than 45 years ago.²²⁵ The agency has experimented over the years with ways to reorient and upgrade its compliance efforts and those of its state partners.²²⁶ Some of these efforts have encountered strong resistance even from within EPA, a manifestation of the complexity of large organizations such as EPA.²²⁷ Several, including some of the most publicized, have not survived or have not achieved hoped-for objectives.²²⁸

previous reporting guidance, states were required to provide EPA with data on approximately 46,000 permittees, while under the new rule, EPA will receive data on approximately 400,000 permittees).

221. Cf. Bradley C. Karkkainen, *Environmental Lawyering in the Age of Collaboration*, 2002 WIS. L. REV. 555, 560 ("The remaining non-compliance cases often involve either smaller targets or more difficult problems of proof, making them costlier and riskier to litigate.").

222. EPA, CWAP, *supra* note 98, at 3 ("For smaller facilities that submit DMRs, EPA has not required the same focus from states and has not required states to submit data about these facilities to EPA. EPA does not, therefore, have a national rate for significant noncompliance for these facilities.").

223. See, e.g., OIG, LIMITED KNOWLEDGE, *supra* note 92, at 8 tbl.2-2 (discussing absence of reliable data on programs such as CAA regulation of minor stationary sources and regulation of small-quantity generators under RCRA).

224. See, e.g., Memorandum from Lisa Jackson, *supra* note 110; *supra* notes 93–96 and accompanying text.

225. See *supra* Part II. We are not suggesting, of course, that EPA does not frequently offer high praise for its enforcement efforts, something the agency has done regularly over the years as well.

226. For book-length treatments, see, e.g., MINTZ, *supra* note 89, at 161; RECHTSCHAFFEN & MARKELL, *supra* note 130; see also OFFICE OF ENF'T & COMPLIANCE ASSURANCE, U.S. EPA, EPA300-R-03-002, ENVIRONMENTAL RESULTS THROUGH SMART ENFORCEMENT: FISCAL YEAR 2002 ENFORCEMENT AND COMPLIANCE ASSURANCE ACCOMPLISHMENTS REPORT 5 (2003), <http://nepis.epa.gov/Exe/ZyPDF.cgi/500005AN.PDF?Dockey=500005AN.PDF> (discussing EPA's "Smart Enforcement" initiative, which aimed to make enforcement more efficient and maximize environmental benefits). See generally Joel A. Mintz, "Treading Water": A Preliminary Assessment of EPA Enforcement During the Bush II Administration, 34 ENVTL. L. REP. 10912 (Oct. 2004).

227. MINTZ, *supra* note 89, at 161; GRANTA Y. NAKAYAMA, NEW PARADIGMS FOR ENFORCEMENT: A WALK DOWN MEMORY LANE 5 (2014),

EPA's recent launching of another experiment in enforcement governance, known as Next Gen, was motivated by the agency's view that, because of contemporary challenges, "[e]nvironmental compliance today requires a change just as dramatic as the one Bill Ruckelshaus [EPA's first Administrator] led over 40 years ago."²²⁹ Next Gen is intended to produce that dramatic transformation and provide a "new paradigm" for enforcement.²³⁰ This Part reviews the premises underlying Next Gen and the key elements of the initiative as

http://www.americanbar.org/content/dam/aba/events/enviro_nment_energy_resources/2014/03/43rd-spring-conference/conference_materials_portal/15-nakayama_grant-paper.authcheckdam.pdf ("While it would seem hard to argue with the general goals of Smart Enforcement, this effort nonetheless has met with resistance from other parts of the Agency.").

228. NAKAYAMA, *supra* note 227, at 5 (summarizing EPA's "Smart Enforcement" reform initiative early in the twenty-first century and the obstacles such reforms faced); Jonathan H. Adler, *Dynamic Environmentalism and Adaptive Management: Legal Obstacles and Opportunities*, 11 J.L. ECON. & POL'Y 133, 149 (2015) (noting that the Clinton Administration's efforts to facilitate state-level experimentation were short-lived); *see also* U.S. GOV'T ACCOUNTABILITY OFF., GAO-02-268, ENVIRONMENTAL PROTECTION: OVERCOMING OBSTACLES TO INNOVATIVE STATE REGULATORY PROGRAMS 3 (2002), <http://www.gao.gov/new.items/d02268.pdf> (finding that states faced substantial "cultural resistance" from EPA officials, largely in the form of time- and resource-consuming reviews, when they sought to innovate); Thomas E. Caballero, *Project XL: Making It Legal, Making It Work*, 17 STAN. ENVTL. L.J. 399, 401 (1998) ("Despite much fanfare heralding Project XL's objectives, and despite apparent industry enthusiasm for regulatory flexibility, the program has not produced any significant results."); Joyce M. Martin & Kristina Kern, *The Seesaw of Environmental Power from EPA to the States: National Environmental Performance Plans*, 9 VILL. ENVTL. L.J. 1, 23–26 (1998) (stressing statutory and regulatory obstacles to innovation under the National Environmental Performance System). *See generally* Barry Rabe, *Environmental Policy and the Bush Era: The Collision Between the Administrative Presidency and State Experimentation*, 37 PUBLIUS 413 (2007) (identifying impediments to state experimentation).

229. Giles, *supra* note 18, at 22. As suggested in Section III.B.1 above, "[b]udget uncertainties and constrained resources only reinforce the imperative to move forward with Next Generation Compliance." OFF. ENF'T & COMPLIANCE ASSURANCE, U.S. EPA, NEXT GENERATION COMPLIANCE: STRATEGIC PLAN 2014-2017 2–7 (2014), <http://www2.epa.gov/sites/production/files/2014-09/documents/next-gen-compliance-strategic-plan-2014-2017.pdf> [hereinafter EPA, NGC 2014–2017].

230. *See generally* EPA, NGC 2014–2017, *supra* note 229. Not everyone perceives Next Gen as the transformative effort being touted by EPA. One commentator has suggested, for example, that

Next Generation Compliance goals, many of which rely on technological advances, have not been perceived as a paradigm shift by the regulated community The primary innovation is to improve its data collection and management systems and make that data more readily available to the public. This is not a paradigm shift to a new approach to environmental enforcement. It is simply an acknowledgement that EPA can do its job better and more efficiently by modernizing its data collection and management functions.

NAKAYAMA, *supra* note 227, at 5–6; *see also* Zacaroli, *supra* note 68.

EPA has described them as a foundation for the next Part's evaluation of how our framework for regulatory design may enhance agency efforts to respond to regulatory dynamism through initiatives such as Next Gen.²³¹

A. EPA's Key Premises in Launching "Next Generation Compliance"

EPA's Assistant Administrator for Enforcement, Cynthia Giles, announced the launch of Next Gen in 2013.²³² As noted above,²³³ EPA has suggested that the new initiative was intended to transform EPA's enforcement efforts. Giles pointed out that the agency faced significant challenges and that, while "tough enforcement" would remain an "essential part of our enforcement work . . . [w]e can accomplish even more by moving our compliance programs into the 21st century."²³⁴ This new approach would take advantage of new monitoring and information technology and "us[e] what we have learned about compliance to make it easier to comply than to violate."²³⁵

231. We explore the details of the Next Gen initiative, and EPA's progress to date in implementing it, much more thoroughly in our second article on regulatory design in the face of dynamic governance challenges. See Markell & Glicksman, *supra* note 7.

232. Giles, *supra* note 18, at 22. For more on the history that led to the launching of Next Gen, see, e.g., EPA, NGC 2014–2017, *supra* note 229, at 3–7 (noting that Next Gen "builds on several innovative efforts like the Clean Water Act Action Plan"); OFF. ENF'T & COMPLIANCE ASSURANCE, U.S. EPA, OECA NATIONAL PROGRAM MANAGER GUIDANCE FISCAL YEAR 2014 2 (2013), <http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100H18X.txt> [hereinafter OECA 2014] ("As part of the FY 2014 work, OECA is investing in a new paradigm called Next Generation Compliance (Next Gen) to improve compliance and reduce pollution."); GAO, STRATEGIC PLAN, *supra* note 101, at 2–4 (noting that Next Gen "remains in the early stages of development" and referencing background documents on its creation). See generally Cynthia Giles, *Next Generation Compliance*, 45 ENVTL. L. REP. 10205 (2015) (also reviewing Next Gen) [hereinafter Giles, ELR].

233. See *supra* note 232 and accompanying text.

234. Giles, *supra* note 18, at 22. EPA put it as follows:

The health and environmental benefits envisioned by our statutes, regulations, and state and tribal programs are not being fully achieved. Although the available data is incomplete, high noncompliance is evident in [many] of the data we do have. State and federal resources for onsite compliance assistance, individual inspections, and enforcement actions are not adequate to address the large universe of regulated sources, especially the numerous small sources that are important contributors to environmental problems Field operations and EPA regulations must consider emerging approaches and technology to be effective and efficient. Together with the program offices, regions, and states, OECA is developing and will implement a new paradigm called Next Generation Compliance, which takes advantage of advances in emissions monitoring and information technology.

OECA 2014, *supra* note 232, at 10.

235. Giles, *supra* note 18, at 22.

B. Key Elements of Next Generation Compliance

EPA conceived of its Next Gen strategy as constituting five, interrelated key elements, as illustrated in Figure 2.²³⁶ As is apparent from the discussion below, EPA's conceptual framework reflects its determination that effective compliance promotion requires much more than the traditional enforcement work of identifying significant violations followed by timely and appropriate enforcement response.

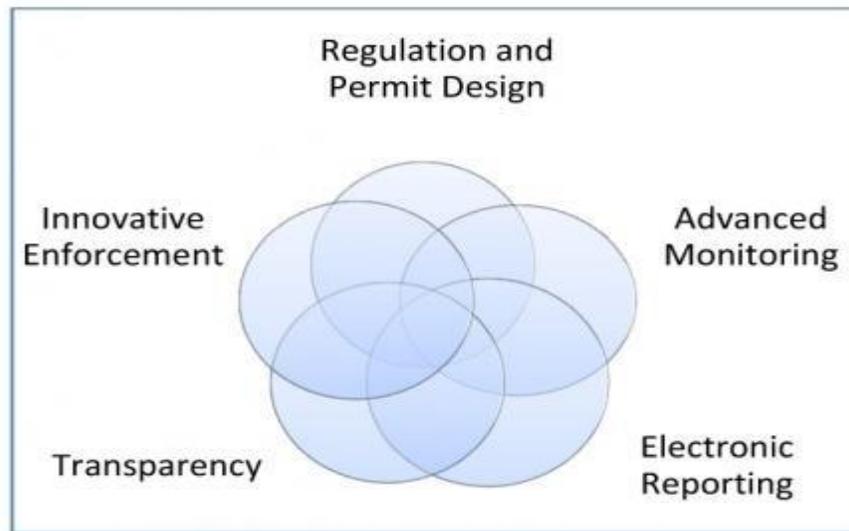


Figure 2

1. Regulation and Permit Design (“Rules with Compliance Built In”)²³⁷

The first component of Next Gen involves the use of a mechanism on which EPA has relied heavily in implementing all of the pollution control statutes—rulemaking. The notion of “rules with compliance built in” reflects EPA’s recognition that the nature and content of regulatory requirements affect compliance.²³⁸ Regulated entities are more likely to comply with rules that

236. This figure is EPA’s. See U.S. EPA, NEXT GENERATION COMPLIANCE, <http://www2.epa.gov/compliance/next-generation-compliance> [hereinafter EPA, NGC].

237. In some publications, EPA uses Regulation and Permit Design to capture this first element; in others it uses “Rules with Compliance Built in.” Compare EPA, NGC, *supra* note 236, with Giles, *supra* note 18, at 22.

238. EPA is in good company in recognizing that rule clarity makes compliance more likely. See, e.g., INT’L NETWORK FOR ENVTL. COMPLIANCE & ENFORCEMENT, CREATING ENVIRONMENTAL LAWS AND REQUIREMENTS THAT ARE ENFORCEABLE (1992), <http://www.inece.org/principis/ch3.pdf>.

establish clear expectations, for example, than with rules that are unclear.²³⁹ One approach is to design regulations that “regulate upstream” by selecting a point in the supply chain where there are a smaller number of producers, rather than large numbers of users or consumers.²⁴⁰ The smaller the size of the regulated universe, the easier it will be for federal and state regulators to communicate regulatory responsibilities and oversee compliance. A smaller regulatory cohort also may have better capacity to comply than a larger, dispersed regulatory community. As an example, Administrator Giles points to a regulation that places responsibility on the auto manufacturers for installation of air emissions control equipment and certification that cars meet required emissions control standards, not on individual car owners.²⁴¹

2. Advanced Monitoring

A second element of Next Gen is promotion of advanced monitoring, which is a tool for measuring compliance status and improving environmental protection more generally.²⁴² Monitoring compliance with environmental

239. Giles, *supra* note 18, at 24 (“One of the principles we have learned over the years of hard experience is that compliance is better when the rules are simple and clear.”); *see also* NAKAYAMA, *supra* note 227, at 5 (“Clear and easily understood rules enable the regulated community to better understand their responsibilities under the regulations and, all other things being equal, will inevitably result in higher compliance rates. Rules for which a regulated party’s compliance status can be easily determined by the regulatory agency also achieve higher compliance rates. Agency personnel . . . can focus on the easily identified entities that are not in compliance.”).

240. Email from David Hindin, EPA Senior Policy Director for Innovation & Next Generation Compliance, to David L. Markell, Steven M. Goldstein Professor of Law, Fla. St. U. Coll. of Law (July 20, 2015) (on file with author).

241. *See* Giles, *supra* note 18, at 23. As Giles notes, second-order compliance challenges exist as well, including ensuring that sources are operating their pollution control equipment properly. *Id.* Giles also points to rules that provide for third-party certifications of compliance and/or public disclosure of compliance information as other ways to write rules that will promote compliance. *Id.* at 24; *see also* Vandenberg, *supra* note 84, at 148–51 (discussing the use of third-party certification systems in forestry and aquaculture). Upstream approaches do not always operate to eliminate compliance issues. *See* William Funk, *Regulation by Litigation: Not so Bad, Regulation & Governance*, 5 REG. & GOVERNANCE 275, 276 (2011) (noting that large makers of diesel engines for semi trucks were caught using a computer defeat mechanism that shut off pollution controls when on the road but not during emissions testing). Volkswagen was caught, and admitted to using, similar software. *See* Coral Davenport & Jack Ewing, *VW Is Said to Cheat on Diesel Emissions; U.S. to Order Big Recall*, N.Y. TIMES, Sept. 18, 2015, <http://www.nytimes.com/2015/09/19/business/volkswagen-is-ordered-to-recall-nearly-500000-vehicles-over-emissions-software.html>. When tested on the road, vehicles that passed emissions tests emitted nearly 40 times permitted levels. Guilbert Gates et al., *Explaining Volkswagen’s Emissions Scandal*, N.Y. TIMES (June 28, 2016), http://www.nytimes.com/interactive/2015/business/international/vw-diesel-emissions-scandal-explained.html?_r=0.

242. Giles, *supra* note 18, at 24. For a recent assessment, *see generally* Ralph Smith, *Detect Them Before They Get Away: Fenceline Monitoring’s Potential to Improve Fugitive Emissions Management*, 28 TUL. ENVTL. L.J. 433 (2015).

requirements is a foundational feature of effective governance.²⁴³ Despite the importance of the monitoring function, assessments over the years have highlighted critical deficiencies.²⁴⁴ Recent reviews across multiple EPA programs suggest that monitoring deficiencies continue to pose significant challenges to effective enforcement.²⁴⁵

EPA's goal through Next Gen is to enhance advanced monitoring, as well as electronic reporting and transparency (other tools that are discussed below), through research and development and other efforts.²⁴⁶ Significant aims include enabling sampling in areas where it does not occur now (e.g., at facility fencelines)²⁴⁷ and development of reliable monitoring technology that is widely accessible at low cost so that citizens as well as government officials and regulated parties can participate in monitoring. The three goals outlined in EPA's Draft

243. Monitoring is critical not only to assess and promote compliance, but also more generally to provide insights into the adequacy of the underlying regulatory regime and detect gaps in regulatory coverage. *See, e.g.*, Eric Biber, *The Problem of Environmental Monitoring*, 83 U. COLO. L. REV. 1, 14–15 (2011) (“In general, monitoring can help identify previously unknown environmental harms that require the development of a new regulatory system or the adjustment of an existing one, serving as a ‘meta’ tool that helps us choose whether and how to regulate. Within any regulatory program, monitoring can help determine whether regulatory standards should be strengthened or relaxed for known harms.”).

244. Of the two main types of emissions from facilities, monitoring methods for stack emissions (which are air pollutant emissions from stationary sources, such as industrial stacks) have advanced considerably in recent years and are relatively mature. Monitoring methods for “fugitive emissions,” which EPA has referred to as “uncontrolled process emissions,” are much less well understood. *See* OFF. CHIEF FIN. OFFICER, U.S. EPA, TECH. MKT. SUMMIT: CASE STUDY PRIMER FOR PARTICIPANT DISCUSSION: FENCELINE AIR QUALITY MONITORING 2 (2012), <http://goo.gl/ghi0MV> [hereinafter EPA, FENCELINE PRIMER].

245. *See* U.S. GOV'T ACCOUNTABILITY OFF., GAO-15-618, GRANTS MANAGEMENT: EPA HAS OPPORTUNITIES TO IMPROVE PLANNING AND COMPLIANCE MONITORING *passim* (Aug. 2015), <http://www.gao.gov/products/GAO-15-618> (discussing the need to explain how grants compliance monitoring relates to enforcement); OIG, REDUCE RISK, *supra* note 68; OFF INSPECTOR GEN., U.S. EPA, PROJECT NO. 15-P-0280, EPA NEEDS TO TRACK WHETHER ITS MUNICIPAL SETTLEMENTS FOR COMBINED SEWER OVERFLOWS BENEFIT WATER QUALITY (2015).

246. *See infra* Section IV.B. EPA suggests that advancing fenceline monitoring will generate benefits that include: (1) working with the private sector to establish new monitoring methods transparently; (2) enhancing certainty by establishing clear regulatory requirements that will be in place for enough time to justify investments; (3) reducing reporting burdens while collecting better data; (4) encouraging facilities to show they are operating within their permit limits and increasing certainty about which emissions are contributing to an ambient problem; and (5) encouraging state and local agency flexibility and experimentation. EPA, FENCELINE PRIMER, *supra* note 244, at 7.

247. EPA defines fenceline monitoring as “the measurement of air pollution at industrial facilities and site remediation boundaries,” and notes that the “techniques and instruments for fenceline monitoring can also be used inside of facility boundaries to monitor air pollutant levels near key process units.” EPA, FENCELINE PRIMER, *supra* note 244, at 1.

Roadmap for Next-Generation Air Monitoring, published in 2013, embody this agenda:

- Promote development of affordable near-source fenceline monitoring technologies and sensor network-based leak detection systems
- Supplement air quality monitoring networks through development of low-cost, reliable air quality monitoring technology
- Support environmental justice communities and citizen efforts to measure air pollution in local areas.²⁴⁸

Additional, more accurate, and timelier data has the potential to dramatically enhance governments' capacity to uncover pollution and violations on a real-time basis. Giles suggests that advances in monitoring capacity are "contributing to a revolution in how we find and fix pollution problems."²⁴⁹ An example is the use of cell phone technology. As Giles has explained, "in one much-used river, EPA has installed solar powered continuous monitoring devices that upload via cell phone technology to agency computers."²⁵⁰ Improved monitoring capacity is also making it possible to identify pollution that previously was unknown—it is making "previously invisible pollution visible."²⁵¹ Giles expresses the hope that advanced monitoring technologies "can help make [traditional monitoring challenges] obsolete."²⁵² In EPA's view, in short, this dramatic recasting of monitoring capacity has the potential to revolutionize how EPA seeks to promote compliance through the various legal mechanisms (such as rulemaking, permitting, and enforcement) available to it.²⁵³

248. U.S. EPA, DRAFT ROADMAP FOR NEXT-GENERATION AIR MONITORING 2 (2013), http://www.eunetair.it/cost/newsroom/03-US-EPA_Roadmap_NGAM-March2013.pdf.

249. Giles, *supra* note 18, at 24.

250. *Id.*

251. *Id.*; see also EPA, FENCELINE PRIMER, *supra* note 244, at 2–7 (summarizing variations of fenceline monitoring and advantages and challenges, including market-based, technology, and financial issues). Advancing fenceline monitoring is one facet of EPA's larger "roadmap" for technology innovation. U.S. EPA, TECHNOLOGY INNOVATION FOR ENVIRONMENTAL AND ECONOMIC PROGRESS: AN EPA ROADMAP, <http://www.epa.gov/envirfinance/innovation.html>.

252. Giles, *supra* note 18, at 24. EPA suggests that fenceline monitoring "has the potential to supplement and simplify a facility's compliance with federal LDAR [Leak Detection and Repair] rules Industry-wide monitoring requirements that support streamlined reporting and flexibility for industry could pave the way for a larger fenceline monitoring technology market." EPA, FENCELINE PRIMER, *supra* note 244, at 4. EPA indicates that there are 53 federal LDAR regulations and acknowledges that LDAR methods are "extremely labor-intensive and require facilities to keep detailed records on every piece of regulated equipment, which may number in the hundreds of thousands for a large plant." *Id.*

253. For more skeptical views, see generally NAKAYAMA, *supra* note 227.

EPA's hope is that such data will also facilitate regulated-party efforts to identify and resolve issues.²⁵⁴ Further, it expects that the dramatic increase in the availability of monitoring technology, as purchase prices drop, will increase public use significantly and enhance communities' understandings of pollution-related concerns. As a result, advanced monitoring has the potential to significantly impact the roles regulated parties and civil society can play in improving compliance. Increased accessibility of data, combined with the increasing mobility and accuracy of new technology and its capacity to provide real-time results, will, in Giles's view, "encourage more direct industry and community engagement," and may "reduce the need for government action."²⁵⁵

3. Electronic Reporting

Electronic reporting, another tool, is a third key element of EPA's Next Gen initiative. EPA's effort in this realm is geared towards having regulated parties report compliance-related information electronically, rather than on paper.²⁵⁶ Electronic reporting has the potential to be much faster, if not necessarily more accurate, than paper reports that need to be entered manually onto a computer.²⁵⁷ Data-entry problems have been an Achilles heel for effective compliance for decades, as a series of GAO and EPA OIG reports have detailed.²⁵⁸ As Giles has acknowledged:

[M]uch of the information reported to EPA and states by facilities is still submitted on paper, and waits for a government employee to manually enter the data into computer systems. Or, in a time of

254. See Giles, *supra* note 18, at 24. Better and more real-time data may motivate regulated parties to reduce and address emissions because they "want to do the right thing;" want to limit impacts and potential liability stemming from such emissions; want to limit securities-related issues; are concerned about a regulatory response; and/or are concerned about citizen reactions. For example, Volkswagen's stock value plunged by nearly 20% immediately following the U.S. Justice Department's announcement that the company had violated the CAA by installing "defeat devices" on its diesel models between 2009 and 2015. Thad Moore et al., *VW Under Fire Amid EPA Accusations It Cheated On Emissions Tests*, WASH. POST, Sept. 21, 2015, https://www.washingtonpost.com/business/economy/vw-shares-plunge-as-epa-accuses-automaker-of-cheating/2015/09/21/3c7b2f2e-607b-11e5-8e9e-dce8a2a2a679_story.html?tid=a_inl. As we discuss in our second article on Dynamic Governance, advanced monitoring also has the potential to transform state-federal relations. Markell & Glicksman, *supra* note 7. It also can equip Congress and the Executive, and the courts in some cases, with the capacity to exercise their powers to oversee EPA's administration of regulatory programs in a much more informed way. *Id.*

255. Giles, *supra* note 18, at 24.

256. EPA's ambitions for electronic reporting extend beyond simply transferring reporting from a paper to an electronic medium. This facet of EPA's Next Gen initiative is closely linked to the Agency's larger E-Enterprise for the Environment initiative, which is a joint EPA-state effort. See generally *E-Enterprise for the Environment Conceptual Blueprint: Executive Summary*, E-ENTERPRISE LEADERSHIP COUNCIL (2014), http://www.exchangenetwork.net/ee/EEnterprise_Conceptual_Blueprint_013114_Executive_Summary.pdf.

257. See Giles, *supra* note 18, at 25.

258. See Markell, *Slack*, *supra* note 14, at 32-33, 60-63.

declining budgets, the paper sits in a corner unopened, until someone has time to examine the data and see if any violations appear likely Errors can be introduced through manual data entry²⁵⁹

Giles notes that “E-reporting is a solution that saves time and money while improving results.”²⁶⁰ She also notes that it will also create greater transparency by dramatically improving accessibility of compliance information.²⁶¹

4. Increased Transparency

EPA identifies “increased transparency,” yet another tool, as the fourth key feature of its Next Gen approach. Giles suggests that “[u]sing transparency as a way to improve performance is one of the most important things we have learned about strategies to improve compliance . . . [and, further, that] EPA’s efforts to make our data more available are only starting to scratch the surface of the ways transparency can improve results.”²⁶² She notes that information must be “important and correct” for transparency to work; hence, transparency goes hand in hand with the related Next Gen features of advanced monitoring and electronic reporting.²⁶³ Giles highlights several ways in which improved transparency could produce improved compliance and better environmental results—including serving as a “reminder” to regulated parties of problems and of their performance relative to the competition; and also as a reminder to government officials and the public of the absolute and relative performance of different members of the regulated community.²⁶⁴

5. Innovative Enforcement Strategies

“Innovative enforcement strategies” is the fifth and final Next Gen element. Giles identifies an array of innovative approaches that will enhance compliance, many of which are byproducts of the first four Next Gen elements. Aside from the potential for tools such as advanced monitoring²⁶⁵ and electronic reporting²⁶⁶ to bolster compliance levels and enforcement efforts, Giles suggests that by “shifting . . . into the electronic age” states can improve their performance, gain additional flexibility in the federal–state relationship, and better serve as laboratories of experimentation.²⁶⁷ She also notes that third-party verification of

259. Giles, *supra* note 18, at 25.

260. *Id.*

261. *Id.* We discuss each of these elements, including the concerns various stakeholders have raised about them, see Part IV *infra*, and in Part II of our exploration of Dynamic Governance, see *supra* note 7 and accompanying text.

262. Giles, *supra* note 18, at 25.

263. *Id.* at 26.

264. *Id.* at 25.

265. *Id.* at 26

266. *Id.*

267. *Id.* For a review from 20 years ago of state innovations in the compliance-promotion arena, including some innovations such as third-party verification touted by

compliance efforts and status, yet another tool, will improve compliance and conserve government resources.²⁶⁸ In addition, Giles notes that “better, more accurate information” will enable EPA and others to learn more about the effectiveness of different compliance-promotion strategies—it will “encourage evidence-based experimentation to find out which strategies work to improve compliance and which do not.”²⁶⁹ There is still much to learn about the effectiveness of different enforcement strategies in different contexts, and an information-rich environment will help shed light on questions that scholars and others have been unable to answer because of historical gaps in the available data.²⁷⁰ Giles concludes that “[v]igorous enforcement . . . will always be the backbone of environmental protection As we continue to learn about ways to strengthen compliance, and take advantage of advances in technology, Next Gen can transform our protection work”²⁷¹ “Vigorous enforcement” is a reference to the mechanisms for enforcing the environmental laws, including administrative enforcement proceedings and the filing of civil and criminal actions in court. “[Taking] advantage of advances in technology” is a reference to the various tools discussed above in an effort to promote compliance without the need for enforcement action (such as by confronting regulated entities with evidence of potential or ongoing noncompliance that prompts them to address any concerns) or to strengthen the evidence available to prove noncompliance if enforcement action is pursued.

Giles, see generally David L. Markell, *States as Innovators: It's Time for a New Look to Our "Laboratories of Democracy" in the Effort to Improve our Approach to Environmental Regulation*, 58 ALB. L. REV. 347 (1994).

268. Sounding another skeptical note, one commentator has suggested that third-party verification is “so last generation” and, while it may have been innovative in the 1970s, it is no longer so. Seth Jaffe, *Coming Soon to a Settlement Near You: Next Generation Compliance*, LAW & THE ENV'T (Jan. 26, 2015), <http://www.lawandenvironment.com/2015/01/26/coming-soon-to-a-settlement-near-you-next-generation-compliance/>. For reviews of third-party verification regimes and their design, see generally McAllister, *supra* note 70, at 22–23 (discussing need for auditor independence and competence). For a discussion of problems relating to the third-party verification of offsets under the Kyoto Protocol's Clean Development Mechanism, see generally Scott Schang & Teresa Chan, *Federal Greenhouse Gas Control Options from an Enforcement Perspective*, 2 SAN DIEGO J. CLIMATE & ENERGY L. 87, 129–30 (2010); The Offset Quality Initiative, *Assessing Offset Quality in the Clean Development Mechanism*, SUSTAINABLE DEV. L. & POL'Y, Spring 2010, 25, at 25 (noting “significant quality issues in the CDM” concerning additionality and the reliability of independent third-party verification).

269. Giles, *supra* note 18, at 26.

270. See, e.g., RECHTSCHAFFEN & MARKELL, *supra* note 130, at 24, 29; Wayne B. Gray & Jay P. Shimshack, *The Effectiveness of Environmental Monitoring and Enforcement: A Review of the Empirical Evidence*, 5 REV. ENVTL. ECON. & POL'Y 3 (2011).

271. Giles, *supra* note 18, at 26.

IV. THE INSIGHTS PROVIDED BY FOCUSING ON ACTORS, MECHANISMS, AND TOOLS

As Part III above indicates, EPA faces a series of challenges in regulatory enforcement as a result of the dynamic regulatory environment in which it operates. The agency has developed a “new paradigm,” its Next Gen initiative, to improve governance and outcomes in the face of those challenges, as described in Part III. As EPA conceptualizes this new governance paradigm, it has five key elements: (1) rules with compliance built in; (2) advanced monitoring; (3) electronic monitoring; (4) increased transparency; and (5) innovative enforcement strategies.

Our claim in this Article is not that these are inappropriate elements to consider in making governance decisions. Instead, we argue that our conceptual framework—under which policy designers would consider the full range of actors, mechanisms, and tools available to advance policy in a particular arena—helps to ensure that policy designers, such as the enterprising EPA officials who have launched Next Gen, consider and integrate the full range of variables that have the potential to contribute to effective governance in pursuing new paradigms to address dynamic circumstances.²⁷² In this Part we illustrate the value of our

272. We have not seen the challenges of the administrative state contextualized in precisely this way and welcome challenges to this conceptualization. Others have framed the key features of regulatory governance differently. *See, e.g.*, Lesley K. McAllister, *Harnessing Private Regulation*, 3 MICH. J. ENVTL. & ADMIN. L. 291, 299 (2014) (identifying three “aspects” of regulation—rule creation, rule implementation, and rule enforcement); Richard B. Stewart, *Remedying Disregard in Global Regulatory Governance: Accountability, Participation, and Responsiveness*, 108 AM. J. INT’L L. 211, 212 (2014) (identifying “the institutional mechanisms and structures of global regulatory decision making,” and presenting “a new taxonomy of governance mechanisms, distinguishing three basic types—decision rules, accountability mechanisms, and other regard-promoting measures”); Mamiko Yokoi-Arai, *The Regulatory Efficiency of a Single Regulator in Financial Services: Analysis of the UK and Japan*, 22 BANKING & FIN. L. REV. 23, 27 (2006) (defining public-sector governance as “the traditions and institutions that determine how authority is exercised in a particular country,” including: “(1) the process by which governments are selected, held accountable, monitored, and replaced; (2) the capacity of government to manage resources efficiently and to formulate, implement, and enforce sound policies and regulations; and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them”). Further, the legal literature has addressed discrete aspects of our framework without necessarily analyzing their impact on other aspects. Stakeholder analysis, for example, assesses government decision-making from the perspectives of affected stakeholders. *See generally* Kent Greenfield, *Ultra Vires Lives! A Stakeholder Analysis of Corporate Illegality (with Notes on How Corporate Law Could Reinforce International Law Norms)*, 87 VA. L. REV. 1279 (2001); Christopher R. Yukins, *Cross-Debarment: A Stakeholder Analysis*, 45 GEO. WASH. INT’L L. REV. 219 (2013). Instrument choice theory focuses on what we call mechanisms, but which others have referred to as “the instruments that arise out of institutions and how they may or may not be used to steer policy.” Blake Hudson, *Institutional Preconditions for Policy Success*, 89 TUL. L. REV. 669, 701 (2015); *see also* Hoi Kong, *Sustainability and Land Use Regulation in Canada: An Instrument Choice Perspective*, 13 VT. J. ENVTL. L. 553, 559

framework by assessing how analysis of the role of one set of actors—citizen actors—may shape the redesign of regulatory enforcement structures and initiatives in response to dynamic circumstances.²⁷³

A. Capacity and Coordination in Integrating Civil Society Roles

We suggest that the role that a policy regime should create for citizens depends on at least two key issues: first, the absolute and relative capacities of citizens, government officials, and regulated parties to perform functions that advance regulatory goals; and second, the degree to which actions by different actors (in this context especially government and citizens) can be coordinated.²⁷⁴ Citizens' *capacity* implicates the extent to which civil society has the wherewithal (including financial, technical, level of commitment, and ability to overcome collective-action problems) to undertake particular tasks. *Coordination* is a critical feature of enhanced citizen involvement because members of civil society may be motivated by private interests that diverge from the "public interest," however that is defined, which suggests the need to consider various forms of gatekeeping and other constraints on citizen action.²⁷⁵ Further, even if civil society's interests are aligned perfectly with the "public interest" (which is unlikely), the introduction of a multiplicity of "civil-society actors" creates significant coordination challenges.²⁷⁶

(2012) (citing THE TOOLS OF GOVERNMENT: A GUIDE TO THE NEW GOVERNANCE (Lester M. Salamon & Odius V. Elliott eds., 2002)). Our framework seeks to consider the interrelationships among actors, mechanisms, and tools, and, in particular, to consider how dynamism affects those relationships and how policymakers, in turn, should alter the relationships in response to change. As we noted above, scholars are increasingly exploring such dynamism in several literatures, including adaptive governance, adaptive management, resilience theory, and democratic experimentalism. See *supra* note 6 and accompanying text.

273. We address the other key actors, key mechanisms, and key tools in our accompanying article, Dynamic Governance, Part II, *supra* note 7.

274. We invite others to add to these variables, and we recognize that they include treatment of issues such as procedural justice.

275. See, e.g., Engstrom, *supra* note 15, at 634–37 (discussing coordination issues that arise from private enforcement efforts, such as "piggybacking" on public enforcement and disrupting relationships between regulators and their targets); see also Michael Greve, *Private Enforcement, Private Rewards: How Environmental Citizen Suits Become an Entitlement Program*, in ENVIRONMENTAL POLITICS: PUBLIC COSTS, PRIVATE REWARDS 105–27 (Michael S. Greve & Fred L. Smith, Jr. eds., 1992).

276. Among other things, there is a possibility of over-deterrence and inconsistent treatment of similarly situated parties. See, e.g., *Atl. States Legal Found., Inc. v. Eastman Kodak, Co.*, 933 F.2d 124, 127–28 (2d Cir. 1991) (stating that a citizen suit may not "supplant state enforcement," and that once the government has reached a settlement the citizen suit cannot continue merely because the citizens have different views about appropriate injunctive relief); cf. *Sierra Club v. Cedar Point Oil Co.*, 73 F.3d 546, 569 n.37 (5th Cir. 1996) (concluding that "courts should exercise restraint" in addressing citizen suits alleging a discharge in violation of the CWA for which EPA has not adopted a permit or limitation due to lack of resources or low prioritization); *Wis.'s Envtl. Decade, Inc. v. Wis. Power & Light Co.*, 395 F. Supp. 313, 319 (W.D. Wis. 1975) (discussing legislators' fears

B. Civil Society's Entry Points in Environmental Enforcement and Compliance

This Section considers the implications of these capacity and coordination questions in the context of four types of civil-society engagement. The discussion illustrates how our framework can help identify and illuminate policy choices that may contribute to effective regulatory programs, including the enforcement and compliance structures that EPA's Next Gen initiative is designed to overhaul.²⁷⁷

First, federal laws provide a multitude of entry points for civil society into *environmental actions undertaken by the government*. One such point involves rulemaking, which features opportunities to participate before a regulation is proposed (including petitioning an agency to create a rule), submit comments during the rulemaking process, and challenge a finalized rule in court,²⁷⁸ although some have concluded that the process has come to be dominated by resource-heavy interest groups.²⁷⁹ In permitting, citizens have an opportunity to comment on a draft permit;²⁸⁰ as in the rulemaking setting, citizens may also have an opportunity to participate before that point and to challenge a final permit.²⁸¹ In some cases, citizens may have an opportunity to participate in agency-initiated enforcement proceedings as well, provide comments before a settlement is finalized, and challenge a proposed settlement.²⁸² In addition to these venues, EPA

that allowing citizen suits against the Secretary of Health, Education, and Welfare to require enforcement action "might have the effect of distorting the agency's enforcement priorities"). For a discussion of the potential pitfalls of excessive reliance on stakeholder cooperation, see generally Seidenfeld, *supra* note 15. Among other things, Seidenfeld concludes that programs that rely heavily on such cooperation "are unlikely to be panaceas for the problems that plague the current administrative state because they can succeed in overcoming the adversarial propensities of at least some stakeholders only within narrow regulatory environments." *Id.* at 413. He identifies the "conditions under which stakeholder empowerment is likely to result in stable and constructive regulatory collaboration." *Id.* at 414.

277. Other types of engagement are also available. For example, citizens have played a role in encouraging companies to reduce emissions and other releases subject to reporting under the Toxic Release Inventory (TRI) program. *See, e.g.*, Katrina Fischer Kuh & David Markell, *Informational Regulation, the Environment, and the Public* (forthcoming 2016); *see generally* Vandenberg, *supra* note 84.

278. *See* 5 U.S.C. § 553(b)-(c), (e) (2012) (rulemaking); *id.* §§ 702, 704 (judicial review of agency actions); *Massachusetts v. EPA*, 549 U.S. 497, 527-28 (2007) (discussing the right of citizens to petition an agency to develop a rule and then to challenge in court an agency's decision not to proceed).

279. *See, e.g.*, Wendy Wagner et al., *Rulemaking in the Shade: An Empirical Study of EPA's Air Toxic Emission Standards*, 63 ADMIN. L. REV. 99, 103 (2011) (discussing potential access and impact imbalances during the notice-and-comment process itself "for rulemakings that become so bloated with technicality, complexity, and the fragmentation of issues into minutiae that the rulemaking project becomes practically inaccessible to less resourceful groups").

280. *See, e.g.*, 40 C.F.R. §§ 71.11(a)(5), 124.10-124.12 (2016).

281. *See, e.g.*, 40 C.F.R. § 124.19 (2016); 5 U.S.C. §§ 702, 704 (2012).

282. *See, e.g.*, 40 C.F.R. pt. 22; *see generally* John C. Cruden & Bruce S. Gelber, *Federal Civil Environmental Enforcement: Process, Actors, and Trends*, 18-SPG NAT. RESOURCES & ENV'T 10 (2004).

has established processes to engage citizens, including obtaining citizen input more generally.²⁸³

Dramatic improvements in data technologies (greater amounts of collected data and more accurate, timely, and accessible data) and communication technologies have significant potential to increase civil society's capacity to contribute through these entry points. As a result, policy-design efforts should consider how to help bolster citizen capacity to take advantage of these technological and other advances, as well as to structure these entry points to enable and encourage citizen participation.²⁸⁴ Virginia's Department of Environmental Quality, for example, has developed three levels of data quality for citizens' monitoring efforts based on the level of data quality and the authorized uses of the data provided to the agency. It anticipates that these data will be useful to the agency in implementing responsibilities such as listing and delisting impaired water bodies, identifying sources discharging into impaired waters that should be addressed in total-maximum-daily-load implementation plans, and identifying waters for future agency monitoring. In addition, the data can be used "to educate the community, to assist local governments in land-use planning, to supplement data for university and professional studies, and to assist local soil and water conservation districts in prioritizing watershed work for best management practices."²⁸⁵

283. EPA has developed citizen-involvement plans, community-participation plans, and other strategies to provide information to citizens, solicit citizen input, and otherwise enhance citizens' capacity to weigh in on activities that may implicate environmental or health concerns. EPA's Environmental Justice initiative pays particular attention to engaging citizens. *See generally* EPA FOR CITIZEN ACTION, <http://www.epa.gov/epahome/citizen.htm> (last visited July 17, 2016). Federal advisory committees are another example. *See generally* FEDERAL ADVISORY COMMITTEES AT EPA, <http://www2.epa.gov/faca> (last visited July 17, 2016). One of the co-authors served on such an EPA committee for several years.

284. The procedural justice literature offers insights both into the value of citizen participation and how to structure such participation to advance procedural justice. *See, e.g.*, David L. Markell & Tom R. Tyler, *Using Empirical Research to Design Government Citizen Participation Processes: A Case Study of Citizens' Roles in Environmental Compliance and Enforcement*, 57 KAN. L. REV. 1, 24 (2008) (discussing reasons that citizens value procedures); David L. Markell et al., *What Has Love Got to Do with It?: Sentimental Attachments and Legal Decision-Making*, 57 VILL. L. REV. 209, 212–13 (2012) (discussing features of procedural justice, particularly the positive effect judges have when they inform the public of their rights and give them an opportunity to speak); *see also* Tom R. Tyler & David L. Markell, *The Public Regulation of Land-Use Decisions: Criteria for Evaluating Alternative Procedures*, 7 J. EMPIRICAL LEGAL STUD. 538, 544 (2010) (suggesting that procedural injustices may be alleviated where governments consider public opinion).

285. VIRGINIA DEP'T OF ENVTL. QUALITY, *Levels of Citizen Water Quality Data in Virginia* 1, http://www.deq.virginia.gov/Portals/0/DEQ/Water/WaterQualityMonitoring/CitizenMonitoring/Data_use_form.pdf; *see also* James McElfish et al., *Clearing the Path: Citizen Science and Public Decision Making in the United States* 1 (2016), ENVTL. L. INST., <http://www.eli.org/sites/default/files/eli-pubs/clearing-path-eli-report.pdf> (suggesting

However, policy design should also consider risks that such advances may create. For example, apparent increases in citizen capacity may amount to less than meets the eye if the data are problematic because of concerns about their accuracy or the absence of important contextual information.²⁸⁶ Indeed, such advances may pose coordination challenges and have unintended consequences if they overload the system and divert agency officials from higher priorities.²⁸⁷ Existing agency or judicial arbiters whose job it is to manage a proceeding and to make informed judgments, such as an administrative law judge (“ALJ”) in an enforcement proceeding,²⁸⁸ may help to mitigate unintended consequences. For other citizen entry points, modifications to agency procedures may be warranted, as agencies have begun to explore in contexts such as management of public comment on proposed regulations in response to increased capacity for mass commenting.²⁸⁹ The key point in terms of our framework is that as citizen access to information changes, it will be important for EPA to consider issues relating to

“appropriate design considerations for projects to clear the path toward greater governmental access to, and reliance on, citizen science”).

286. The TRI program, which made much more data about facility releases of pollution publicly available than ever before, has been subject to such criticisms. *See, e.g.*, Stephen M. Johnson, *Competition: The Next Generation of Environmental Regulation?*, 18 SOUTHEASTERN ENVTL. L.J. 1, 17 (2009) (describing criticism of TRI data as “incomplete, inaccurate, or confusing”); Abdallah Simaika, *The Value of Information: Alternatives to Liability in Influencing Corporate Behavior Overseas*, 38 COLUM. J.L. & SOC. PROBS. 321, 359 (2005) (describing criticism of TRI program “for providing mounds of raw, unrefined data with little instruction on its effective use”).

287. *See* Engstrom, *supra* note 15, at 634–37 (discussing the concern that inexperienced, or single-issue private enforcers can “generate bad precedent,” which then restricts government regulators and hampers enforcement efforts that are in the public interest).

288. KENNETH C. DAVIS, ADMINISTRATIVE LAW TREATISE, § 8.11, at 564 (1958) (“Intervention in administrative proceedings is controlled in four ways—by statutory provisions, agency rules, agency practices, and judicial decisions.”). The procedures for intervention vary by agency. Agencies that allow limited public participation generally give ALJs substantial discretion to determine its nature and extent. *See, e.g.*, 14 C.F.R. § 13.206(b) (2012) (allowing ALJs for the Federal Aviation Administration to “determine the extent to which an intervenor may participate in the proceedings”); 16 C.F.R. § 3.14(a) (2012) (allowing Federal Trade Commission ALJs or the Commission to issue an order permitting intervention “to such extent and upon such terms as are provided by law or as otherwise may be deemed proper”). The incentives that ALJs have in different contexts to manage proceedings in particular ways might deserve closer attention. *See generally* ROBERT L. GLICKSMAN & RICHARD E. LEVY, ADMINISTRATIVE LAW: AGENCY ACTION IN LEGAL CONTEXT 490–95 (2010).

289. *See, e.g.*, Wendy E. Wagner, *Administrative Law, Filter Failure, and Information Capture*, 59 DUKE L.J. 1321, 1331–32 (2010) (describing how “filter failure” has allowed affected interests to submit “voluminous filings” and put agencies “at the mercy of an unlimited flood of information through various pluralistic processes,” including notice-and-comment rulemaking); *see generally* Cynthia R. Farina & Mary J. Newhart, *Rulemaking 2.0: Understanding and Getting Better Public Participation*, CORNELL E-RULEMAKING INITIATIVE PUBLICATIONS (2013), <http://scholarship.law.cornell.edu/cei/15>.

capacity and coordination in structuring citizens' roles at each of these entry points into the regulatory process.

A second form of civil-society engagement involves *citizen interactions with regulated parties*. For example, citizens concerned about operations at a nearby plant may contact plant officials to raise concerns and acquire information. "Good-neighbor agreements" are a vehicle sometimes used to create more-or-less formal arrangements between neighbors and regulated parties.²⁹⁰ In some cases, these interactions may be required by legislation, as under the CAA in connection with emergency preparedness.²⁹¹ In others, EPA may embed such an arrangement in a permit or in settlement of an enforcement case.²⁹² Alternatively, citizens have sometimes worked relatively independently of agencies to negotiate such agreements.²⁹³ These agreements may require improved access to information and commitments by the regulated party to reduce pollution, develop accident-response plans, and invest in community services.²⁹⁴ Proponents of good-neighbor agreements have suggested that they offer potential for innovation because they are an experimental strategy, they lead to increased citizen influence over activities within community borders, and they are likely to yield predictable benefits when embodied in a binding agreement.²⁹⁵

New, better, and timelier information about pollutant releases and risks has the potential to transform these relationships, with significant implications for the shape of governance more generally. EPA Assistant Administrator Giles hopes that the emergence of significantly enhanced relationships between regulated

290. See Thalia González & Giovanni Saarman, *Regulating Pollutants, Negative Externalities, and Good Neighbor Agreements: Who Bears the Burden of Protecting Communities?*, 41 *ECOLOGY L.Q.* 37, 39–40 (2014); see also Sanford Lewis & Diane Henkels, *Good Neighbor Agreements: A Tool for Environmental and Social Justice*, 23 *SOC. JUST.* 134, 138–39 (1996); Markell & Tyler, *supra* note 284, at 11 n.55.

291. 42 U.S.C. § 7412(r) (2012) (consent decree requiring certain facilities to publish risk-management plans and make them available to the public).

292. See *United States v. Murphy Oil USA, Inc.*, No. 3:10-cv-00563-bbc, slip op. at 100–02 (W.D. Wis. 2010) (requiring defendant to conduct monthly meetings with a local non-profit organization to discuss the citizens' concerns, and provide them with a report of the progress on the Consent Decree and updated data on the refinery). EPA has published a list of the ten enforcement settlements that reflect Next Gen features. At least three of those incorporated good-neighbor agreements. U.S. EPA, NEXT GENERATION ENFORCEMENT SETTLEMENT HIGHLIGHTS, <http://www2.epa.gov/sites/production/files/2015-01/documents/nextgen-enfsettlementhighlights.pdf> (Murphy Oil, BP Whiting, and Metropolitan St. Louis Sewer District).

293. See Janet V. Siegel, *Negotiating for Environmental Justice: Turning Polluters into "Good Neighbors" Through Collaborative Bargaining*, 10 *N.Y.U. ENVTL. L.J.* 147, 170–72 (2002) (stating that good neighbor agreements are "a viable tool for communities to bargain with industry for positive reforms, policies, and financial investment that protect community health and welfare while also responding to industry's needs").

294. See González & Saarman, *supra* note 290, at 40; Lewis & Henkels, *supra* note 290, at 138–45.

295. Lewis & Henkels, *supra* note 290, at 147–48.

parties and communities (“interactions on steroids”), along with improved capacity and coordination between them, will reduce the need for government engagement.²⁹⁶ But, again, policy design will need to be mindful that improved capacity for such interactions between regulated entities and citizen groups may not provide the anticipated enhancements to regulatory enforcement. Authors of a recent case study of a good-neighbor agreement express skepticism about the viability of “shift[ing] the burden” of overseeing regulated parties from government officials to communities.²⁹⁷ The Authors cite capacity concerns as a significant reason for this skepticism.²⁹⁸ The Authors suggest that, even in relatively affluent communities, the public generally lacks the resources and technical expertise needed to accomplish the necessary comprehensive monitoring.²⁹⁹ Deputization of civil society is likely to pose coordination issues as well, and process designers would be advised to carefully consider how to address them.³⁰⁰

In short, new technologies and other advances are dramatically enhancing the possibility of improved communications and relationships between regulated

296. See Giles, *supra* note 18, at 24.

297. González & Saarman, *supra* note 290, at 37, 41 (“[R]eliance on [good neighbor agreements] to remediate the negative human health impacts of pollution is misguided . . . [W]e cannot shift the burden to communities, whether politically powerful or not, to hold industrial polluters accountable for the costs they impose on society. Rather, there must be a radical restructuring of the environmental regulatory scheme.”).

298. The authors argue that good neighbor agreements can present hurdles for community activists, including the difficulty of bringing corporate management to the negotiating table, problems with ensuring that the community can present a unified set of interests, and lengthy negotiations. These problems are amplified in the politically disenfranchised and historically marginalized communities where good-neighbor agreements are most often considered as an alternative for addressing environmental harms. *Id.* at 62. The authors note that “[t]he American Lung Association describes the capacity for communities to complete studies of pollution exposure as ‘quite limited.’” *Id.* at 44–45.

299. González & Saarman, *supra* note 290, at 45. In its Environmental Justice materials, EPA also has highlighted capacity concerns in its assessment of community empowerment. See U.S. EPA, PLAN EJ 2014, SUPPORTING COMMUNITY-BASED ACTION PROGRAMS 1 (2014), <https://www.epa.gov/sites/production/files/2015-02/documents/plan-ej-community-action-2011-09.pdf> (“[W]e realize that far too many communities . . . lack the capacity to affect environmental conditions.”). EPA’s environmental justice initiative includes efforts to build such capacity. See *id.*

300. Promoting coordination among public and private actors is likely to be relatively easy when a good-neighbor-type arrangement is created through an agency settlement that is enforceable by the government. See *United States v. Murphy Oil USA, Inc.*, No. 3:10-cv-00563-bbc at 97–102 (W.D. Wis. 2010) (consent decree settlement requiring Murphy Oil to (1) install an ambient monitoring system so that the citizens would have access to air-pollution data in their neighborhood; (2) make publicly available on its website meteorological and ambient monitoring data; (3) hold monthly meetings with the public to discuss concerns and ensure transparency; and (4) conduct community-enhancement projects such as noise surveys and mitigation of excess noise levels, fence construction, and reports at public meetings on efforts to suppress dust caused by activities or wind on refinery property).

parties and the communities in which they operate. As these changes develop, questions of civil-society capacity and the mechanics of coordination are likely to be important parts of program-design initiatives intended to empower citizens and, to a greater or lesser degree, privatize traditional government functions by empowering civil society through interactions between regulated entities and citizen representatives.

A third type of citizen engagement involves *equipping and empowering citizens to serve as fire alarms*.³⁰¹ Because of their numbers, proximity to regulated facilities, and interest in protecting their families' health or access to clean natural resources, citizens may learn about problems before the government does, and sometimes before even the facility itself uncovers them. The literature refers to citizens providing such information to the government as a "fire-alarm" function.³⁰² Just as a citizen pulls a fire alarm to alert the fire department of the need for help, a citizen provides information to notify the government of the need for attention.³⁰³

In the context of this entry point, as for the two discussed above, the significant increase in publicly available information, including in some cases information that citizens themselves generate due to access to cheaper and more accurate monitoring technologies,³⁰⁴ will dramatically increase citizens' capacity and willingness to serve as "fire alarms." Close attention to citizens' capacity, and their coordination with government enforcement efforts, will be critical as their fire-alarm role expands. For example, false alarms divert scarce resources that otherwise would be devoted to higher priority activities.³⁰⁵ To optimize citizens'

301. Hammond & Markell, *supra* note 11, at 356–57 (noting that "[t]he classic account of fire alarms provides that they are a means of converting 'the oversight job of a politician from active monitor to reactive servant of affected constituencies,'" and that "[a]lthough the origins of the fire-alarm theory lie in a traditional principal-agent conceptualization of administrative law—the theory originally focused on congressional oversight—fire alarms can provide notification to many different actors") (citing McNollgast, *Structure and Process, Politics and Policy: Administrative Arrangements and the Political Control of Agencies*, 75 VA. L. REV. 431, 434 (1989)).

302. See ROBERT L. GLICKSMAN & RICHARD E. LEVY, ADMINISTRATIVE LAW: AGENCY ACTION IN LEGAL CONTEXT 760–61 (2d ed. 2015) ("Fire alarms leverage the public's interest in compliance and reduce [government] enforcement costs, but are only effective if the public is likely to be aware of violations and has the incentive to report them."); Matthew D. McCubbins et al., *Administrative Procedures as Instruments of Political Control*, 3 J.L. ECON. & ORG. 243, 250 (1987); Matthew D. McCubbins & Thomas Schwartz, *Congressional Oversight Overlooked: Police Patrols Versus Fire Alarms*, 28 AM. J. POL. SCI. 165, 166 (1984).

303. EPA has established a web page that covers both emergencies and whistleblower protection. See REPORTING ENVIRONMENTAL VIOLATIONS, <http://www2.epa.gov/enforcement/report-environmental-violations> (last accessed July 17, 2016).

304. See generally Snyder, et al., *supra* note 53 (discussing the status of air pollution sensor technologies and their implications for citizen science).

305. See Kal Raustiala, *Police Patrols & Fire Alarms in the NAAEC*, 26 LOY. L.A. INT'L & COMP. L. REV. 389, 410 (2004) (suggesting that some of the shortcomings of

service as fire alarms, considerable education will be essential to help citizens understand the information they generate or can access, so that they can make informed judgments about when government intervention is needed.³⁰⁶ The government may find it worthwhile to experiment with possible fire-alarm mechanism features—e.g., who may pull an alarm, how it is pulled, the type of response it triggers—as it tries to calibrate use of those mechanisms in a world in which citizens have real-time access to an enormous volume of information.³⁰⁷

A fourth type of citizen engagement involves *citizens operating as direct actors through the legal process*, with citizen suits serving as the most prominent example of this direct citizen engagement.³⁰⁸ Almost all of the major environmental laws authorize citizens to bring suit in federal district court against violators under some circumstances.³⁰⁹ Congress empowered citizens to act as

using citizens as “fire alarms” are that the participation is inherently decentralized and driven by “disconnected individual choices,” and thus, enforcement can be unfocused, reactive, and not in the collective best interest of the community). But policymakers also should be alert to the possibility that government officials will pay insufficient heed to legitimate fire alarms, as seems to have occurred in Flint, Michigan. *See* Kennedy, *supra* note 101 (noting that Flint residents reported problems with drinking water quality as early as May 2015, several months before a local hospital detected unusually high blood-lead levels in children and city officials issued a health advisory).

306. *See* EPA, FY 2014–2018, *supra* note 159, at 47 (noting that “sharing of critical, up-to-date information (such as skills and services, best practices and success stories, useful contacts, relevant grants and technical assistance, data, and multimedia strategies)” will be needed to encourage citizen contributions to environmental research that complement EPA research).

307. One of the authors has previously provided in-depth reviews of two different citizen fire-alarm mechanisms in the environmental enforcement arena, one involving citizens’ capacity to petition EPA to withdraw a state’s authorization to administer a regulatory program if state performance is deficient, and the other involving obtaining international review of ineffectual enforcement performance. *See* Hammond & Markell, *supra* note 11, at 357 (discussing petition to withdraw state permitting authorization as a type of fire alarm). *See generally* David Markell, *The Role of Spotighting Procedures in Promoting Citizen Participation, Transparency, and Accountability*, 45 WAKE FOREST L. REV. 425 (2010).

308. For general treatment of citizen suits, see generally SEAN FARHANG, *THE LITIGATION STATE: PUBLIC REGULATION AND PRIVATE LAWSUITS IN THE UNITED STATES* (Princeton Univ. Press 2010). For symposium treatment of citizen suits under the environmental laws specifically, see Symposium, *supra* note 17. Common-law suits such as private-nuisance actions are another enforcement mechanism sometimes available to citizens, either independent of or in tandem with statutory actions. *See, e.g.*, *Int’l Paper Co. v. Ouellette*, 479 U.S. 481, 487–500 (1987) (discussing CWA preemption of state common law nuisance actions involving water pollution); *Am. Elec. Power Co. v. Connecticut*, 564 U.S. 410, 420–25 (2011) (discussing CAA displacement of federal common-law nuisance actions to abate greenhouse gas emissions).

309. *See, e.g.*, 16 U.S.C. § 1540(g) (2012) (Endangered Species Act); 33 U.S.C. § 1365 (2012) (CWA); 42 U.S.C. § 6972 (2012) (RCRA); 42 U.S.C. § 7604 (2012) (CAA); 42 U.S.C. § 9659 (2012) (CERCLA). For a recent review, see Edward Lloyd, *Citizen Suits and Defenses against Them*, SW014 ALI-CLE 285 (Feb. 2015) (on file with authors). EPA has limited control over some of the parameters for citizen suits established by the statutes

“private attorney generals” against violators to address its concern that government resources were too limited for it to bring suit in all of the cases in which enforcement action is appropriate, and also to provide a safety net in the event of agency capture.³¹⁰ It opened the courthouse doors to citizens so that they could pursue violators and supply deterrence beyond that stemming from government enforcement activities.³¹¹ Further, Congress authorized the award of attorneys’ fees to successful plaintiffs to provide incentives for citizens to bring cases.³¹²

But for various reasons, including concerns about coordination, Congress preserved for the government primary enforcement authority, confining citizens to a supplemental or subordinate role.³¹³ It required citizens to provide advance notice to the government and alleged violators before filing suit to enable the government to preempt the citizens’ action.³¹⁴ Similarly, in some cases courts have held that a later-filed government action operates to render a citizen suit moot

themselves, such as statutory standing requirements. But it has the ability to influence the availability of citizen suits through its own actions, such as taking enforcement action that operates to preclude a citizen suit. *See generally* Karl S. Coplan, *Citizen Enforcement*, in ELGAR ENCYCLOPEDIA OF ENVIRONMENTAL LAW: ENVIRONMENTAL DECISIONMAKING (Leroy C. Paddock et al. eds., forthcoming 2016) (on file with authors).

310. Karl S. Coplan, *Citizen Litigants Citizen Regulators: Four Cases Where Citizen Suits Drove Development of Clean Water Law*, 25 COLO. NAT. RES., ENERGY & ENVTL. L. REV. 61, 64–67 (2014) (elaborating on the development of environmental citizen suits, and on Congress’s intentions when incorporating this enforcement mechanism into the CAA).

311. *See, e.g.*, Megha Shah, *Grassroots Enforcement of EISA: The Need for A Citizen Suit Provision in the Energy Independence and Security Act of 2007*, 77 GEO. WASH. L. REV. 488, 497 (2009) (“[E]ven with diligent government enforcement, the knowledge that concerned citizens have the ability to enforce compliance serves as a deterrent for those entities contemplating violating the law. Thus, citizen suits encourage compliance with environmental statutes by both serving as an enforcement mechanism for past violations of the statute and as a deterrent against future violations.”); *see also* Sarah L. Stafford, *Private Policing of Environmental Performance: Does It Further Public Goals?*, 39 B.C. ENVTL. AFF. L. REV. 73, 78 (2012) (noting that citizen suits can supplement limited government enforcement resources, “thereby increasing the level of deterrence associated with environmental violations”).

312. *See, e.g.*, 33 U.S.C. § 1365(d) (2012); 42 U.S.C. § 7604(d) (2012). The Supreme Court also restricted fee reimbursements. *See, e.g.*, *Ruckelshaus v. Sierra Club*, 463 U.S. 680, 693–94 (1983) (holding that fee shifting was not “appropriate” under the CAA for plaintiff that did not succeed on any of its claims); Richard E. Levy & Robert L. Glicksman, *Judicial Activism and Restraint in the Supreme Court’s Environmental Law Decisions*, 42 VAND. L. REV. 343, 416–17 (1989) (criticizing that decision).

313. *See Gwaltney v. Chesapeake Bay Found.*, 484 U.S. 49, 61 (1987) (characterizing intended citizens’ roles as “interstitial,” not “potentially intrusive”). A Senate Report stated that “[t]he Committee intends the great volume of enforcement actions [to] be brought by the State.” *Id.* at 60 (citing S. REP. NO. 92–414, at 64 (1971), *reprinted in* 2A Legislative History of the Water Pollution Control Act Amendments of 1972, at 1482 (1973)).

314. *See, e.g.*, 33 U.S.C. § 1365(b) (2012); 42 U.S.C. § 7604(b) (2012).

because the government action adequately addresses the alleged violations.³¹⁵ Thus, Congress established a gatekeeping regime that enables the government to monitor and, in some cases, displace, citizen suits.³¹⁶

The significant increase in accessible information that is a primary goal and feature of the Next Gen initiative will make it easier to launch citizen suits.³¹⁷ Although Congress likely did not anticipate this dramatic change in capacity, the change will increase the importance of coordinating government and private enforcement, such as through EPA's exercise of its gatekeeping authority. EPA will need to be alert to a range of issues that include over-deterrence, inconsistent treatment of similarly-situated regulated parties, the use of theories and evidence in ways that might have unintended consequences for EPA's policy objectives, and citizens' exercise of their "private attorney general" authority to pursue their own private rather than public interests.³¹⁸ At the same time, citizen-initiated enforcement may become increasingly important to the extent that government enforcement capacity diminishes.

C. Dynamism, Environmental Enforcement, and Regulatory Redesign of Civil Society's Roles

The revolution in data availability, which is central to Next Gen, will significantly affect citizens' roles in each of the four contexts discussed above.³¹⁹ More data generated by regulated parties, and more data collected by citizens, will expand citizens' capacity to participate in EPA decision-making processes, including rulemakings, permit proceedings, and enforcement actions. It also will affect citizens' capacity to work directly with regulated parties through "good neighbor" and other arrangements; expand citizens' role as fire alarms alerting the government to perceived concerns; and provide a basis for increased citizen-suit activity.

315. See, e.g., *Atl. States Legal Found., Inc. v. Eastman Kodak Co.*, 933 F.2d 124, 127–28 (2d Cir. 1991).

316. For detailed consideration of agency gatekeeping of citizen suits, see Engstrom, *supra* note 15, at 644–63 (suggesting the importance of contextual features in design of such regimes).

317. See Markell & Glicksman, *supra* note 19, at 74–75. This is not to downplay the evidentiary and other issues citizens are likely to face in seeking to rely on new types of data. See generally Zacaroli, *supra* note 68 (discussing the pros and cons for a company facing a citizen suit). Access to better information also may increase the viability of common law actions, particularly when monitoring data suggests material harm to individuals or the ambient environment.

318. Markell & Glicksman, *supra* note 19, at 73–74.

319. See Memo from Cynthia Giles, EPA Assistant Adm'r to EPA Regional Counsels, *Use of Next Generation Tools in Civil Enforcement Settlements* 3 (Jan. 7, 2015), <http://www2.epa.gov/sites/production/files/2015-01/documents/memo-nextgenuseinenfsettlements.pdf>. Giles alluded to a hoped-for expansion of the first type of interaction in her 2015 memo. See *id.* at 3 ("Some [Next Gen] tools [will] allow individuals and communities that are impacted by a facility's environmental noncompliance to have real-time access to environmental information stemming from a settlement.").

Regardless of one's views of the normative implications of these significant changes in citizens' roles, process designers need to account for these consequences. In the context of the Next Gen initiative, it will be important for EPA to consider the likely implications of this rollout of dramatically increased data and improved communications technology for the roles that citizens may play. We have identified some of these implications to illustrate the type of analysis we regard as critical to process design that carefully considers both possible benefits and unintended consequences of such transformations in capacity, and of other aspects of a dynamic regulatory environment. Consideration of the impact of change on the desired role of citizen actors is particularly important when a goal of program redesign is to expand nongovernmental organizations' roles, as is the case for EPA's ongoing initiative. In *Dynamic Governance, Part II*, we extend our conceptual framework to consider other key actors and important mechanisms and tools.

CONCLUSION

One of the factors that complicates efforts to govern effectively is the dynamic character of many policy challenges and the opportunities to address them. This Article demonstrates the dynamic character of a wide array of policy arenas, and suggests several reasons for, and sources of, such dynamism. Beyond arguing that those involved in policy design and implementation should account for this reality, this Article offers a conceptual framework for doing so, notably that policy design needs to account for the full array of actors that have the potential to affect regulatory implementation, the range of mechanisms available to promote regulatory goals, and the tools available to the actors with the authority and capacity to use these mechanisms.

Our conceptual framework has value independently, but it also provides insights when viewed through the different lenses that rich literatures, such as those on adaptive governance and adaptive management, offer for facilitating adaptability as circumstances change. For example, as we describe in Section I.E. above, adaptive management is a decision-making methodology crafted specifically to deal with change. It is an iterative, structured approach that includes, among other steps, problem identification, establishment of management goals, selection and implementation of management actions, monitoring and evaluation of those actions, and cycling back to the first step for refinement in light of lessons learned.³²⁰ Our framework suggests that, at each step, policymakers' consideration of the full range of possible actors and their roles, of possible legal and other mechanisms, and of tools is likely to enhance their ability to craft regulatory programs that allow each step to proceed in an optimal way, while minimizing regulatory and practical barriers to doing so. Other decision-making

320. See *supra* notes 6, 82–86 and accompanying text. For discussion of the value of *ex post*, “back-end” decision-making procedures for rulemaking and adjudication, see generally Robert L. Glicksman & Sidney A. Shapiro, *Improving Regulation Through Incremental Adjustment*, 52 KAN. L. REV. 1179 (2004); Sidney A. Shapiro & Robert L. Glicksman, *The APA and the Back-End of Regulation: Procedures for Informal Adjudication*, 56 ADMIN. L. REV. 1159 (2004).

methodologies for responding to change are likely to present a different array of choices in light of the actors, mechanisms, and tools involved in their design and implementation.

We have used the specific context of regulatory enforcement to demonstrate the value of our conceptual framework because we are convinced that it offers a useful and revealing lens for policy design in a dynamic context. The opportunity to apply our framework in this context stems from EPA's determination that the dynamic circumstances it confronts require radical reform of its enforcement and compliance infrastructure and its decision to establish a transformative enforcement and compliance "paradigm" in response to the shifting landscape it faces. The discussion above reviews the challenges facing EPA that have persuaded it of the need for a new approach, identifies the elements of the transformative effort on which EPA has embarked, and provides examples of the kinds of sophisticated regulatory design choices that our framework may illuminate.

We respectfully suggest that our conceptual framework may provide a helpful lens for considering regulatory design, including redesign of regulatory enforcement. The five elements that EPA has described as the centerpiece of Next Gen are a mix of what we suggest should be termed "mechanisms" and "tools," and we think it is important to consider them distinctly at a conceptual level. Two of EPA's five elements—"rules with compliance built in" and "innovative enforcement"³²¹—refer to legal *mechanisms* available to EPA in implementing policy. In contrast, the other three—advanced monitoring, electronic reporting, and increased transparency—are *tools* to advance Next Gen that typically are put into use through a legal mechanism, including rulemaking, permitting, or enforcement. EPA's own materials acknowledge as much.³²² This lack of conceptual clarity has the potential to cause an agency such as EPA to miss opportunities to advance its goals more effectively through a different mix of actors, mechanisms, and tools. Our discussion of the role of citizen actors in Part IV illustrates why we believe that use of our framework is likely to aid in exposing and addressing critical issues for today's complicated multi-level, multi-governance realities.

In a second article that serves as a companion piece to this one, we continue our exploration of the value of our three-part policy design framework, both generally and by applying it to EPA's new enforcement venture. In that article, we elaborate on the introductory discussion here concerning why our framework focuses on what we believe to be critical policy design questions: who are the key actors; what legal and other mechanisms might each actor use to advance a desired policy objective; and what tools (such as advanced monitoring in the EPA context) might be helpful in advancing that objective.³²³ The

321. See *supra* Section I.V.B.

322. See, e.g., Giles, *supra* note 18, at 26 (citing use of rulemaking or enforcement to include advanced monitoring and other tools).

323. The answers to each of those questions will vary depending on the context. See, e.g., Greg Mitchell, *Good Scholarly Intentions Do Not Guarantee Good Policy*, 95 VA. L. REV. IN BRIEF 109, 111 (2010) (arguing, in the context of anti-discrimination policy, that

application of the framework to EPA's Next Gen Initiative illustrates how the three components of the framework relate to one another, and how the mechanisms and tools available to implement a regulatory program interact with a variety of actors, both inside and outside government. This case study also demonstrates that, by focusing policymakers' attention on the challenges presented by a dynamic regulatory environment in a structured manner, our framework may help to spot significant issues that otherwise are not likely to receive sufficient attention as part of regulatory reform efforts, and thereby avoid missing important opportunities for successful reform.

scholars must avoid oversimplifying complex problems because they may have context-dependent solutions). Our three dimensions are intended to be inclusive: actors can and often do work together; an agency may use more than one mechanism to advance a policy objective; and a mechanism may make use of more than one tool.