Next Generation Compliance

by Cynthia Giles

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Summary

This Article is adapted from Chapter One of Next Generation Environmental Compliance and Enforcement (LeRoy C. Paddock and Jessica A. Wentz eds.) published in 2014 by ELI Press. The book emerged from a two-day EPA workshop covering a broad array of topics, ranging from general comparisons of different compliance approaches to focused case studies of regulatory programs. This Article defines "next generation compliance" and outlines its five key elements: rules with compliance built in; advanced pollution monitoring technologies; electronic reporting systems; increased transparency; and innovative enforcement strategies.

William D. Ruckelshaus, the U.S. Environmental Protection Agency's (EPA's) first administrator, said that the first thing he did when he took the helm in 1970 was file a bunch of lawsuits against the country's biggest polluters. He made it clear to everyone that there was a new sheriff in town who was going to take action to stop the all-too-apparent air and water pollution plaguing the nation (see Reference 1, below).

Four decades later, violations of pollution standards still can pose a threat to children with asthma, adults with cardiovascular disease, people susceptible to waterborne illness, and all of us exposed to chemicals in our daily lives. And violations still harm American businesses that are doing the right thing and should not have to compete with companies, domestic or foreign, who don't play by the rules.

While we are justifiably proud of the significant progress we have made as a nation on the visible violations that fueled public outrage in the 1960s, big challenges remain. Today's problems are pollution not apparent to the naked eye that still poses real threats to health, the large number of smaller sources that collectively make a big difference, and pollution that isn't always easily identifiable as what comes from the top of a stack or the end of a pipe. These compliance problems require new tools and new thinking. Environmental compliance today requires a change just as dramatic as the one Bill Ruckelshaus led over 40 years ago.

Tough enforcement was a new idea in environmental protection back in 1970. Today strong criminal and civil enforcement is—and will continue to be—an essential part of our environmental protection work. But we can accomplish even more by moving our compliance programs into the 21st century (see Reference 2). Just as the Internet has transformed the way we communicate and access information, advances in information and emissions monitoring technology are setting the stage for detection, processing, and communication capabilities that can revolutionize environmental protection. We are moving toward a world in which states, EPA, citizens, and industry will have real-time electronic information regarding environmental conditions, emissions, and compliance, and we are using what we have learned about compliance to make it easier to comply than to violate. We call it Next Generation Compliance, or Next Gen.

I. Rules With Compliance Built In

For years, we have assumed that federal and state agencies would help ensure that we were achieving the ben-

Author's note: Special thanks to David Hindin, who contributed to the ideas described here and is leading EPA's Next Generation Compliance work.

efits contemplated in environmental regulations by taking action against violators. Research shows that enforcement cases do more than just improve compliance by the entity sued; they also deter potential violators and thus improve compliance generally—much as seeing a speeder getting ticketed tends to slow traffic (see Reference 3). However, a small number of federal and state enforcers cannot effectively police millions of regulated facilities. While enforcement is an essential part of EPA's compliance program, it is not realistic to think that enforcement alone will get us to the levels of compliance envisioned by our rules.

We can get a bigger bang for the buck by working hard to make sure we design rules that will work in the real world—rules with compliance built in. We know a lot about what drives compliance; we need to use that knowledge to structure programs that will work better and be more self-implementing. For example, take reducing emissions from automobiles. There are millions of cars and trucks in the United States, each of which is a small source of harmful emissions that collectively pack a wallop for air quality. One could imagine the nightmare of requiring each owner to independently purchase and install air emissions control equipment, then depending on the government to find and ticket violators. Instead, we require auto manufacturers to install pollution controls when the car is made, and to certify cars as meeting the standard. For equipment installation requirements, government monitors the small number of manufacturers, not the millions of car owners, and can focus enforcement on those who deliberately circumvent the installation standards.

EPA is using this thinking today. In an April 2013 proposed rule requiring emissions controls for thousands of oil and gas producers, the agency took comment on a proposal to make initial compliance much easier. The idea was to allow the small number of air pollution control equipment manufacturers to have their equipment certified by EPA and then tell energy extraction companies that if they buy one of the certified compliance-ready models, they can just report that fact, eliminating the need for separate field testing. The manufacturer builds the compliance-ready equipment and reports who purchased the approved models. Compliance checks are easy: government need only electronically compare the user's purchase and installation reports with the manufacturer's sales reports. The more resource-intensive interaction is limited to a small number of manufacturers. Approaches like this have the potential to make compliance easier and less costly, while improving results and increasing certainty for the regulated community.

More effective and more efficient ways to get the necessary pollution controls installed are not the whole story. Other compliance challenges remain—most obviously the need to ensure that sources are properly operating their pollution control equipment. Advanced monitoring and information technologies, discussed below, can be part of the answer to this second-order problem. Efficient mechanisms for ensuring installation of the required pollution controls will help to free up scarce resources to focus on downstream challenges.

Next Gen is about writing rules that work well and that achieve the desired result without requiring court action. For starters, we should focus on greater simplicity and clarity. One of the principles we have learned over years of hard experience is that compliance is better when the rules are simple and clear. When you consider what will actually happen in the real world, the net environmental benefit of a simpler, clearer rule may trump a more detailed and in theory more protective standard. We need to think more carefully about balancing flexibility and simplicity when we write rules and permits.

There are many other strategies that we should explore in writing rules. Independent third-party validation can work in some cases (see Reference 4). Requiring monitoring is also surprisingly effective at improving performance; a facility probably won't take steps to improve compliance if it doesn't even know it is violating. Requiring certifications of compliance can also transform compliance rates for some programs; certifications require someone to check, and increase the chances that problems are caught and fixed, creating good jobs and improving protection. Public disclosure is another underutilized tool; there is powerful evidence that publishing information about company performance drives better behavior, as pressure is applied by customers, neighbors, investors, and insurers. And 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. We saw that approach work in the acid rain program, where an integrated system of pollution allowances, continuous monitoring, electronic reporting, and market trading got fast and efficient results and very high levels of compliance (see Reference 5). Rules with compliance built in can improve protection of health and the environment without depending on enforcement cases.

II. Advanced Pollution Monitoring

It used to be hard to figure out how much pollution was coming from a stack or a pipe. Expensive tests done once a year or less often created huge uncertainty about how much pollution there really was, and whether that amount varied much from day to day. Grab samples taken at wide intervals created opportunities to sample at times when pollution might be lower, further obscuring the accuracy of reporting. The proliferation of smaller sources, which can be individually modest but collectively significant, made these challenges even greater. These uncertainties are compounded for pollution you can't see or smell, which is often the case, particularly for toxic pollutants.

Advanced monitoring technologies can help make these problems obsolete. Monitoring devices are becoming more accurate, more mobile, and cheaper, all of which is

contributing to a revolution in how we find and fix pollution problems. Through the use of these technologies, some companies have discovered that they greatly underestimated their pollution, sometimes by an order of magnitude. Actual measurements, as opposed to estimates, often show far higher emissions than we, or the company, thought. Real-time monitoring is possible now—not just for air, but also water. For example, in one much-used river, EPA has installed solar-powered continuous monitoring devices that upload via cell phone technology to agency computers (see Reference 6).

As we use advanced monitoring equipment in our enforcement work, we are finding serious pollution issues that require attention. Many companies are themselves adopting this technology to manage their operations and to help them quickly identify and fix problems, thereby saving money, reducing pollution, and avoiding compliance issues. In our enforcement cases we are getting agreements to install these monitoring technologies at fence lines so that companies and communities can know about pollution, and prompt action can be taken to fix problems before they become serious health concerns (see Reference 7).

One of the more powerful uses of these technologies is to make previously invisible pollution visible. Infrared cameras, for example, allow the user to actually see dark plumes that look like smoke when volatile organic compounds such as benzene are released into the air, even though these emissions are invisible to the naked eye (see Reference 8). By using equipment that looks like a video camera, and is nearly as easy to operate, we can locate pollution leaks and releases. These videos can be powerfully persuasive in conversations with companies that didn't believe they had a pollution problem.

As the price of monitoring devices drops, we are not far from the day when the public will have access to pollution monitoring tools. Communities with monitoring data will encourage better performance by industries they host (see Reference 9). As pollution data become more available, companies may find that doing their own monitoring will better ensure that accurate and relevant information is available to the public. These changes, driven by new technologies, will encourage more direct industry and community engagement, and reduce the need for government action (see Reference 10).

III. Electronic Reporting

Today just about every aspect of our lives can be managed electronically. We can bank from home, send pictures from phones, and track packages across the country from our desks. And yet, much 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 declining budgets, the paper sits in a corner unopened, until someone has time to examine the data and see if any violations appear likely. This means that important pollution and violation information can go unnoticed. Errors can be introduced through manual data entry, requiring aggravating and time-consuming correction processes. And far too much time ends up being spent on minor issues while major ones go unaddressed. This is particularly a problem for states, which bear the largest share of the burden of dealing with mountains of paper. Electronic reporting, or "e-reporting," is a solution that saves time and money while improving results (see Reference 11).

Widespread electronic reporting opens the door for private sector development of e-reporting tools, with the potential to be both cheaper and more user-friendly than what government can provide. Software developers can take advantage of the market created by electronic reporting to develop e-reporting tools that work better for the user, with no additional cost to the taxpayer. Private tax preparation and reporting tools are an example of a private sector innovation that is both easy to use and nimble in responding to customer needs.

E-reporting also allows for electronic data checks that can help avoid problems and reduce transaction costs. For example, software reporting tools that allow self-correction, by flagging inconsistent or mathematically impossible entries, as is done by EPA's electronic Greenhouse Gas Reporting Tool, help to prevent mistakes before they happen, saving everyone time and money (see Reference 12).

Electronic reporting also creates greater transparency. If you want to view paper records, you need to travel to a government office and sit there with your pad and pencil taking notes. How much easier would it be if the same data could be reviewed online, creating government that is more open and gives people information about facilities and pollution that affects them? Greater accessibility can also drive better compliance performance as facilities learn from each other about what performance is possible (see Reference 13).

Electronic reporting is not a one-way street. Once an electronic mode of communication is set up between government and facilities, government can provide specific, relevant information and compliance assistance to industry (see Reference 14). For example, if a company reports that it's discharging high levels of nitrogen, the computer can direct them to sources of help specifically for reducing nitrogen loading.

IV. Increased Transparency

You know those reports that come once a year with your drinking water bill that tell you about the quality of water you get from your drinking water supplier? Do these reports just tell you how clean your drinking water is or do they help to actually improve water quality? A 2008 study in Massachusetts found that larger drinking water systems required to mail the reports directly to customers reduced their total violations by 30-44%% as a result of this new reporting, and reduced the more severe health

violations by 40-57% (see Reference 15). A rule that originated with the desire to inform people turned out to accomplish a lot more.

Using transparency as a way to improve performance is one of the most important things we have learned about strategies to increase compliance (see Reference 16). Probably the best known environmental example is the Toxics Release Inventory, where the requirement to report and publish information is credited with a significant drop in emissions (see Reference 17). EPA's efforts to make our data more available are only starting to scratch the surface of the ways transparency can improve results.

A sophisticated understanding of how transparency works as a regulatory tool has helped us to design transparency programs that work. Some research suggests that transparency serves a reminder function; publishing data on facility performance draws attention to problems and brings senior-level focus to bear on fixing them. The reminder function also works within peer groups; companies can see how their peers perform, and this can both confirm that better performance is possible—others are doing it—and provide competitive incentive to improve. Some companies are using transparency as part of their business model, believing that sharing more information with the public about strong performance provides a competitive edge (see Reference 18).

Public disclosure and transparency also improve results by putting pressure on lower-performing companies. Public information acknowledges the many strong performers that work hard to be good neighbors, and motivates others to devote effort up front to avoid problems that invite bad press, or scrutiny from neighbors and government. Publicly known violations may also alert investors and insurers to poor management, providing financial motivation to avoid violations. If we can create incentives that push companies to just do the right thing the first time, so much the better.

When information on compliance and pollution is publicly available, citizens can see how good a job their government is doing at protecting them from health threats. The same theories that support use of greater transparency to improve facility performance also work for government; states and EPA regions can see that others are getting better results, which can motivate a push to find out if what others are doing can help. This is part of the thinking behind our recently published state dashboards (www.epa-echo.gov/echo/). The public can go online and easily see how federal and state governments are doing inspecting major sources, finding violators, and taking action.

Of course, transparency only works if the information is important and correct. Publicizing data that are incomplete or wrong undermines the goal. Transparency has to be coupled with a program to collect the right information. And where government relies on self-reporting for compliance data, we also need ways to check for accuracy. That's why Next Gen principles for advanced monitoring and electronic reporting go hand-in-hand with transparency: providing accurate information on real pollution issues.

Releasing an avalanche of data is not the answer. For the public, the key is relevant, user-friendly information, such as easy-to-understand miles per gallon ratings for vehicles. For more expert users, larger sets of more comprehensive data can be valuable, especially if they can be quickly and easily viewed and sorted (see Reference 19). Two recent examples: first, the Facility Level Information on Greenhouse Gas Tool allows users to explore greenhouse gas data for individual facilities using mapping and graphing features (http://ghgdata.epa.gov) and, second, there is an online tool that allows easy identification of the biggest contributors to water pollution problems (http://cfpub.epa.gov/dmr/) (see Reference 20). Even in an era of very tight budgets, thoughtful transparency strategies can improve results, and open the door for private sector development of apps that will make a difference.

V. Innovative Enforcement Strategies

In 2010, EPA and the states embarked on a new approach to protect people's health by improving compliance with drinking water standards, one of EPA's top priorities. We implemented a new scoring system to identify drinking water suppliers with the most serious violations, and announced that all serious violators would either return to compliance in six months or face enforcement (see Reference 21). Six months later, there was a big upturn in enforcement actions, as states and EPA followed through on this promise. As a result of this focused state and federal attention over the last three years, we have seen a 65% drop in reported public water suppliers with serious violations, now that operators know that we are serious about the importance of compliance with drinking water standards. The increased attention has also inspired drinking water systems and government to correct inaccurate data, helping us to focus our attention on the big problems. With only a modest investment of resources, this new approach has made a big difference.

Even in a time of declining budgets, we are developing more innovative approaches like these to help us get better protection. The Next Gen ideas that can work in regulations can also work in enforcement cases. Advanced monitoring is helping us to identify violators and target enforcement efforts, so we are less dependent today on tips, complaints, and self-identified violations, to direct and focus our enforcement work. Electronic reporting is also being incorporated into enforcement settlements, saving time and money for both the defendant and government. Third-party verification of the defendant's compliance status is part of both civil and criminal cases, improving compliance and saving taxpayer dollars.

Many states are already moving in the directions discussed here, recognizing that shifting quickly into the electronic age has the potential to improve effectiveness and save money. These strategies will also help support states that want greater flexibility to focus on the most important problems, because better, more accurate infor-

mation will encourage evidence-based experimentation to find out which strategies work to improve compliance and which do not. EPA is working closely with our state partners to design and implement the electronic agencies of the future.

Vigorous enforcement of the law will always be the backbone of environmental protection. It was true when Bill Ruckelshaus launched EPA, and it remains true today. If we are to do our job to protect the public and assure a level playing field for complying businesses, then states and EPA need to work together to make sure there are consequences for violations. But everyone is better off when we prevent violations. As we continue to learn about ways to strengthen compliance, and take advantage of advances in technology, Next Gen can transform our protection work even in a time of declining budgets.

Appendix: Annotations and References

This Appendix includes annotations, references, and relevant examples intended to provide additional information to readers. EPA gathered most of the information described during the course of extensive research and analysis on topics related to Next Generation Compliance.

Reference 1: "William D. Ruckelshaus, the U.S. Environmental Protection Agency's (EPA's) first administrator, said that the first thing he did when he took the helm in 1970 was to file a bunch of lawsuits against the country's biggest polluters. He made it clear to everyone that there was a new sheriff in town who was going to take action to stop the all-too-apparent air and water emissions plaguing the nation." For more information on William Ruckelshaus, see http://www2.epa.gov/aboutepa/william-d-ruckelshaus. The following are excerpts from an April 2009 interview with Ruckelshaus for the PBS show *Frontline*[1]:

> **Reporter: What did you see your job as being when you got the agency started?**
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> "It seemed to me we had a societal issue, and that was the federal government had never been very active in trying to deal with pollution abatement or protection of the environment or public health. . . . It was left up to the states. And my impression from having had that experience in the state of Indiana was the states weren't good regulators of industry on the question of health, safety, and the environment. They had competed so strongly for industry being located in their borders that they just weren't good regulators, or there wasn't much political support for going after polluters and after this kind of problem."
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> "So what you needed to do was . . . to focus the attention on the central government, set some reasonable standards and then go about enforcing them."
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> "That was important to do because the public was all riled up about this problem—for justifiable reasons, in my judgment—and they needed to be reassured that their government was responding to their demands that something be done about this problem. Having the opportunity to do that in a federal agency and act responsibly toward a legitimate public demand was well worth doing. So we had to select some big, visible polluters—both industrial and municipal—go after them, make sure the public understood we were being responsive to their concerns, and that would energize the agency and get us in a position to do things that needed to be done in order to address the problem."
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> **Reporter: So you had to enforce the law. You had to be a tough regulator.**
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> "That's right, in order to be successful you had to reassure the public that this was a problem the government was taking seriously. We had to be tough. We had to issue standards and we had to enforce them. . . . There were targets galore, and most of the people running big American manufacturing facilities in those days believed this was all a fad; it was going to go away, and all they had to do was sort of hunker down until the public opinion subsided, public concern subsided, and it would go away."
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> "We went after U.S. Steel. There was Dow Chemical. We went to a national mayor's conference down in Atlanta, at the request of now-Senator, then-Mayor [Richard] Lugar of Indianapolis. . . . I told him when I got there we're going to announce that we're going to sue Atlanta, Cleveland, and Detroit, who are in violation of requirements for treatment of sewage going into these waterways around their community."

For general information on the history of EPA, see Dennis C. Williams, *The Guardian: EPA's Formative Years* (Sept. 1993), *at* http://www2.epa.gov/aboutepa/guardian-epas-formative-years-1970-1973.

Reference 2: "Today, strong criminal and civil enforcement is—and will continue to be—an essential part of our environmental protection work. But we can accomplish even more by moving our compliance programs into the 21st century." There is a rich store of theoretical and empirical literature demonstrating the effectiveness and limits of traditional individual-facility monitoring and enforcement in promoting compliance and deterrence. *See, e.g.*:

- *Monitoring, Enforcement, & Environmental Compliance: Understanding Specific & General Deterrence* (State of the Science White Paper prepared for EPA Oct. 2007), http://www.epa.gov/Compliance/resources/reports/compliance/research/meec-white-paper.pdf.
- Compliance Literature Search Results—Citations to Over Two Hundred Compliance-Related Books and Articles from 1999 to 2007 (April 2007), http://

1. The full interview can be viewed at http://www.pbs.org/wgbh/pages/frontline/poisonedwaters/interviews/ruckelshaus.html.

www.epa.gov/Compliance/resources/reports/compliance/research/lit-results-2007.pdf.

Reference 3: "Research shows that enforcement cases do more than just improve compliance by the entity sued; they also deter potential violators and thus improve compliance generally—much as seeing a speeder get ticketed tends to slow traffic." For example, an academic analysis of the compliance of 251 major pulp, paper, and paperboard mills in 28 states over 14 years found that, in the year following a sanction, plants reduced their discharges by a statewide average of 7% across the entire range of emissions distribution. Even complying plants responded to penalties against other facilities in their states by further reducing discharges to increase compliance margins. J. Shimshack & M. Ward, *Enforcement and Over-Compliance*, J. Environ. Econ. 55(1):90-105 (2008).

The provided example of requiring auto manufacturers to build pollution control equipment into all cars and trucks sold in the United States combines two design principles for highly effective regulations: (1) focusing regulatory requirements on fewer, better-defined "upstream sources" rather than numerous diverse or diffuse "downstream sources"; and (2) building physical structures and product designs into regulations in order to make compliance easier and noncompliance difficult.

- For an introduction to legal and practical considerations in building compliance into rules through physical structures or product designs, see Edward K. Cheng, *Structural Laws and the Puzzle of Regulating Behavior,* 100 NW U. L. Rev. 655-718 at 657 (2006).
- Another example of regulating "upstream" through physical structure and product design: When EPA banned leaded gasoline, the Agency mandated gas nozzle inlet restrictors to make it physically difficult for automobile owners to pump cheaper leaded gasoline into vehicles not designed for it. This made it virtually impossible for drivers to violate the rule and dramatically simplified compliance monitoring. Rather than needing to monitor the gas pumping actions of millions of drivers, EPA could focus on assuring that a much smaller set of pump manufacturers and installers met their applicable nozzle standards.

The referenced April 2013 proposed rule requiring emissions controls for thousands of oil and gas producers is the *Oil and Natural Gas Sector: Reconsideration of Certain Provisions of New Source Performance Standards,* 78 Fed. Reg. 22126 (Apr. 12, 2013). The rule is published at http://www.gpo.gov/fdsys/pkg/FR-2013-04-12/pdf/2013-07873.pdf.

Reference 4: "Independent third-party validation can work in some cases."

- For an introduction to designing rules to incorporate third-party approaches, see Lesley K. McCallister, *Regulation by Third Party Vertification,* 53 B.C. L. Rev. 1 (2012), http://lawdigitalcommons.bc.edu/cgi/viewcontent.cgi?article=3182&context=bclr.
- On December 6, 2012, the Administrative Conference of the United States published a recommendation on *Agency Use of Third-Party Programs to Assess Regulatory Compliance* at http://www.acus.gov/sites/default/files/documents/Recommendation%202012-7%20%28Third-Party%20Programs%20to%20Assess%20Regulatory%20Compliance%29.pdf. A review of third-party regulatory verification programs in a variety of federal rules and voluntary programs developed in support of the recommendation, *Third Party Programs to Assess Regulatory Compliance* (Oct. 22, 2012), is available at http://www.acus.gov/report/third-party-programs-final-report.
- *Third-party verification regulatory example*: EPA recently proposed two rules aimed at protecting the public from risks associated with exposure to formaldehyde. The first proposal would implement the formaldehyde emission standards under TSCA Title VI for hardwood plywood, medium-density fiberboard, particleboard, and other finished goods. The second proposal would establish a framework for a third-party certification program to ensure that composite wood panel producers comply with their formaldehyde emission limits. Under the proposed framework, third-party certifiers (TPCs) would apply to EPA-recognized accreditation bodies who would verify the certifiers' ability to ensure that panel producers comply with the formaldehyde emission standards. The TPCs would audit composite wood panel producers and verify compliance with the formaldehyde emission standards. The proposed rule with the third-party framework is available at https://www.federalregister.gov/articles/2013/06/10/2013-13254/formaldehyde-third-party-certification-framework-for-the-formaldehyde-standards-for-composite-wood.

Reference 5: "[M]arket strategies that set standards but allow companies to decide how best to get there can be simple and effective in the right circumstances . . . We saw that approach work in the acid rain program, where an integrated system of pollution allowances, continuous monitoring, electronic reporting, and market trading got fast and efficient results and very high levels of compliance."

- An analysis of the Acid Rain Program determined that it led to the "largest quantified human health benefits of any federal regulatory program implemented in the last 10 [years], with annual benefits exceeding costs by >40 to 1" by promoting "public confidence in the programs, highly accurate and complete emissions data, and a high compliance rate

(>99% overall)." *See* John Schakenbach et al., *Fundamentals of Successful Monitoring, Reporting, and Verification Under a Cap-and-Trade Program*, 56 J. Air & Waste Mgmt. Ass'n, 1576, 1576 (2006), http://www.epa.gov/airmarkt/cap-trade/docs/fundamentals.pdf.

- Under the Acid Rain Program's missing data provisions, sources also must substitute increasingly conservative emission values if the actual emissions data that is available drops below regulatory "cut points." Because the missing data is substituted automatically, the deficiencies are not automatically violations, saving regulators and sources enforcement and litigation costs. And because the substitute data provisions increase a facility's reported emissions, they create an incentive for sources to properly maintain and quality-assure their monitoring equipment.

Reference 6: "[I]n one much-used river, EPA has installed solar-powered continuous monitoring devices that upload via cell phone technology to agency computers." One such device is used on the Charles River in Massachusetts. The parameters measured include: temperature, conductivity, pH, dissolved oxygen, turbidity, chlorophyll, and phycocyanin (measured to estimate the level of cyanobacteria, a harmful algal bloom). The buoy takes measurements every 15 minutes and uploads the results to a password-protected website.

Reference 7: "In our enforcement cases we are getting agreements to install [advanced monitoring] technologies at fence lines so that companies and communities can know about pollution, and prompt action can be taken to fix problems before they become serious health concerns." For example, on May 23, 2012, EPA and the U.S. Department of Justice announced an enforcement settlement with BP North America Inc. The settlement requires BP to pay an $8 million penalty and invest more than $400 million to install state-of-the-art pollution controls and cut emissions from BP's petroleum refinery in Whiting, IN. In addition, as a supplemental environmental project, BP will install, operate, and maintain a $2 million fence line monitoring system at Whiting Refinery and will make the data collected available to the public by posting the information on a publicly accessible website. The fence line monitors will continuously monitor benzene, toluene, pentane, hexane, SO_2, hydrogen sulfide (H_2S), and all compounds containing reduced sulfur. U.S. EPA, *BP Whiting Settlement* (May 23, 2012), http://www2.epa.gov/enforcement/bp-whiting-settlement-flaring.

Reference 8: "[M]ake previously invisible pollution visible. Infrared cameras, for example, allow the user to actually see dark plumes that look like smoke when volatile organic compounds such as benzene are released into the air, even though these emissions are invisible to the naked eye." The following Government Accounting Office (GAO) video shows vented gas, which appears as "smoke" billowing from the top of cylindrical metal oil storage tanks and from a pneumatic valve, as seen through an infrared camera. The video also shows the equipment as seen through the naked eye where the gas is invisible. The video clips were supplied to GAO by EPA and a private emission detection firm. *See* http://www.youtube.com/watch?v=N7tLcPQk3PA.

Reference 9: "Communities with monitoring data will encourage better performance by industries they host." The following EPA-produced "citizen science" video demonstrates how EPA and the New York State (NYS) Department of Environmental Conservation collaborated with citizens tracking air quality in Tonawanda, New York to identify and address excessive levels of benzene and other hazardous air pollutants. The citizen monitoring led to a series of enforcement actions by EPA and NYS to bring the Tonawanda Coke Facility into compliance with clean air requirements. The company ultimately agreed to improve its operations, monitor for leaks, and upgrade pollution controls, slashing pollution releases by at least two-thirds. Also, in March 2013, the company and one of its executives were convicted of related criminal violations. What began as a community effort to assess air pollution quality led to reduced air pollution and effective enforcement responses. *See* http://www.youtube.com/watch?v=DZKxn1nioNA.

Reference 10: "These changes [lower-cost monitoring devices, improved public access to pollution monitoring tools, and more available data], driven by new technologies, will encourage more direct industry and community engagement, and reduce the need for government action." In the context of air monitoring, for example, EPA is already working with the commercial sensor industry, academic institutions, community groups, and innovative individuals to develop, evaluate, and apply new and innovative air quality and exposure monitoring technologies, http://www.epa.gov/research/airscience/next-generation-air-measuring.htm.

Reference 11: "E-reporting is a solution that saves time and money while improving results."

- See the National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Proposed Rule's preamble for a qualitative and quantitative elucidation of the benefits and costs of e-reporting. For example, "The cost of implementing the proposed rule in the first four years after the effective date is approximately $50.6 million. The cost is estimated to drop to $2.9 million per year after that time period, when all regulated facilities will be converted to electronic reporting. However, two years after rule promulgation, annual savings greatly outweigh annual costs, by approximately $29 million per year. EPA anticipates that the proposed rule will save money for states, tribes, and territories, as well as EPA and NPDES permittees, while result-

ing in a more complete, accurate, and nationally-consistent set of data about the NPDES program. By the fifth year of implementation, the anticipated savings for the states is $28.9 million annually; for the permittees, $1.2 million annually; and for EPA, $0.7 million annually." *NPDES Electronic Reporting Proposed Rule* (July 30, 2013), http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OECA-2009-0274-0097.

- *See also* ". . . Ohio EPA launched its electronic discharge monitoring report (eDMR) system and, as of 2011, has achieved a 99% electronic reporting adoption rate by its permit holders. According to Ohio EPA, based on interviews and data collection, their work demonstrates how electronic reporting in this instance produced significant efficiency savings (time and resources) while increasing data quality. In the opinion of Ohio EPA, this has led to more effective human health and environmental protection through improving its ability to monitor and enforce CWA compliance. (Case Study: Ohio Environmental Protection Agency's Electronic Discharge Monitoring Report (eDMR) System Reaches 99% Adoption, http://www.docstoc.com/docs/78099815/Case-Study--Ohio-Environmental-Protection-Agencys-electronic. In the Ohio EPA case study, the authors found that the automated compliance tools within its eDMR system informed permit holders if their discharge amounts exceeded authorized permit limits or were otherwise entered erroneously, and reduced errors from 50,000 to 5,000 per month. Permit holders were often able to quickly correct their data, leaving the Ohio EPA with more accurate and robust data. Simultaneously, as the need for data entry and error checking diminished, Ohio EPA was able to move almost five full-time personnel away from those tasks and into other productive types of work. *Id*." *NPDES Electronic Reporting Proposed Rule*, *supra*.
- "Software developers can take advantage of the market created by electronic reporting to develop e-reporting tools that work better for the user, with no additional cost to the taxpayer." Many people are personally familiar with federal income tax return e-reporting using IRS-approved tax preparation software. See the Internal Revenue Service web page, "How Tax Preparation Software is Approved for Electronic Filing," for further background information, http://www.irs.gov/Tax-Professionals/e-File-Providers-&-Partners/How-Tax-Preparation-Software-is-Approved-for-Electronic-Filing.

Reference 12: "[S]oftware reporting tools that allow self-correction by flagging inconsistent or mathematically impossible entries, as is done by EPA's electronic Greenhouse Gas Reporting Tool (e-GGRT), help to prevent mistakes before they happen, saving everyone time and money." The e-GGRT supports facility and supplier reporting for the EPA Greenhouse Gas Reporting Program. It requires electronic reporting of greenhouse gas (GHG) emissions from large sources and suppliers in the United States. The e-GGRT may be accessed at https://ghgreporting.epa.gov/ghg/login.do. For more information on the Greenhouse Gas Reporting Program generally, see http://www.epa.gov/ghgreporting/.

Reference 13: "Greater accessibility [to e-data] could also drive better compliance performance as facilities learn from each other about what performance is possible." Research has demonstrated similar impacts from public access to Toxics Release Inventory (TRI) data. *See, e.g.,* Fung, A. & O'Rourken, D.; *Reinventing Environmental Regulation From the Grassroots Up: Explaining and Expanding the Success of the Toxics Release Inventory*, 25 Env. Man. 115, 126 (2000): "By encouraging the most advanced firms to develop ever more effective pollution prevention and reduction practices and by pressuring the worst performers to adopt these demonstrated technologies, public policies [like TRI] can effectively deploy the resources of environmental agencies and utilize the energy and wisdom of ordinary people to improve the quality of our air, soil, and water and thereby to create safer communities for all of us." (http://nature.berkeley.edu/orourke/PDF/tri.pdf).

Reference 14: "Electronic reporting is not a one-way street. Once an electronic mode of communication is set up between government and facilities, government can provide specific, relevant information and compliance assistance to industry." To support these outcomes, the FY 2014 President's Budget proposes "investing in the E-Enterprise Initiative to assess and reformulate business processes, transition from paper-based to electronic reporting, and develop an interactive portal for regulatory transactions with States and the business community. This investment will improve the quality of data used for decision-making and allow the Agency and States to regulate and enforce compliance more effectively and efficiently." (http://www.whitehouse.gov/sites/default/files/omb/budget/fy2014/assets/environmental.pdf). And, in addition to promoting e-reporting, E-Enterprise supplements and amplifies the positive impacts of advanced pollution monitoring and increased transparency.

EPA's current Priority Goal under the FY 2011-2015 EPA Strategic Plan is to "increase transparency and reduce burden through E-reporting." In furtherance of this goal, the Agency established a joint EPA/Environmental Council of the States (ECOS) E-Enterprise Working Group to develop recommendations advancing the goals of E-Enterprise for both EPA and ECOS. Since many environmental reports are submitted directly to delegated state agencies, the success of this initiative is dependent upon a shared commitment to the joint pursuit of a vision grounded

on the open and transparent exchange of information and data. *See* http://goals.performance.gov/goal_detail/epa/368/print.

Reference 15: "A 2008 study in Massachusetts found that larger drinking water systems required to mail [Safe Drinking Water Act Consumer Confidence Reports] directly to customers reduced their total violations by 30-44% as a result of this new reporting, and reduced the more severe health violations by 40-57%." The referenced study is L. Bennear & S. Olmstead, *Impacts of the "Right to Know": Information Disclosure and the Violation of Drinking Water Standards*, 56 J. Envt'l Econ. & Mgmt. 117 (2008).

Reference 16: "Using transparency as a way to improve performance is one the most important things we have learned about strategies to increase compliance."

- The mandatory disclosure of information to the public is an increasingly pervasive and important regulatory tool that has become "one of the most striking developments in the last generation of American law." Cass R. Sunstein, *Informational Regulation and Informational Standing: Akins and Beyond*, 147 U. Pa. L. Rev. 613 (1999).
- There is a large and growing body of academic literature on the uses and effectiveness of transparency as a regulatory tool to improve compliance and performance. For an overview of transparency principles, begin with A. Fung, M. Graham, D. Weil, and E. Fagotto, *Transparency Policies: Two Possible Futures*, Harvard Univ. Taubman Center Policy Brief 2007-1, http://www.transparencypolicy.net/assets/two%20possible%20futures.pdf. For more detailed information, see also A. Fung, M. Graham & D. Weil, Full Disclosure: The Perils and Promise of Transparency (Cambridge Univ. Press 2007). The Transparency Policy Project web page is another potentially helpful resource: http://www.transparencypolicy.net/.

Reference 17: "[The Toxics Release Inventory] requirement to report and publish information is credited with a significant drop in emissions." *See, e.g.*, Fung and O'Rourken, *supra*. *See also* Konar S. & Cohen, M., *Does the Market Value Environmental Performance?*, 83(2) Rev. of Econ. & Stats. 281 (2001). This study found a significant positive relationship between the environmental performance and the intangible asset value of publicly traded S&P 500 firms. Firms with worse performance had lower intangible asset values—approximately 9% of the replacement value of the tangible assets—after controlling for other variables known to affect firms' market value. On the other hand, a 10% reduction in toxic chemical emissions resulted in a $34 million increase in value, http://www.people.fas.harvard.edu/~hiscox/KonarCohen.pdf.

Reference 18: "Some companies are using transparency as part of their business model, believing that sharing more information with the public about strong performance provides a competitive edge." *See* U.S. EPA, *The Toxics Release Inventory in Action: Media, Government, Business, Community and Academic Uses of TRI Data* (July 2013), *available at* http://www2.epa.gov/toxics-release-inventory-tri-program/toxics-release-inventory-action-media-government-business.

The referenced Enforcement and Compliance History Online (ECHO) state dashboards, along with state comparative maps, can be referenced from EPA's main ECHO web page at http://www.epa-echo.gov/echo/. EPA delegates much of its Clean Air Act (CAA) authority to state, local, and tribal agencies. To manage the national CAA stationary source compliance monitoring and enforcement program, EPA requires delegated agencies to regularly report data on the type of facilities within their jurisdiction and the activities conducted, such as compliance evaluations, compliance determinations, and enforcement actions. The dashboards provide an easy-to-use summary of activities to answer questions like which facilities are regulated, how many have been evaluated, and how many have alleged violations and have been subject to enforcement. The ECHO State Comparative Maps provide a quick interactive way to review national enforcement and compliance trends and to compare states and territories.

Reference 19: "Releasing an avalanche of data is not the answer. For the public, the key is relevant, user-friendly information, such as easy-to-understand miles per gallon ratings for vehicles. For more expert users, larger sets of more comprehensive data can be valuable, especially if they can be quickly and easily viewed and sorted."

- Disclosed information may be provided in summary form or in more detail. Summary disclosures aim to highlight the information most relevant to users, often in the form of scales or ratings, to increase the likelihood that they will see it, understand it, and act on what they have learned. Summary disclosures typically occur at or near the point in time when the consumers of the information will be making their decisions, e.g., buying products such as cars or major appliances. In contrast, detailed disclosure is more comprehensive. It tends to include data on multiple variables, underlying or supporting data, and/or data extending over long periods of time. This allows viewers to access large data sets in their entirety, analyze them, and release or repackage the data to best suit their interests, audiences, or clients. Both types of disclosure may include taking advantage of emerging technological capacities such as social media and smart phone applications.
- For a discussion of the structuring and uses of both summary and comprehensive disclosure, see Memo-

randum for the Heads of Executive Departments and Agencies—Disclosure and Simplification as Regulatory Tools (Cass R. Sunstein, OMB; June 18, 2010), http://www.whitehouse.gov/sites/default/files/omb/assets/inforeg/disclosure_principles.pdf.

- For a video example of a nongovernmental organization (NGO) that downloaded and re-formatted individual-facility Greenhouse Gas Reporting Program information to inform its members, see http://www.youtube.com/watch?v=5rdSSeomIho. The NGO's description of the video reads, "It just got a whole lot easier for Americans to find out which power plants and industrial sites are releasing the most emissions. The Environmental Protection Agency recently released its greenhouse gas database, and included some great tools for tracking polluters. While it doesn't include any requirements to reduce those emissions, it could be a first step in that direction by simply making clear who is releasing it and how much is being released. After the Toxics Release Inventory was created in the 80s, companies—under pressure from the public—began cutting even before mandatory reductions were phased in." Note that EPA was not involved in the decision or steps to produce this video. Consistent with comprehensive disclosure, the NGO, on its own, analyzed and repackaged publicly available data for its members.

Reference 20: "[T]here is an online tool that allows easy identification of the biggest contributors to water pollution problems (http://cfpub.epa.gov/dmr/)." This tool is the CWA Discharge Monitoring Report (DMR) Pollutant Loading Tool. It is designed to help users determine who is discharging, what pollutants they are discharging, and how much and where they are discharging. The tool calculates pollutant loadings from permit and DMR data from EPA's Integrated Compliance Information System for the National Pollutant Discharge Elimination System (ICIS-NPDES). Data is available presently for the years 2007 through 2011. Pollutant loadings are presented as pounds per year and as toxic-weighted pounds per year to account for variations in toxicity among pollutants. The tool ranks dischargers, industries, and watersheds based on pollutant mass and toxicity, and presents "top ten" lists.

Reference 21: The referenced scoring system to identify drinking water suppliers with the most serious violations and have them face enforcement if not returned to compliance in six months is described more fully in: EPA Memorandum From Cynthia Giles to Regional Administrators, *Drinking Water Enforcement Response Policy* with attachment (Dec. 8, 2009), http://www2.epa.gov/sites/production/files/documents/drinking_water_erp_2009.pdf.