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The Limits of Performance-Based Regulation

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THE LIMITS OF PERFORMANCE-BASED REGULATION

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ABSTRACT

Performance-based regulation is widely heralded as a superior approach to regulation. Rather than specifying the actions regulated entities must take, performance-based regulation instead requires the attainment of outcomes and gives flexibility in how to meet them. Despite nearly universal acclaim for performance-based regulation, the reasons supporting its use remain largely theoretical and conjectural. Owing in part to a lack of a clear conceptual taxonomy, researchers have yet to produce much empirical research documenting the strengths and weaknesses of performance-based regulation. In this Article, I provide a much-needed conceptual framework for understanding and assessing performance-based regulation. After defining performance-based regulation and distinguishing it from other types of regulation, I also show that this kind of regulation can itself take many forms, depending on the specificity of required outcomes, the proximity of these outcomes to the regulatory goal, the way that performance is determined, the underlying basis for required outcomes, the characteristics of the targeted regulated entities, and the allocation of the burden of proving compliance. Variation along these dimensions can ultimately result in widely varying impacts of different regulations, which means that policy-makers cannot assume that every performance-based regulation will work the same.

More importantly, this Article contributes a comprehensive consideration of the dangers of performance-based regulation, illustrating with real-world examples how this form of regulation can work poorly and even create its own problems, especially when performance cannot be adequately defined, measured, or monitored. In highlighting the dangers of performance-based regulation, I do not suggest that it should never be used; instead, I show that regulators must fully take into account

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the performance of performance-based regulation and not be swayed by intuitive claims suggesting this form of regulation is a panacea. Despite its theoretical advantages, performance-based regulation also possesses limitations which must be considered. Decision makers should carefully scrutinize both performance-based regulation and its alternatives, paying close attention to how each alternative will be enforced and seeking to anticipate unintended consequences.

INTRODUCTION

Critics of regulation have long charged that it is too constraining, unreasonable, and costly.[1] These objections ring loudest whenever a regulation rigidly requires every entity it targets to undertake the same action or adopt the same technology, even though for some entities or under some circumstances the required action or technology might be unduly expensive, ineffectual, or even counterproductive. For many regulatory officials and analysts, the better approach is to adopt *performance-based regulation*.[2] This more flexible form of regulation imposes outcome objectives on the targets of regulation rather than dictating exactly what to do. In other words, instead of telling businesses and other regulated entities exactly what actions they must take or technologies they must adopt, performance-based regulation imposes binding performance or outcome targets and leaves it entirely to regulated firms to determine how to achieve those targets.

Performance-based regulation has won acclaim from policymakers and analysts the world over.[3] In the United States, both Republican and Democratic administrations have favored the use of performance standards. President William Clinton, for example, directed regulators in his administration to try to "specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt."[4] Ten years later, President George W. Bush's Office of Information and Regulatory Affairs similarly urged his administration to adopt performance

1. *See, e.g.*, EUGENE BARDACH & ROBERT A. KAGAN, GOING BY THE BOOK: THE PROBLEM OF REGULATORY UNREASONABLENESS (1982); PHILIP K. HOWARD, THE DEATH OF COMMON SENSE: HOW LAW IS SUFFOCATING AMERICA (1994).

2. Cary Coglianese, Jennifer Nash & Todd Olmstead, *Performance-Based Regulation: Prospects and Limitations in Health, Safety, and Environmental Protection*, 55 ADMIN. L. REV. 705, 707 (2003) (noting the "increasing attention" to the use of performance as a basis for regulation).

3. *See, e.g.*, DANIEL J. FIORINO, THE NEW ENVIRONMENTAL REGULATION 199 (2006); CASS R. SUNSTEIN, SIMPLER: THE FUTURE OF GOVERNMENT, 11–12 (2013).

4. Exec. Order No. 12,866, 58 Fed. Reg. 51,735 (Sept. 30, 1993).

standards whenever possible, asserting that they are "generally superior" to other forms of regulation because they "give the regulated parties the flexibility to achieve regulatory objectives in the most cost-effective way."[5] Most recently, President Barack Obama issued an executive order that reaffirmed his predecessors' preferences for regulating via "performance objectives," specifically urging regulatory agencies to consider more opportunities to use these "flexible approaches" to regulation.[6]

In addition to its bipartisan support in the United States, performance-based regulation possesses a fan base that extends throughout the world. The global trading regime operating under the World Trade Organization formally favors the use of performance standards, with Article 2.8 of the Agreement on Technical Barriers to Trade (TBT) stating that, whenever appropriate, countries should craft technical regulations "in terms of performance rather than design or descriptive characteristics."[7] Representatives to the WTO's Committee on TBT "have stressed . . . the advantages of performance-based regulation"[8] and urged that "[w]henever possible, . . . standards should be performance based rather than based on design or descriptive characteristics."[9] Likewise, Canada, Mexico, and the United States have committed, as one of ten "common regulatory principles" in a jointly adopted Regulatory Cooperation Framework, to "[p]romote performance-based regulation" as much as possible.[10] The Organization of Economic Cooperation and Development (OECD) has noted that "[t]he use of performance-based regulation is rapidly developing in OECD countries."[11] Performance-based regulation's flexibility not only promises more cost-effective outcomes, but also a simpler means of achieving the kind of regulatory coordination that can help facilitate international

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5. OFFICE OF INFO. AND REGULATORY AFFAIRS, CIRCULAR A-4: REGULATORY ANALYSIS (Sept. 17, 2003), http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

6. Exec. Order No. 13,563, 76 Fed. Reg. 3821 (Jan. 18, 2011).

7. Agreement on Technical Barriers to Trade, Apr. 15, 1994, 1868 U.N.T.S. 120.

8. WORLD TRADE ORG. COMM. ON TECHNICAL BARRIERS TO TRADE, COMPILATION OF SOURCES ON GOOD REGULATORY PRACTICE, G/TBT/W/341 (Sept. 13, 2011).

9. WORLD TRADE ORG. COMM. ON TECHNICAL BARRIERS TO TRADE, DECISIONS AND RECOMMENDATIONS ADOPTED BY THE WTO COMMITTEE ON TECHNICAL BARRIERS TO TRADE SINCE JANUARY 1, 1995, G/TBT/1/Rev.12 (Jan. 21, 2015).

10. SECURITY AND PROSPERITY PARTNERSHIP OF NORTH AMERICA, COMMON REGULATORY PRINCIPLES 1 (2007), https://www.whitehouse.gov/sites/default/files/omb/oira/irc/SPP-Common-Regulatory-Principles.pdf. Separate recommendations emanating from Canada have also favorably singled out performance standards. *See, e.g.*, EXTERNAL ADVISORY COMMITTEE ON SMART REGULATION, SMART REGULATION: A REGULATORY STRATEGY FOR CANADA 11 (2004), http://publications.gc.ca/collections/Collection/CP22-78-2004E.pdf.

11. ORG. FOR ECON. CO-OPERATION DEV., REGULATORY POLICIES IN OECD COUNTRIES: FROM INTERVENTIONISM TO REGULATORY GOVERNANCE 135 (2002).

trade. As a result, across a wide range of policy domains—occupational health and safety, environment and energy, building and fire protection, nuclear reactor safety, and banking and securities, to name a few—regulators and regulatory analysts around the world advocate for and use performance-based regulatory approaches.

Despite global enthusiasm for performance-based regulation, surprisingly little empirical research exists to show how such regulation has actually worked in practice.[12] Indeed, even though legal and policy scholars have written widely on regulatory instrument choice, the case for performance-based regulation still remains largely theoretical. Admittedly, it does make intuitive sense that regulators would achieve more cost-effective outcomes by mandating outcomes and giving firms flexibility in how to meet them. Yet, global trends in regulatory strategy should be grounded in more than just intuition. Given the enormous stakes for public welfare, regulatory policy decisions should be grounded on a careful consideration of evidence and a full weighing of the advantages and disadvantages of alternatives.[13] Of course, it is easier to identify a need for empirical testing of performance-based regulation than to perform such testing. Sorting out the distinctive positive and negative impacts associated with performance standards, as opposed to other types of regulatory instruments, requires overcoming the difficulties of achieving randomization or applying statistical methods

12. Coglianese, Nash & Olmstead, *supra* note 2, at 708. One exception can be found in several accounts of building code regulations in New Zealand suggesting that the performance-based regulatory approach there contributed to a massive crisis in buildings prone to severe mold and water damage. Peter May, *Performance-Based Regulation and Regulatory Regimes: The Saga of Leaky Buildings*, 25 LAW & POL'Y 381 (2003); Peter Mumford, Enhancing Performance-Based Regulation: Lessons from New Zealand's Building Control System (2010) (unpublished Ph.D. dissertation, Victoria University of Wellington), http://www.victoria.ac.nz/vbs/research-services/documents/PeterMumford.pdf; Derek Gill, *Regulatory Coherence: The Case of New Zealand* 22–34 (ERIA Discussion Paper Series, 2016), http://www.eria.org/ERIA-DP-2016-12.pdf. Another exception is a study of U.S. reformulated gasoline performance standards, which indicates that these regulations failed because they gave refiners too much flexibility. Maximilian Auffhammer & Ryan Kellogg, *Clearing the Air? The Effects of Gasoline Content Regulation on Air Quality*, 101 AM. ECON. REV. 2687 (2011).

13. In his same order affirming a preference for performance standards, President Obama directed that regulatory agencies "must measure, and seek to improve, the actual results of regulatory requirements." Exec. Order No. 13,563, 76 Fed. Reg. 3821 (2011). *See also* Cary Coglianese, *Measuring Regulatory Performance: Evaluating the Impact of Regulation and Regulatory Policy* (Org. for Econ. Co-operation and Dev. Expert Paper No. 1, 2012), http://www.oecd.org/gov/regulatory-policy/1_coglianese%20web.pdf [hereinafter Coglianese, *Measuring Regulatory Performance*]; Michael Greenstone, *Toward a Culture of Persistent Regulatory Experimentation and Evaluation*, *in* NEW PERSPECTIVES ON REGULATION (David Moss & John Cisternino, eds., 2009); Cary Coglianese & Lori Snyder Bennear, *Program Evaluation of Environmental Policies: Toward Evidence-Based Decision Making*, *in* SOCIAL AND BEHAVIORAL SCIENCE RESEARCH PRIORITIES FOR ENVIRONMENTAL DECISION MAKING (National Research Council 2005) [hereinafter Coglianese & Bennear, *Program Evaluation of Environmental Policies*].

to yield valid causal inferences.[14] The empirical researcher must be able to isolate the effect of the instrument type from all other factors that might explain regulatory outcomes.[15]

The development of a solid empirical base for recommending performance-based regulation or any other regulatory strategy depends first on understanding what these strategies are and what they do. The field of regulation sorely lacks a clear and widely accepted conceptual taxonomy of regulatory design, which has impeded research and unfortunately has too often clouded policy judgment. Widespread variation in terminology about regulatory instruments reveals that no system yet exists by which either government officials or researchers can classify regulations by their type—performance-based or otherwise—and thus begin systematically to measure and compare the impacts associated with the selection of different instruments.[16] Further complicating the matter, rules often come in packages, with performance standards combined together with other types of rules to impose several different types of legal obligations on specific industries or economic practices. For researchers to discover how the choice of instrument type affects the benefits and costs of regulation, they must separate out performance-based rules from other types of rules. To progress, what is needed at the outset is a clearer and more widely-accepted definitional and theoretical framework about performance-based regulation.[17]

In this Article, I offer that much-needed conceptual framework as a vital step toward better understanding and assessing performance-based regulation. In order to inform decisions about when a performance-based regulatory strategy should—and should not—be used, I present a clear taxonomical scheme for distinguishing between performance-based instruments and other types of regulation. I also show, importantly, that even when performance-based regulation is properly conceived in a larger framework of regulatory

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14. Coglianese, *Measuring Regulatory Performance, supra* note 13, at 38–43; Ian Ayres, Yair J. Listokin, & Michael Abramowicz, *Randomizing Law*, 159 U. PA. L. REV. 929 (2011).

15. Cary Coglianese, *Administrative Law and Empirical Analysis*, 2002 U. ILL. L. REV. 1111, 1115 (2002).

16. *See, e.g.*, Kenneth Richards, *Framing Environmental Policy Instrument Choice*, 10 DUKE ENVTL. L. & POL'Y F. 221, 284–85 (table A2) (2000) (detailing variation across fifteen sources in terminology used to describe regulatory instruments).

17. Of course, this is not to deny that other obstacles will remain. For example, analyzing longitudinal variation in regulatory standards may be complicated for reasons of path dependence. If a technology standard is followed by a performance standard in the same jurisdiction, firms that have already invested sunk costs in the old (required) technology may well stick with it even if they would never have adopted that technology if a performance standard had been adopted in the first place.

instruments, different performance-based regulatory strategies can vary along a number of key dimensions that can affect their ultimate impact, for good or ill. Drawing on real examples of performance standards, I argue against the prevailing unalloyed enthusiasm for performance-based regulation and show how its principal theoretical advantage—namely, its flexibility—can also turn out in practice to be a major potential weakness. Without denying that performance-based regulation can sometimes be the appropriate choice for regulators, I offer a countervailing, and counterintuitive, account that highlights its potential disadvantages—we might even call them its dangers.

My purpose in highlighting the disadvantages of performance standards is not to deny their potential advantages. Nor is it to suggest that other instrument types are necessarily always better. On the contrary, other regulatory instruments can have their problems too; indeed, sometimes they suffer from some of the same problems as performance standards. My aim is simply to show how performance-based regulation, as with any type of regulation, can work well or poorly under different circumstances. Furthermore, how performance standards are designed and how they are implemented and enforced matters greatly. Rather than continuing to treat performance standards with unbridled enthusiasm based on only intuitive or theoretical assumptions, policy makers and researchers need to take a careful look at how performance standards themselves actually perform. Although I hardly claim here to offer the definitive or categorical assessment of performance-based regulation under all circumstances, I do show that the *performance of* performance-based regulation remains an open but vital empirical question, one whose answer is long overdue.

Most worrisome of all, if researchers and regulators do not take steps to understand more fully how performance-based regulation works in practice, the disadvantages of this regulatory approach in practice could very well come to outweigh its advantages in theory. The recent Volkswagen diesel emissions debacle, for example, shocked regulators around the world, as the car company flouted a performance-based regulatory approach for more than seven years by selling cars that emitted up to forty percent more pollution than allowed under the applicable performance standards.[18] Perhaps a more clear-eyed assessment of the potential dangers associated with performance-based regulation's flexibility would have increased

18. Cary Coglianese, *What Volkswagen Reveals about the Limits of Performance-Based Regulation*, REGBLOG (Oct. 5, 2015), http://www.regblog.org/2015/10/05/coglianese-volkswagen-performance-based-regulation/.

regulatory vigilance. Certainly, as I describe later in this Article, the U.S. Environmental Protection Agency (EPA) should have been on better guard, as it had encountered a very similar failing with its performance standards over diesel truck emissions nearly twenty years earlier. It is precisely because of the risks associated with accepting a "Panglossian" view of performance-based regulation that we need frank recognition of its dangers in order to counteract the prevailing view that tends to treat these standards as inherently superior. Regulators need to see that they must approach the use of performance-based regulation with the same level of care that they would any instrument type—and perhaps, at times, even greater care. As with any form of regulation, if performance-based regulation is not designed and deployed well, it can prove costly, ineffectual, and even dangerous.

I. WHAT IS PERFORMANCE-BASED REGULATION?

As with other terminology in public policy, the phrase "performance-based regulation" must be clearly defined, as it often means different things to different people.[19] In one important respect, all regulation is or should be "performance-based":[20] all regulation is or should be directed at changing the behavior of regulated entities in ways that improve their performance in terms of enhancing social welfare. But such a capacious definition is obviously not very useful. To define performance-based regulation more precisely, we ought to start by distinguishing four main ways that performance can be incorporated into regulation:[21]

1. Performance can be used as a basis for evaluating regulatory programs and agencies (evaluation or management).[22]
2. Performance can constitute a criterion for allocating enforcement and compliance resources (targeting).[23]

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19. Coglianese, Nash & Olmstead, *supra* note 2, at 708–09.

20. *See* Coglianese & Bennear, *Program Evaluation of Environmental Policies*, *supra* note 13, at 249.

21. *See* Coglianese, Nash & Olmstead, *supra* note 2, at 709.

22. *See, e.g.*, Cary Coglianese, *Measuring Regulatory Performance*, *supra* note 13. *See also* EXECUTIVE SESSION ON PUBLIC SECTOR PERFORMANCE MANAGEMENT, GET RESULTS THROUGH PERFORMANCE MANAGEMENT: AN OPEN MEMORANDUM TO GOVERNMENT EXECUTIVES 2–4 (2001), https://www.innovations.harvard.edu/get-results-through-performance-management-open-memorandum-state-and-local-government-executives (encouraging government agencies to use performance to measure agency success).

23. *See, e.g.*, 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, 5 (2014)

3. Performance can trigger the application of differentiated or tiered regulatory standards (tracking).[24]
4. Performance can form the basis for legal or regulatory commands (standards).[25]

Although each of these aspects of regulation can in principle be "performance-based," my focus here is on the last of these—the use of performance as a basis for legal or regulatory commands. A performance-based regulation in this last sense is often referred to as a "performance standard."

A performance standard specifies a required outcome but leaves the means of achieving that outcome to the discretion of the regulated entity. Consider several concrete examples of this general definition from different regulatory contexts:

- The U.S. Consumer Product Safety Commission (CPSC) does not specify how manufacturers must package medicines to make it hard for children to open the packages and poison themselves. Instead, it imposes a performance standard for child-resistant packaging. Packaging manufacturers must test any new designs with a sample of four-year old children who are instructed to open the package. The basic standard is that eighty-five percent of the children must be unable to open the package within five minutes.[26] The CPSC does not tell manufacturers how to construct bottle caps or other child-resistant features of packaging; it just says the packages have to resist opening by the vast majority of children in tests.
- The U.K. Department of Trade and Industry adopted regulations in 1999 designed to address air pollution from a variety of off-road mobile sources, such as tractors, bulldozers, fork-lifts, and other machines. Rather than specifying exactly how engines in these many different types of equipment needed to be built, the Department imposed a set of performance standards. These performance standards were

(describing how EPA, in addition to recognizing Performance Track members, also designated members as low priorities for enforcement).

24. *See, e.g.*, *id.* (explaining that Performance Track members were also subject to reduced regulatory and administrative requirements).

25. *See, e.g.*, NEIL GUNNINGHAM & RICHARD JOHNSTONE, REGULATING WORKPLACE SAFETY: SYSTEMS AND SANCTIONS 23 (1999) ("[A] performance standard is one which specifies the outcome of the . . . improvement but which leaves the concrete measures to achieve this end open for the employer to adapt to varying local circumstances.").

26. 16 C.F.R. § 1700.20 (2015).

stated in terms of "limit values" that a prototype engine needed to meet before the manufacturer could receive a certificate of approval, authorizing the sale of the engines in equipment. To demonstrate that an engine could meet the performance standards, a governmental authority would connect the prototype to an emissions analyzer and run the engine in accordance with a detailed testing protocol. As long as levels of carbon monoxide, hydrocarbon, nitrogen oxides, and particulates did not exceed the limit values, the engine would pass the test and receive the certificate of approval.[27]

- The U.S. National Highway Traffic Safety Administration (NHTSA) operates under a statute that requires vehicle safety standards to "be stated in objective terms," which the agency construes as directing it to issue performance standards.[28] After Congress in 1991 required automobile manufacturers to install air bags in most of their vehicles,[29] NHTSA issued standards for air bags that specified the level of performance air bag systems must meet.[30] Measured using now-famous crash-test dummies, air bag systems are required to protect the dummies from specific levels of force related to injury on test crashes into rigid barriers. NHTSA did not tell auto manufacturers exactly how they needed to design, make, or install their air bags; manufacturers just needed to pass the performance test.
- Buildings in New Zealand must meet the requirements contained in a performance-based building code. As the New Zealand government explains, the code "states how a building must perform in its intended use rather than describing how the building must be designed and constructed."[31] For example, the buildings in which nursing homes or day care centers are housed "shall have provision for maintaining the internal temperature at no less than 16°C measured at 750 mm above floor level, while the space is adequately ventilated." To prevent fires, one of the relevant code provisions

27. The Non-Road Mobile Machinery Regulations, Regulations 1999, SI 1999/1053, art. 2, ¶ 6 (UK).

28. 49 U.S.C. § 30111(a) (2015).

29. 56 Fed. Reg. 26039 (June 6, 1991).

30. 58 Fed. Reg. 46551 (Sept. 2, 1993).

31. *Building Code*, NEW ZEALAND MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT, http://www.dbh.govt.nz/the-building-code (last visited Jan. 1, 2016). For provisions of the code cited in this paragraph, see Building Regulations 1992, sch 1, cls G5.3.1, C2.2, C6.3, http://www.legislation.govt.nz/regulation/public/1992/0150/latest/DLM162576.html.

> requires that the "maximum surface temperature of combustible building materials close to fixed appliances using controlled combustion and other fixed equipment when operating at their design level must not exceed 90°C." Rather than requiring stairways be made of metal, the building code states that they "must be designed and constructed so that they remain stable during and after fire."

Given the widespread use of performance standards around the world, it is not difficult to find many other examples from other jurisdictions and areas of regulatory policy.

These examples make clear how a performance standard stands in contrast to a "means" standard—that is, one which specifies exactly how the regulated entity must act (presumably, in order to achieve a desired level of performance). Means standards are also sometimes known as prescriptive standards, command-and-control regulation, specification standards, design standards, or technology-based standards.[32]

Means standards suffer from several disadvantages. First, for some regulated entities, the mandated means may not prove as effective as other means. Second, for some regulated entities, the mandated means may prove to be more costly than other equally effective means. Finally, by specifying how to act, means standards can inhibit innovation toward better or cheaper ways to achieve the same outcomes. By giving firms flexibility to choose their own means to achieve the desired goals, performance standards theoretically allow firms to select the most effective or lowest-cost options. Performance standards may also place fewer obstacles in the way of innovation as well as the kind of harmonization needed to facilitate international trade.

Performance-based regulation bears certain affinities or relationships to several other regulatory terms or concepts, including:

- *Market-based regulation.* Typically, performance standards require all regulated entities to achieve the same level of

32. At the risk of adding to nomenclature confusion, it bears noting that what some people call "technology-based standards" are actually performance standards that are *based on* what is achievable by existing technologies. *Cf.* Sidney A. Shapiro & Thomas O. McGarity, *Not So Paradoxical: The Rationale for Technology-Based Regulation*, 1991 DUKE L.J. 729 (1991). Furthermore, performance standards are themselves sometimes lumped under the banner of command-and-control regulation when they require a uniform level of performance for all regulated entities, as opposed to allowing different firms to meet different performance levels as under market-based instruments. *See, e.g.*, ROBERT N. STAVINS, A U.S. CAP-AND-TRADE SYSTEM TO ADDRESS GLOBAL CLIMATE CHANGE (2007).

performance. For example, an emission limit in an air pollution control law will mean that all smokestacks must ensure that they emit no more than the level of chemicals specified in the limit. With market-based regulation, however, entities are not required to achieve uniform levels of performance, but instead they may average, trade, or bank performance units.[33] Emissions trading regimes—sometimes called tradable emissions permits or just "cap and trade"—are examples of market-based air pollution control regulation.[34] It is important to understand that market-based regulation is a type of performance standard, but just not one in which each firm must achieve the same level of performance.

- *Self-regulation.* Self-regulation refers to rules that are imposed by a private firm or a trade association on itself or its own members.[35] The term focuses on the identity of the "regulator"—the industry, in the case of self-regulation, as opposed to the government. Self-regulation is flexible in the sense that a firm or an industry trade group gets to choose what the regulation will be. But the nature of the rules adopted by a self-regulator may be, just as with rules adopted by any regulator, either means-based or performance-based.
- *Management-based regulation.* A requirement that regulated entities engage in their own planning and internal rulemaking efforts aimed at the achievement of specific public goals is sometimes considered to be "performance-based," but is more properly called a management-based regulation.[36] Under a management-based regulation, a firm can choose what actions it will take to achieve the public goal motivating the regulation. Such an approach sometimes has been referred to as "enforced self-regulation"[37]—and sometimes,

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33. Robert N. Stavins, *Market-Based Environmental Policies*, *in* PUBLIC POLICIES FOR ENVIRONMENTAL PROTECTION 31–76 (Paul R. Portney & Robert N. Stavins, eds., 2d ed. 2000).

34. Robert N. Stavins, *What Can We Learn from the Grand Policy Experiment? Lessons from SO2 Allowance Trading*, 12 J. ECON. PERSP. 69 (1998); Thomas Tietenberg, *Cap-and-Trade: The Evolution of an Economic Idea*, 39 AGRIC. & RESOURCE ECON. REV. 359 (2010).

35. Cary Coglianese & Evan Mendelson, *Meta-Regulation and Self-Regulation*, *in* THE OXFORD HANDBOOK OF REGULATION 147 (Robert Baldwin, Martin Cave & Martin Lodge, eds., 2010).

36. Cary Coglianese & David Lazer, *Management-Based Regulation: Prescribing Private Management to Achieve Public Goals*, 37 LAW & SOC'Y REV. 691, 692–96 (2003).

37. *See generally* John Braithwaite, *Enforced Self-Regulation: A New Strategy for Corporate Crime Control*, 80 MICH. L. REV. 1466 (1982); *see also* IAN AYRES & JOHN BRAITHWAITE, RESPONSIVE REGULATION: TRANSCENDING THE DEREGULATION DEBATE 101–32 (1992); *and* BRIDGET HUTTER, REGULATION AND RISK: OCCUPATIONAL HEALTH AND SAFETY ON THE RAILWAYS 135–57 (2001).

probably because of the flexibility it affords regulated entities, it even parades under the banner of performance-based regulation.[38] Yet, management-based regulation is in fact a type of means standard, as it requires firms to engage in a variety of specific means related to planning and other management activities. No achievement of a specified level of performance is required under a management-based regulation—and indeed, in many cases regulated entities are not even required to follow their own mandated but internally constructed plans.[39] It is often only the planning itself that is required.

- *Information disclosure*. Information disclosure regulation can require firms to report their levels of performance.[40] But it is actually a type of means standard, as it requires firms engage in very specific activities related to the collection and reporting of information. By itself, information disclosure regulation does not require firms to achieve any specified level of performance.
- *Equivalency clauses or waiver provisions*. Equivalency clauses or waivers may be used to supplement means standards. Under equivalency provisions, firms may choose alternative means that achieve equivalent levels of performance as the mandated means.[41] They might thus be considered a type of "back-door" performance standard. Equivalency clauses or waivers exhibit a key feature of certain performance standards, discussed below. That is, they typically place the burden of proof on the firm to demonstrate that the required performance level has been met. They also often require advance governmental approval.

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38. *See, e.g.*, Safety Management Systems for Part 121 Certificate Holders, 75 Fed. Reg. 68224, 68224–25 (Nov. 5, 2010) (proposing a rule that would require operators "to develop and implement a safety management system (SMS)" which the agency considers to be a "performance-based regulation"); Pipeline Safety: Safety of Gas Transmission and Gathering Pipelines, 81 Fed. Reg. 20722, 20816 (Apr. 8, 2016) (characterizing requirements for the implementation of integrity management systems as a type of "performance-based" regulation).

39. *See generally* SERGE TAYLOR, MAKING BUREAUCRACIES THINK: THE ENVIRONMENTAL IMPACT STATEMENT STRATEGY OF ADMINISTRATIVE REFORM (1984); Lori Snyder Bennear, *Evaluating Management-Based Regulation: A Valuable Tool in the Regulatory Toolbox?*, *in* LEVERAGING THE PRIVATE SECTOR: MANAGEMENT-BASED STRATEGIES FOR IMPROVING ENVIRONMENTAL PERFORMANCE (Cary Coglianese and Jennifer Nash, eds., 2006).

40. *See generally* Paul R. Kleindorfer & Eric W. Orts, *Informational Regulation of Environmental Risks*, 18 RISK ANALYSIS 155 (1998); Cass R. Sunstein, *Informational Regulation and Informational Standing:* Akins *and Beyond*, 147 U. PA. L. REV. 613, 613–15 (1999).

41. Coglianese, Nash, & Olmstead, *supra* note 2, at 713.

- *Codes of practice or guidance*. Somewhat the mirror image of equivalency clauses, codes of practice are non-binding means standards that may be used to supplement performance standards.[42] Under such guidance, firms are given the option to choose to implement the means stated in the code in lieu of meeting the performance standard. Codes of practice are thought to be especially helpful to smaller firms.

It is important to see that not every type of flexible regulatory instrument is performance-based.[43] Management-based regulation and information disclosure give a considerable amount of ultimate discretion to the firm, but they do require the firm to carry out very specific means—either planning or the collection and dissemination of information. By contrast, other flexible approaches, such as market-based regulation and equivalency clauses, provide their flexibility in the same way that performance standards do: by imposing obligations to achieve outcomes without mandating the adoption of any particular means of achieving those outcomes.

II. DIFFERENCES IN PERFORMANCE STANDARDS

Just as there are differences between performance standards and other related regulatory instruments, so too are there vast differences in the types of rules that fall within the category of performance standards. Performance standards can differ along at least six different dimensions.

1. Specificity (loose vs. tight)

Performance standards can be loose, such as in an airworthiness rule requiring civil aircraft to be in an "airworthy condition."[44] Or these standards can be tightly specified, such as with motor vehicle brake standards that require motor vehicles to "[d]ecelerat[e] to a stop from 20 miles per hour at not less than" 20 feet for "vehicles with a seating capacity of 10 persons or less, including driver, and built on a passenger car chassis."[45]

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42. *Id.* at 712.

43. *See generally* Lori Snyder Bennear & Cary Coglianese, *Flexible Environmental Regulation*, *in* THE OXFORD HANDBOOK OF U.S. ENVIRONMENTAL POLICY (Sheldon Kamieniecki & Michael Kraft, eds., 2012) [hereinafter Bennear & Coglianese, *Flexible Environmental Regulation*].

44. 14 C.F.R. § 91.7 (2015).

45. 49 C.F.R. § 393.52 (2015).

Note that both of these standards address the performance of some technology—airplanes or automobile brakes—but neither are technology standards that specify the use of a certain technology. Rather, they define the outcomes the technologies are supposed to achieve, either in loose or tight terms.

Sometimes loosely specified regulation is referred to as principles-based regulation, which articulates general guiding tenets. But since it is possible that some "principles" could speak to means as well as ends,[46] I do not consider principles-based regulation as always or necessarily referring to loose performance standards.

2. Proximity between legal command and regulatory goal (close vs. distant)

Performance standards can have a close or distant connection between the legal command and the regulatory goal. For example, the general duty clause in the United Kingdom's Health and Safety at Work Act of 1974 imposes a binding obligation on any employer to "ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees."[47] Contrast that provision with a U.K. Health and Safety Executive regulation setting a "workplace exposure limit" of two parts per million (ppm) of formaldehyde exposure over an eight-hour period.[48] The regulatory goal in both of these cases is to protect workers' health, a goal that the first rule actually embeds in its command. With the second standard, there are one or more physiological steps between exposure at a level above the limit and any actual health problems a worker might experience. Indeed, it is at least conceivable that some workers exposed to (slightly) impermissible levels of formaldehyde might not suffer any diminution in health whatsoever. But, the second standard is still based on a determination that there is a causal connection between some unacceptably high level of exposure and the public concern motivating the regulation, while the first standard is stated expressly in terms of that public concern.

46. The Clean Air Act includes standards based on "reasonably available" pollution control technology. 42 U.S.C. § 7502(c)(1) (2012).

47. Health and Safety at Work Act 1974, c. 37 § 2 (U.K.).

48. Control of Substances Hazardous to Health Regulations 1994, sch. 1.

3. How performance is determined (measured vs. predicted)

Methods of determining performance can include (a) direct observation of actual outputs or outcomes (on a continuous or periodic basis), (b) testing under conditions similar to actual conditions, or (c) computer simulations based on models of the relationship between inputs and outputs.[49] Often the performance in a regulatory standard can be measured, such as when an environmental regulator monitors manufacturers' compliance with motor vehicle exhaust standards by connecting emissions analyzers by a hose to a vehicle's exhaust and directly measuring the emissions that come out for a specified period of time.[50] Yet, at times, performance cannot be measured at all, but must be predicted or modeled. As Notarianni and Fischbeck note with respect to performance-based fire safety standards for buildings, "direct measurement of the performance of a building is not usually possible" because doing so would require that "full-scale prototypes of the building . . . be built and then burned under various scenarios."[51] In still other circumstances, it may be possible to predict outputs simply by measuring inputs, such as in estimating how much sulfur dioxide will be emitted from a coal-powered plant based on data on the sulfur content of the coal being burned.

4. Basis for the standard (ideal vs. feasible)

Performance standards can vary in terms of the basis or justification of the required level of performance. Sometimes the required level of performance may seek to achieve an "ideal" state, such as when the U.S. Clean Air Act's risk-based national ambient air quality standards are set at levels determined "to protect the public health," "allowing an adequate margin of safety."[52] Other times, rather than basing standards on some ideal level of tolerable risk, performance standards may be set based on what is technologically feasible—in other words, at a level that achieves as many benefits as possible until the costs become unacceptable. An example would be

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49. For an example of direct measurement, *see* EPA, 70 Fed. Reg. 28606 (May 18, 2005) (imposing performance standards for mercury emissions from coal-burning power plants to be satisfied by use of continuous emissions monitoring technology). For examples of the other methods of performance assessment, *see infra* notes 51–52 and accompanying text.

50. *See generally* 40 C.F.R. § 86 et seq. (2015).

51. Kathy Notarianni & Paul S. Fischbeck, *Performance with Uncertainty: A Process for Implementing Performance-Based Fire Regulations*, *in* IMPROVING REGULATION: CASES IN ENVIRONMENT, HEALTH AND SAFETY 234 (Paul S. Fischbeck and R. Scott Farrow, eds., 2001).

52. 42 U.S.C. § 7409(b)(1) (2012).

the Clean Air Act's New Source Performance Standards, set at a level "which reflects the degree of emission limitation achievable through the application of the best system of emission reduction."[53] A still further way to determine the level of a performance standard would be to conduct a benefit-cost analysis to find an economically optimal level. As should be evident, the degree of stringency of a performance standard will generally follow from the basis for the standard. That stringency matters.

5. Unit of regulation (individual vs. aggregate)

A performance standard can be applied to narrow or broad targets. The target—or the unit of regulation—is the entity or physical thing that must meet the required level of performance. For example, the unit of regulation could be at an individual level: each automobile produced by an automobile manufacturer must emit no more than a specified level of pollution.[54] Or the unit can be an aggregation: the average emissions of all the cars in an automobile manufacturers' fleet must meet the specified level of pollution.[55] The total level of pollution could well turn out to be the same under either approach, but the way performance is specified in the regulation can be either individualized or aggregated in some fashion. The EPA's "bubble policy" for stationary sources of air pollution is another example of an aggregated performance standard.[56] This policy allows facilities to average emissions from across all of their point sources, so long as the aggregate level of emissions does not exceed a specified level.

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53. 42 U.S.C. § 7411(a)(1) (2012).

54. *See, e.g.*, 40 C.F.R. § 86.1811-04(c) (2016) (detailing emissions requirements for individual vehicles). The requirements in state inspection and maintenance programs called for under the Clean Air Act demand that existing automobiles meet emissions limits on an individual basis. *See, e.g.,* 67 Pa. Code §§ 177.51, 177.53, 177.204 (detailing emissions requirements for individual vehicles).

55. *See, e.g.*, 40 C.F.R. § 86.1811-4(d) (2016) (detailing fleetwide emissions requirements). Fuel economy standards are another example of a fleetwide performance standard for automobiles. *See generally Corporate Average Fuel Economy (CAFE) Standards,* U.S. DEPARTMENT OF TRANSPORTATION, https://www.transportation.gov/mission/sustainability/corporate-average-fuel-economy-cafe-standards (last visited Jan. 30, 2017).

56. 46 Fed. Reg. 50766 (Oct. 14, 1981); Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, Inc., 467 U.S. 837 (1984) (upholding EPA's bubble policy for stationary sources of pollution). *See generally* THOMAS H. TIETENBERG, EMISSIONS TRADING: AN EXERCISE IN REFORMING POLLUTION POLICY (1985).

6. Burden of proof (regulator vs. regulated)

Finally, performance standards can differ in terms of how they allocate the burden of proof. Sometimes, as with equivalency clauses or waiver provisions, the burden of proof is placed on the regulated entity to show that it has achieved or can achieve the stated level of performance. For example, under fire safety code exemptions, a contractor must demonstrate to the satisfaction of the government that an alternative design or plan will provide an equivalent level of safety.[57] In most contexts, though, it is up to the regulator to prove that the regulated firm has failed to achieve the required level of performance.[58] It is typically the regulator that must demonstrate that a firm emitted pollution over the applicable performance limit or that the bottle caps on a medicine bottle failed to pass the child safety performance test.

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These differences within the general category of performance standards matter for the same reason that it is important to understand variations among regulatory instruments more generally: different types of performance standards create different incentives and costs for firms. The extent to which a given performance standard will in practice allow for innovation and cost-effectiveness will depend on the specific characteristics of the standards under consideration. The more a regulated firm bears the burden of proof, for example, then the more it must spend to demonstrate performance, and less innovation will take place (all other things being equal).

III. PERFORMANCE STANDARDS AND INNOVATION

As noted in a recent WTO committee report, it is often thought that "[p]erformance based regulation is more easily adaptable and *encourages innovation.*"[59] This is a common claim made about performance standards.[60] But what exactly does it mean?

Performance standards provide flexibility that can allow for innovation because a regulated entity may be able to meet the mandated

57. For an example taken from the fire safety standards for federally funded buildings, see 15 U.S.C. § 2227(a) (3) (2011) and 41 C.F.R. § 102.80-105 et seq. (2015).

58. RICHARD J. PIERCE, JR., 2 ADMINISTRATIVE LAW TREATISE § 10.7 (4th ed. 2002).

59. WORLD TRADE ORG. COMM. ON TECHNICAL BARRIERS TO TRADE, *supra* note 8 (emphasis added).

60. *See* ORG. FOR ECON. CO-OPERATION AND DEV., REGULATORY REFORM AND INNOVATION (1997).

outcome in any number of ways.[61] Even if there might only currently exist one way to meet a performance standard, human ingenuity can be applied to identify new ways. Over time, the kind of flexibility built into performance standards may permit regulated entities to find ways to meet the regulation's objectives that are even less costly than any means known at the time the regulation is adopted.

Although the innovation possibilities of performance standards mark one of their chief theoretical advantages, it is important to recognize that performance standards do not by themselves actually *encourage* innovation. That is, there is nothing in the specification of a required end-state that for that reason provides any new incentives for innovation. The incentives for innovation exist outside of the regulation, in the overall competitive business environment that drives regulated firms to look for new, less costly ways to achieve regulatory goals. While performance standards facilitate such innovation, since the regulatory scheme gives firms flexibility, the performance standards alone do not actually drive the innovation.[62]

It is somewhat of a misconception to think that performance standards will induce innovation (as opposed merely to *allow for* innovation). There is also another corollary misconception—that means-based standards lock-in existing technologies and do not allow for innovation. This is not necessarily so, as means-based rules typically contain options for obtaining waivers—and, of course, there is always a background option of amending a means standard to authorize or require a different kind of means. Ultimately, then, the choice between means standards and performance standards is not one between *no innovation* and *robust innovation*. The reality is more complicated.

That reality is still more complicated if the stringency of a standard is taken into account. Until now, I have focused attention on the *form* of performance standards as compared to the form of other types of regulatory instruments, explaining that the flexibility provided by performance standards does not, by itself, provide an incentive for innovation. But *form* is not the same as *stringency*. Depending on their level of stringency, performance standards can

61. W. KIP VISCUSI, RISK BY CHOICE: REGULATING HEALTH AND SAFETY IN THE WORKPLACE 130–31 (1983) ("The central advantage of performance standards is that the firm has the opportunity to select the least costly means of compliance.").

62. STEPHEN BREYER, REGULATION AND ITS REFORM 105 (1984) ("A performance standard *permits* flexibility and change.") (emphasis added).

indeed encourage innovation. If a performance standard is stringent enough that it can only be met through new technologies that are not currently available, firms will be encouraged to innovate (or to abandon their line of business).[63]

A further qualification can arise with types of performance standards that allow for non-uniformity of performance, so-called market-based regulation. This form of performance-based regulation (and only this form) can encourage innovation through its form, entirely separate from stringency.[64] To understand why, recall the example of an emissions permits trading regime, a non-uniform environmental performance-based regulation. A permit-trading regime is performance-based in that the regulated firm must never exceed the level of emissions authorized by the number of permits that it holds. But firms are allowed to buy and sell those permits, so that some firms may have more permits than others. Allowing firms to aggregate emissions by buying and selling permits provides an incentive for innovation, because if a firm can improve its performance it can sell its excess permits in the marketplace.[65]

Outside of stringency and marketability, the degree to which performance standards allow for innovation will vary because innovation is risky and costly for regulated entities. Costs can sometimes be affected by the standard itself. All other things being equal, the more difficult it is for the regulated entity to demonstrate it has met the required level of performance, the less innovation will take place. Key factors affecting the difficulty of demonstrating performance include the *burden of proof* and the *standard of proof*. Must the regulated entity satisfy the burden of proof and demonstrate to the regulator that it meets the performance standard, say, through either (a) regular reporting or (b) preapproval of an innovative approach? Or must the regulator bring an enforcement action and bear the burden of proof? Moreover, what standard of proof (e.g., kind of evidence and level of certainty) is required? How costly is it to operationalize and measure performance? How much uncertainty will the regulator tolerate (e.g., preponderance of evidence versus beyond a reasonable doubt)?

63. Nicholas A. Ashford, Christine Ayers, & Robert F. Stone, *Using Regulation to Change the Market for Innovation*, 9 HARV. ENVTL. L. REV. 419 (1985).

64. Stavins, *supra* note 33, at 33.

65. Adam B. Jaffe & Robert N. Stavins, *Dynamic Incentives of Environmental Regulations: The Effects of Alternative Policy Instruments on Technology Diffusion*, 29 J. ENVTL. ECON. & MGM'T S43, S45–46 (1995).

The answers to questions like these will likely affect, in practice, the resulting level of innovation permitted by performance standards.[66]

To illustrate, contrast the CPSC's standards for child-resistant packaging, described earlier,[67] with the Clark County (Nevada) building commission's performance-based equivalency clause.[68] In the former, if a manufacturer fails to meet the packaging standard, the CPSC must bring an enforcement action and meet its burden of showing that the product package is unsafe. In the case of the Clark County building commission, which oversees building construction in Las Vegas, the burden is on the firm to demonstrate it can achieve a level of performance equivalent to the applicable means standards. When Circus Circus Enterprises proposed a new design for its thirty-story Luxor Hotel and Casino in Las Vegas, the building's unique pyramidal shape and large internal atrium did not comply with the county's existing "prescriptive" code provisions addressing the ventilation of smoke.[69] Circus Circus therefore had to proceed under a performance-based equivalency clause, demonstrating to the county building regulators that the hotel's alternative ventilation systems would provide a level of performance in the event of fire equivalent to a traditional building following the means-based code.[70] The burden of proof was on Circus Circus, and meeting it required the use of extensive computer simulation, third-party testing, and ultimate simulations with theatrical smoke—all with multiple reviews undertaken by county officials.[71]

We can expect that, all things being equal, the closer performance standards are to the Clark County equivalency clause process, the less innovation will take place. I also propose a corollary: all other things being equal, the more responsive the regulator is to making exceptions or changes to means-based regulation, the more innovation can be expected to take place. The key takeaway is that with performance standards, as with means standards, there will be tradeoffs between the level of certainty demanded by the regulator and the degree to which innovation will likely occur. By varying the

66. *See generally* Kathy Notarianni & Paul S. Fischbeck, *Performance with Uncertainty: A Process for Implementing Performance-Based Fire Regulations*, *in* IMPROVING REGULATION: CASES IN ENVIRONMENT, HEALTH AND SAFETY 234–39 (Paul S. Fischbeck & R. Scott Farrow, eds., 2001).

67. 16 C.F.R. § 1700.20, *supra* note 26.

68. Douglas H. Evans, Robert D. Weber & James R. Quiter, *Luxor Hotel and Casino: An Application of Performance-Based Fire Safety Design Methods*, Proceedings of the 1998 Pacific Rim Conference and Second International Conference on Performance-Based Codes and Fire Safety Design Methods (1998).

69. Douglas Evans, *Unique Smoke Management Designs*, FIRE PROTECTION ENGINEERING, Summer 2000, at 9–10.

70. *Id.* at 10.

71. *See id.*

burden and standard of proof, regulators can design performance standards in ways that increase the benefits from certainty in the achievement of the desired outcomes—but doing so can also increase costs to regulated firms and actually inhibit innovation. Not all performance standards will allow for, let alone encourage, much innovation.[72]

IV. WHEN SHOULD GOVERNMENTS CHOOSE PERFORMANCE STANDARDS?

The discussion so far should make clear that performance standards allow for flexibility along two dimensions. The first is *cross-sectional* flexibility, which enables what might be called "fitness," because performance standards allow for differently situated firms to meet the required outcomes in the ways that best fit their own circumstances.[73] With fitness, the question is this: To what degree does one size truly fit all? The second dimension is *longitudinal* flexibility, which I have been just discussing—flexibility over time allows for innovation.

The more heterogeneous a regulated sector, either cross-sectionally or longitudinally, the greater the cost savings that can accrue from allowing firms to choose their own means rather than requiring every firm to adopt identical means.[74] A regulated sector will be cross-sectionally heterogeneous when firms come in different sizes, use different processes or techniques, draw upon different supply chains, face different prices for labor or capital, or exhibit any number of other differences that affect the costs of meeting regulatory objectives. For example, the industry covered by the U.K.'s nonroad mobile machine emissions standards is quite heterogeneous,

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72. A similar analysis could be made of performance standards' oft-claimed advantage in regulatory harmonization and the facilitation of international trade. Means standards can certainly be harmonized to facilitate trade better, if they are made to be identical. With sufficient interest, trading partners can surely reach agreements on compatible or identical means standards. On the other hand, as the discussion in this and the previous section of this Article should make clear, depending on how countries' performance standards are designed, they may afford little meaningful harmonization potential, such as if each requires different but expensive testing protocols or measurement techniques. Performance standards provide no logically inherent advantage in terms of harmonization merely because they take a performance-based form.

73. *See* Coglianese, Nash & Olmstead, *supra* note 2, at 707. *See also* Earl Blumenauer, *Beyond the Backlash: Using Performance-Based Regulations to Produce Results Through Innovation*, 26 J. ENVTL. L. & LITIG. 351, 364–65 (2011).

74. *See* VISCUSI, *supra*, note 61, at 131 ("The greatest gains from this discretion [granted by performance standards] arise from the wide variations in technologies of different vintage and type.").

as the firms making farm tractors are quite different from those that make fork-lifts and construction trucks—and, of course, the products they make are different as well.[75] By contrast, a sector will be heterogeneous longitudinally, if there is a high likelihood that the sector—or its products and processes—will change over time. The financial sector—as with nearly anything today having to do with digital technology—experiences considerable, and often rapid, changes over time.[76]

Although performance standards can result in cost-savings under conditions of heterogeneity, these standards depend on performance being reliably measured in some way, whether through direct measurement, testing, simulation, or modeling.[77] Thus, as I have illustrated elsewhere, the choice between performance standards and means standards requires a careful assessment of both the regulated firms' heterogeneity and the regulator's ability to measure the relevant outputs or outcomes.[78] The resulting Figure 1, below, shows where the three primary approaches to regulation would be best suited. If performance standards are most appropriate under conditions of heterogeneity and when the regulator can assess output well, Figure 1 shows that means standards are appropriate when output assessment is difficult (or costly) and when most of the firms will be the same, both cross-sectionally and over time. When regulated firms are similar and stay that way, one size truly does fit all. Finally, as David Lazer and I have shown elsewhere, management-based regulation fits well in circumstances fitting into the lower-left quadrant of Figure 1, where heterogeneity is high but the regulator's capacity to assess outputs is limited.[79]

While the framework in Figure 1 provides a very rough heuristic for thinking about the choice between performance-based and means-based regulation, it is helpful to consider further the conditions under which these two approaches to regulation may be appropriate. Especially given the almost universal enthusiasm for

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75. *Outline of Non-Road Mobile Machinery (NRMM) Emissions Regulations*, VEHICLE CERTIFICATION AGENCY, http://www.dft.gov.uk/vca/other/non-road-mobile-mach.asp (last visited Jan. 21, 2017).

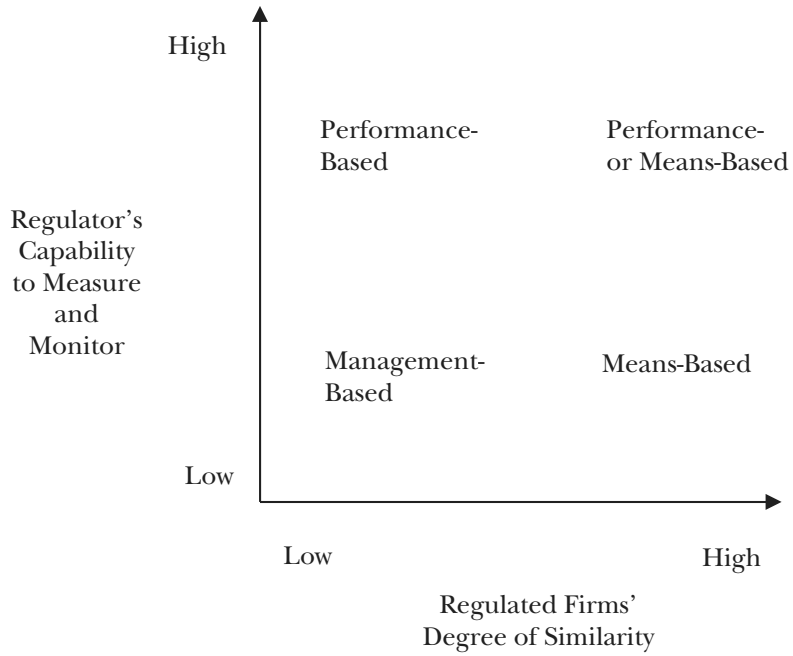
76. Parts of the economy that touch on both the financial sector and information technology will presumably be even more prone to frequent change over time. At least that is the argument eBay has recently made in advancing a case for a performance-based approach to regulation of its PayPal business. *See* PAYPAL & EBAY INC., 21ST CENTURY REGULATION: PUTTING INNOVATION AT THE HEART OF PAYMENTS REGULATION (2013), http://www.ebaymainstreet.com/sites/default/files/PayPal-Payment-Regulations-Booklet_US.pdf.

77. *See* Coglianese, Nash & Olmstead, *supra* note 2, at 715.

78. Cary Coglianese, *Management-Based Regulation: Implications for Public Policy*, *in* RISK AND REGULATORY POLICY: IMPROVING THE GOVERNANCE OF RISK 167–68 (2010).

79. Coglianese & Lazer, *supra* note 36, at 705.

FIGURE 1: CONDITIONS FOR PERFORMANCE-BASED AND OTHER FORMS OF REGULATION



performance-based regulation—with, as already noted, strictures adopted by the last several presidential administrations in the United States seeking effectively to privilege performance standards as a default choice for government regulators[80]—decision makers might do well to ask whether performance-based regulation is indeed usually better. Obviously the answer will depend on the circumstances under which performance standards would be applied, but it is possible to say more by considering how performance and means standards might compare in terms of the demands they place on the regulator.

Since the principal advantage of performance-based regulation lies in the cost-savings afforded by its greater flexibility, let us imagine a decision-making scenario in which benefits are held constant. In other words, imagine that a regulator faces a choice between adopting a means standard and a performance standard, each with identical social benefits because both will achieve equivalent levels of risk reduction or other social improvements. Although in reality such an assumption might rarely hold, for purposes of analysis it is

80. *See, e.g.*, Exec. Order No. 12,866, 58 Fed. Reg. 51,735 (Oct. 4, 1993); OFFICE OF INFO. AND REGULATORY AFFAIRS, *supra* note 5; Exec. Order No. 13,563, 76 Fed. Reg. 3821 (Jan. 18, 2011).

a useful one to make.[81] It allows us to consider the best case for performance-based regulation, namely one where it is more cost-effective, achieving identical societal benefits for lower overall cost to society (especially in the form of compliance costs to firms). Counter-intuitively, even in such circumstances where both types of standards might yield identical societal benefits, it still may sometimes be better for regulators to adopt means standards.

If benefits to society are held constant, the choice between a means standard and a performance standard in any particular regulatory context will turn on their relative costs. Here, it is important to keep in mind two kinds of costs. The first, which I will call "social costs," contains the kind of costs that would typically enter into a conventional benefit-cost analysis: opportunity costs to firms (compliance costs) and any costs of negative side-effects associated with the regulation. The second kind of cost, which typically does not enter directly into the equation of a benefit-cost analysis, is the kind that the government must incur in developing and enforcing the rule. These "governmental costs" or "administrative costs" are typically much smaller than the social costs and social benefits of regulation and therefore it is typically of little consequence if they are not explicitly taken into consideration in a regulatory impact analysis. Moreover, since governmental costs are paid for by taxes, they can in theory be recouped through transfer payments—in other words, they do not represent a real opportunity cost, at least to society overall.[82]

But from the very real standpoint of day-to-day operations, governmental costs do matter. A regulator is constrained, and cannot simply raise taxes to pay for the costs associated with developing and enforcing a new regulation.[83] As a result, two key practical questions arise for a regulator choosing between performance and means standards which would each deliver equal social benefits: (1) How much social cost-saving will a performance standard likely yield? (2) Are the savings in social costs sufficient to justify any additional investment of governmental resources to create and monitor

81. After all, even though real-world policy decisions are rarely as simple as this example, governments are often urged to regulate in the most cost-effective way. *See, e.g.*, Draft Report to Congress on the Costs and Benefits of Federal Regulation, 67 Fed. Reg. 15014, 15,030 15,032-33 (Mar. 28, 2002) (reporting on international efforts to make regulation simpler and less costly).

82. OFFICE OF INFO. AND REGULATORY AFFAIRS, *supra* note 5, at 38.

83. GARY C. BRYNER, BUREAUCRATIC DISCRETION: LAW AND POLICY IN FEDERAL REGULATORY AGENCIES 1 (1987) ("In virtually every case the scope of agency responsibility and authority greatly exceeds the resources provided.").

performance standards? Again, because the social benefits are assumed to be the same, the only tradeoff is between cost-savings to the regulated community (which is what reduces the social costs of performance standards) and the relative differences in administrative costs to the government.

Governmental costs—the transaction costs associated with instrument choice—can turn out to be crucial. After all, in a world with no governmental costs, there would be no difference between means standards and performance standards.[84] The government regulator could create highly specified means standards, so that cross-sectional fitness could be perfectly addressed. Similarly, the regulator could adapt regulations effortlessly in response to innovation and other changing circumstances over time. In a world with no governmental costs, means standards could be seamlessly tailored to fit any different or changing circumstance.

Obviously, we do not live in a world with zero governmental costs. The challenge for regulators is to use their limited resources in a way that maximizes social welfare.[85] Consider a highly stylized example of a choice between two hypothetical standards, one means-based and one performance-based. As illustrated in Table 1, below, both standards would result in the same level of social benefits, but the performance standard would yield these benefits at half the costs, because firms could innovate to find their own lowest-cost means to achieve the desired output. (The numbers in the table are in common units, such as money.) As a result, the "net social benefits" (social benefits minus social costs) of the performance standard would be greater. This is the main reason why policy makers and scholars enthusiastically profess to prefer performance standards.

TABLE 1: A STYLIZED CHOICE BETWEEN A MEANS STANDARD AND A PERFORMANCE STANDARD

	Hypothetical Regulation A (Means Standard)	Hypothetical Regulation B (Performance Standard)
Social Benefits	200	200
Social Costs	100	50
Net Social Benefits	100	150
Governmental Costs	25	50
Overall Net Benefits	75	100

84. Coglianese & Lazer, *supra* note 36, at 703.

85. *See generally* John D. Graham & Paul R. Noe, *Beyond Process Excellence: Enhancing Societal Well-Being, in* ACHIEVING REGULATORY EXCELLENCE 72–87 (Cary Coglianese, ed., 2017).

Yet consider what happens when we add in governmental costs. If the performance standard were to prove more costly to government—say because such a standard would impose greater costs for monitoring compliance in order to achieve the same social benefits—these costs would need to be added to the calculus. Now, if the administrative costs to government were merely treated as an additional kind of social costs, they could be subtracted from the net social benefits, with a resulting final "overall net benefits" (*see* Table 1). If the governmental or administrative costs of regulating are dwarfed by the social costs, as they often are in reality by several orders of magnitude, they will rarely affect the bottom line in any comparison between means standards and performance standards—just as they do not affect the hypothetical bottom line in Table 1. Performance standards still outperform means standards in this illustration.

Yet are performance standards really the preferred regulatory approach in this example? Not necessarily. If the regulator faces a constrained budget and needs to make a choice that yields the most "bang for the buck," it should choose the means standard under the conditions presented in Table 1. Why? For an investment of twenty-five, the regulator yields net social benefits of one hundred with the means standard, a return on investment of four to one. The return on investment for the performance standard is only three to one. To put the point somewhat differently, in the example in Table 1 the regulator could implement two means standards for the price of one performance standard, and doing so would result in thirty-three percent more net social benefits. Of course, this stylized example should not be taken to suggest that means standards will always be preferable; only that they may sometimes be. The key in many cases will be to consider what goes into computing the governmental costs. In other words, what does it take for government to be able to ensure that a performance standard and a means standard can yield comparable social benefits? In terms of governmental costs, there might be two kinds: the cost of crafting a suitable regulatory instrument (rulemaking), and the cost of monitoring and enforcing the rule (implementation).[86] Performance standards may spare the government the cost of finding the one choice that fits all best, but they might sometimes also be more costly to monitor and enforce.

86. *See, e.g.*, Administrative Procedure Act § 3, 5 U.S.C. § 552 (2012). *See also* KRISTIN E. HICKMAN & RICHARD J. PIERCE, JR., FEDERAL ADMINISTRATIVE LAW: CASES AND MATERIALS 3 (2010).

Although each policy decision will require its own analysis, the relevant questions confronting the decision maker will be:

- Is it more costly for government to identify one effective solution and ensure it is being used? (Means standards)
- Or is it more costly for government to establish a way of monitoring the outcomes of many different solutions? (Performance standards)

If there is a known means, one that is already being used effectively by many firms, then the costs of finding a means-based solution should be low. The costs of finding such a solution may also be lower for simple problems than for complex problems. But then again, it may well be easiest of all, whether the problem is simple or complex, to embed the regulatory goal into a performance standard.

But that does not mean it will be easy to ensure that regulated firms actually meet the regulatory goal. When it comes to enforcement costs, performance standards that require "in-use" or continuous monitoring are likely to be more costly than standards that can be enforced by testing samples or perhaps just by making predictions.[87] In some cases, the costs of monitoring the required performance will be prohibitively high, such as with regulation aimed at preventing low-probability catastrophic loss. If a performance standard were simply to say, "Do not construct a building that can burn down quickly," the regulator (and the building's occupants) may not know if the standard has been met until the building catches fire—which will obviously be too late.[88]

In comparing governmental costs to estimated cost-savings from performance standards, it should be remembered that the actual cost-savings to regulated industry will likely vary depending on the way a performance standard is designed. Although performance standards do promise cost-savings, as I explained earlier, different types of performance standards are likely to yield different levels of savings. Assuming equivalent social benefits can be achieved, the savings in social costs from performance standards will generally be higher:

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87. *Cf.* Colin S. Diver, *Regulatory Precision*, *in* MAKING REGULATORY POLICY 222 (Keith Hawkins & John M. Thomas, eds., 1989) ("The larger number of . . . events governed by the rule, the larger the number of times that the agency is called upon to make an authoritative determination.").

88. Coglianese, Nash & Olmstead, *supra* note 2, at 714.

- The closer the performance standard is to the ultimate objective (for this allows the firm more flexibility than if performance is applied to only one causal branch leading to the ultimate objective).
- The easier it is for the firm to demonstrate performance or to be assured it will be found in compliance (for this makes it less costly for the firm to try some new means of meeting the required performance).
- The greater the background incentives that firms have to innovate (for as I have noted, uniform performance standards themselves do not create new incentives to innovate simply because they are performance-based).

In situations where firms have little external incentive to innovate, where it is difficult or costly for firms to be assured that trying new approaches will still meet required performance levels, or where the performance standard is set so far back on a causal chain that it does not afford much real flexibility, the cost differences between performance standards and means standards may be minimal or even nonexistent.

One final comment bears mention when it comes to the relative costs of performance standards versus means standards. It is sometimes said that a hybrid regulatory approach would be best, specifically one that combines performance standards with means-based codes of practice or guidance.[89] Such a hybrid approach gives more sophisticated firms the ability to innovate and adapt, while at the same time it gives clear guidance to those firms that simply want to know "what do I do." Although this may seem like an ideal solution, it is only likely to increase governmental costs. With hybrids, government faces higher costs of analysis and decision making over any alternative—that is, against either a pure means standard or a pure performance standard—since government must both find a recommended means and establish an appropriate performance goal. Since the monitoring costs for pure performance standards are normally thought to be greater than for pure means standards,[90] the hybrid approach will result in monitoring costs for government that are higher than a pure means standard but lower than a pure performance standard. Furthermore, the social—that is, nongovernmental—costs of the hybrid will equal a pure performance standard only if the firms that follow the code of practice

89. *Id.* at 713.

90. *See* BREYER, *supra* note 62, at 105 (noting that performance standards are more difficult to enforce).

are those for which the code represents their lowest-cost strategy. But if some firms follow the code even though it contains, in relation to their particular circumstances, a higher-cost means (for reasons of inertia or convenience), then social costs could be higher than a pure performance standard but lower than a pure means standard (assuming that at least some firms do depart from the code when a lower-cost means is known).

V. THE DANGERS OF PERFORMANCE-BASED REGULATION

Despite the theoretical attractiveness of performance standards, and their endorsement in governmental proclamations around the world, the ultimate value of any performance-based regulation will depend on what it ultimately delivers. While systematic empirical research on performance standards remains to be undertaken, experience with at least some performance standards reveals several unacknowledged or little emphasized limitations of performance-based regulation. It is, of course, possible that performance standards are still "generally superior" to technology or design standards, as stated in the U.S. government's regulatory guidance.[91] But the seemingly unbridled enthusiasm for performance-based regulation by regulatory commentators and officials around the world masks some of its challenges and limitations.

In this final Part of this Article, I offer a corrective account of performance standards, pointing to seven problems that can arise with performance standards. Of course, recognizing more completely performance standards' dangers and limitations is not to counsel against ever using them. The recitation of limitations in this Part of this Article should, though, make policymakers more attentive in the future, so that they no longer act on the basis of generalizations about performance-based regulation that are either too sweeping or too optimistic. Ultimately, the performance of performance-based regulation is an empirical question. As a result, when regulatory officials find themselves considering performance standards, which indeed can be superior in some respects, they also should recognize that performance standards cannot do everything—and they may even at times pose some of their own unique perils.

91. OFFICE OF INFO. AND REGULATORY AFFAIRS, *supra* note 5.

A. Failure to avoid conflict

Although not a danger per se, it is worth noting at the outset that the flexibility afforded by a performance-based approach does not necessarily translate into reduced conflict or litigation over regulation. It has sometimes been suggested that a shift to performance-based regulation would result in less adversarial and more collaborative regulation.[92] But this is not always so. The EPA's experience regulating heavy-duty diesel emissions certainly did not avoid conflict. In 1972, the EPA issued standards that are similar in many respects to the standards the U.K. adopted for mobile machinery. The EPA's standards limited carbon monoxide emissions from heavy-duty diesel truck engines to 40 g/BHP-hr and imposed a combined standard for hydrocarbons and NOx (nitrous oxide) of 16 g/BHP-hr.[93] These emissions standards were expressed as g/BHP-hr—grams of emissions per brake horsepower-hour—to focus on the relationship between the engine's emissions and the amount of work it does, as measured by a dynamometer or friction brake applied to the drive shaft. The regulation required testing emissions following a protocol known as the "steady state" test—running a prototype engine through thirteen separate "modes" (speeds and torques) specified by the EPA and then averaging the resulting emissions captured by a machine analyzer.[94] This was a classic performance standard: the EPA did not specify how engine manufacturers should design and build their engines to meet these tests. It only required that their engines meet the test.

At various times over the years, environmental groups, manufacturers, and government have all resorted to litigation over these EPA performance standards. Environmental groups went to court in 1984 to force the EPA to issue separate NOx emissions standards.[95] Industry groups filed suit to compel the EPA to delay the implementation of the new standards in 1986.[96] And in 1998, the EPA filed an enforcement action against the engine manufacturers and secured the largest settlement (as of that date) in the EPA's history.[97] This case shows that there is nothing inherent in performance-based regulation that can reconcile the different interests at

92. *See* Blumenauer, *supra* note 73, at 364.

93. 37 Fed. Reg. 18262, 18264 (Sept. 8, 1972).

94. *Id.*

95. Natural Res. Def. Council, Inc. v. Ruckelshaus, 21 Env't. Rep. Cas. (BNA) 1953 (D.D.C. Sept. 14, 1984).

96. Natural Res. Def. Council, Inc. v. Thomas, 805 F.2d 410 (D.D.C. 1986).

97. U.S. ENVTL. PROT. AGENCY, DOJ, EPA Announce One Billion Dollar Settlement with Diesel Engine Industry for Clean Air Violations (Oct. 22, 1998), http://yosemite.epa.gov/

stake over regulation nor make organizations avoid pursuing their interests through litigation.

B. Unintended consequences from unrecognized tradeoffs

Tradeoffs are a staple of policymaking, but the implications of such tradeoffs have previously remained unacknowledged in the literature on performance-based regulation. This is unfortunate because if tradeoffs are not clearly identified when setting performance standards, the regulator risks adopting a standard that achieves one goal at the expense of other goals. The histories of the CPSC's child resistant packaging regulation and of NHTSA's air bag regulations are compelling, albeit tragic, examples of how a myopic use of performance standards to achieve one objective can result in significant losses in terms of other important objectives or values.

The CPSC's performance standard helped ensure that drug packaging was hard for children to open—after all, it called for testing to ensure that eighty-five percent of children could not open packaging in five minutes. Yet, packaging that met this standard also proved difficult for many adults to open. Subsequent studies showed that about seventy percent of female and forty percent of male senior citizens could not open child-resistant containers—and that even between twenty-two and sixty-four percent of adults between the ages of eighteen to forty-five experienced difficulties.[98] As a result, frustrated adults took steps to subvert child-resistant designs, such as leaving medicine packages open or transferring pills into containers that were easier to open. A 1989 report found that more than fifty percent of accidental ingestions by young children occurred when adults left pills lying loose or transferred them into other, non-resistant packaging.[99] The CPSC eventually revised its performance standard to include a test both for child-resistance *and*

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opa/admpress.nsf/b1ab9f485b098972852562e7004dc686/93e9e651adeed6b7852566a60069ad2e; Mike Osenga, *Diesel Industry Confronts the Emissions Settlement*, DIESEL PROG. 42 (Dec. 1998).

98. Frederick T. Sherman, Joshua D. Warach & Leslie S. Libow, *Child-Resistant Containers for the Elderly?*, 241 J. AM. MED. ASS'N 1001, 1001 (1979); Philip A. Atkin et al., *Functional Ability of Patients to Manage Medication Packaging: A Survey of Geriatric Patients*, 23 AGE & AGING 113, 115 (1994); Requirements for the Special Packaging of Household Substances, 60 Fed. Reg. 37710, 37720, 37730 (July 21, 1995).

99. Barbara J. Jacobsen et al., *Accidental Ingestions of Oral Prescription Drugs: A Multicenter Survey*, 79 AM. J. PUB. HEALTH 853 (1989).

adult ease of opening[100]—but for more than a decade the performance test essentially overlooked the tradeoff between child resistance and adult access.

A similar "tunnel vision" afflicted NHTSA over its air bag performance standards. NHTSA's prescribed performance test used crash test dummies proportioned to the size of the average-sized adult male.[101] Air bags that met this performance test have, to NHTSA's credit, saved many lives.[102] But tragically, they also led to the development of air bag systems that sometimes harmed, even killed, smaller statured adults and children, even in accidents where these smaller occupants otherwise would have survived.[103] The rapid deployment of airbags creates a force against smaller individuals that leads to head and face injuries—sometimes as severe as decapitations.[104] Over time, NHTSA and the auto industry have worked to see the development of "smart" airbag technologies that now can meet a more multi-faceted performance test.[105] But for many years, the performance standard approach proved harmful for some drivers and passengers due to inadequate attention in initial performance standards to the tradeoffs between protection for average-sized males and the harms to smaller individuals.[106]

C. Regulatory red tape

Regulation is routinely criticized for imposing burdensome, dense requirements that consume page after page of code books.[107] Are performance standards an answer? The EPA's history of developing standards for heavy-duty diesel engine emissions shows that performance-based regulation does not necessarily result in the

100. 16 C.F.R. § 1700.20 (2016).

101. Federal Motor Vehicle Safety Standard; Occupant Crash Protection, 65 Fed. Reg. 28,962, 29,009 (July 17, 1984) (codified at 49 C.F.R. § 571.208). For a narrative account of the evolution of airbag regulations, see Federal Motor Vehicle Safety Standard; Occupant Crash Protection, 65 Fed. Reg. 30,680, 30,740 (May 12, 2000).

102. Donna Glassbrenner, *Estimating the Lives Saved by Safety Belts and Air Bags* (18th Int'l Technical Conference on the Enhanced Safety of Vehicles, Conf. Paper No. 500, 2003).

103. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., NAT'L CTR. FOR STATISTICS & ANALYSIS, COUNTS OF FRONTAL AIR BAG RELATED FATALITIES AND SERIOUSLY INJURED PERSONS (2007).

104. *Id.*

105. *See* 49 C.F.R. §§ 552, 571, 585, 595 (establishing performance testing for dynamic automatic suppression systems rather than merely systems aimed to protect dummies sized as average adult males).

106. Public Citizen, Inc. v. Mineta, 343 F.3d 1158, 1163 (9th Cir. 2003).

107. *See, e.g.*, HOWARD, *supra* note 1. *See also* Patrick McLaughlin, *The Code of Federal Regulations: The Ultimate Longread*, MERCATUS CENTER (April 1, 2015), http://mercatus.org/publication/code-federal-regulations-ultimate-longread-game-thrones-hunger-games.

elimination of governmental red tape. In order to give manufacturers discretion to choose how to reduce NOx emissions, the EPA added layer upon layer of requirements that, over the years, have grown to an extraordinary level of prescriptiveness in how emissions testing must be done.[108] Engine manufacturers now employ teams of engineers to understand and comply with these requirements.[109] Moreover, even when industry experts think they have met the government's tests, the EPA still can threaten to withhold a certificate of conformity and pursue enforcement actions against manufacturers.[110] This is far from a system that fosters simplicity and certainty. Not only are the costs and complexity of these emissions performance standards a burden for industry; they have not proven easy or cheap for government to design. It has taken the agency decades to refine its testing protocols.

D. Limited discretion and flexibility

As noted, the main theoretical advantage of performance standards comes from the flexibility they provide to regulated entities. But as I have explained, the level of discretion that a performance standard provides can vary dramatically. For example, when considering flexibility in reference to the underlying regulatory goal, the closer the binding regulatory standard is to the regulation's ultimate goal, the greater the discretion that the regulated entity will generally enjoy.[111] If the ultimate goal of an environmental regulation is to reduce the health effects from human exposure to ground level ozone, then regulated firms will have more discretion the more closely tied their obligation is to this goal. After all, the health effects of ozone could be reduced by, among other things, alerting citizens to stay indoors on days with high smog levels, reducing pollution from stationary sources, reducing evaporative emissions of volatile organic compounds from automobiles, or reducing tailpipe hydrocarbon or NOx emissions from mobile sources.[112] But even if

108. 66 Fed. Reg. 5002 (Jan. 18, 2001).

109. *See Occupational Outlook Handbook: Mechanical Engineers*, BUREAU OF LABOR STATISTICS (Dec. 17, 2015), http://www.bls.gov/OOH/architecture-and-engineering/mechanical-engineers.htm#tab-6 (noting strong job prospects for mechanical engineers and the demand for design of cleaner technology).

110. 42 U.S.C. §§ 7525(a)(3)(A), 7524(b) (2012).

111. Bennear & Coglianese, *Flexible Environmental Regulation*, *supra* note 43; Coglianese, Nash & Olmstead, *supra* note 2, at 710.

112. EPA, *Ozone Reduction Strategies—Tips to Reduce Ozone—Control Measures*, https://web.archive.org/web/20150216021610/http://www.epa.gov/airquality/ozonestrategy/controlmeasures.html.

all four of these options were equally effective in protecting public health, only one of them will satisfy the regulator's command if the agency tells vehicle manufacturers to control tailpipe emissions—even if they do so using performance standards.

Of course, a performance-based tailpipe standard still allows engine and vehicle manufacturers to consider a range of options that they might not otherwise be allowed to consider if the government selected the precise means to achieve the desired reductions in tailpipe emissions. Options that remain might include the design of engine operating conditions (such as timing, fuel injection, and so forth), changes to fuel, and installation of after-treatment devices. Yet in reality, even all of these options for reducing tailpipe emissions might not be available to the manufacturer. The history of the EPA's heavy-duty diesel emissions regulation indicates that a performance standard is little different than a design or technology standard if only one known or available means will meet the mandated performance level. For example, once the EPA reduced its permissible 2007 NOx limits by nearly ninety percent,[113] engine manufacturers for all practical purposes were forced to adopt after-treatment solutions—that was the only available means that would meet the new performance standard.[114]

F. Potential for fraud or evasive behavior

Over the decades, the implementation of the EPA's heavy-duty diesel emissions standards has been accompanied by the development of a variety of testing protocols: from "steady-state" to multiple versions of "transient" tests to experimentation with limited in-use testing.[115] At each stage, as the EPA tried different protocols to monitor engines' performance, the agency learned that the previous version of its testing did not adequately reflect what the agency sought to measure.[116] It may seem almost a truism to note that performance standards depend on the ability of government agencies to specify, measure, and monitor performance. But it is often not acknowledged how difficult, if not impossible, it

113. 40 C.F.R. § 86.007-11 (2015).

114. *See* Thomas A. Dollmeyer et al., *Meeting the U.S. 2007 Heavy-Duty Diesel Emission Standards—Designing for the Customer*, COM. VEHICLE EMISSIONS UPDATE, 2007.

115. Alan C. Lloyd & Thomas A. Cackette, *Diesel Engines: Environmental Impact and Control*, 51 J. AIR & WASTE MGMT. ASS'N 809 (2001).

116. Cary Coglianese & Jennifer Nash, *The Law of the Test: Performance-Based Regulations and Diesel Emissions Control*, YALE J. ON REG. (forthcoming).

sometimes can be to obtain reliable and appropriate information on performance.

The recent transatlantic scandal over emissions from Volkswagen diesel automobiles has revealed even more starkly the vital role of effective monitoring in a performance-based regulatory scheme. In September 2015, the EPA accused Volkswagen of installing software in what amounted to an estimated eleven million cars with diesel engines that detected when the cars were being tested for nitrogen oxide emissions.[117] According to the EPA, the company's cars met emissions standards in the laboratory or testing station, but during normal operation they emitted nitrogen oxides up to forty times permissible levels.[118] Volkswagen, which subsequently admitted the "misconduct,"[119] apparently evaded regulators in both the United States and in Germany *for seven years.*[120] Although the firm itself bears responsibility for circumventing the regulators' testing, the fact that the firm succeeded in evading attention for so long testifies to the inadequacy of the government's oversight.[121] Tellingly, Volkswagen only succumbed to detection when a small nonprofit group hired a few researchers at West Virginia University to test just three Volkswagen vehicles.[122] It should not have been difficult for regulators to have detected the violations themselves much earlier.

In November 2015, the EPA issued a second notice of violation, alleging that Volkswagen also installed a similar "defeat device" on three-liter engines used in luxury sedans and sport-utility vehicles produced by the company's Volkswagen, Audi, and Porsche

117. Letter from Phillip A. Brooks, EPA Office of Enforcement and Compliance Assurance, to Volkswagen AG, Sept. 18, 2015, https://www.epa.gov/sites/production/files/2015-10/documents/vw-nov-caa-09-18-15.pdf (notice of violation); William Boston & Sarah Sloat, *Volkswagen Emissions Scandal Relates to 11 Million Cars*, WALL ST. J. (Sept. 22, 2015), http://www.wsj.com/articles/volkswagen-emissions-scandal-relates-to-11-million-cars-1442916906.

118. Chris Isidore & Peter Valdes-Dapena, *EPA Accuses VW of Cheating on Emission Rules*, CNN MONEY (Sept. 22, 2015), http://money.cnn.com/2015/09/18/autos/epa-cheating-vw/.

119. *See, e.g.*, Statement by Prof. Dr. Winterkorn, VOLKSWAGEN (Sept. 23, 2015), https://www.volkswagen-media-services.com/en/detailpage/-/detail/Statement-by-Prof-Dr-Winterkorn/view/2721302/7a5bbec13158edd433c6630f5ac445da?p_p_auth=6jhXNw3R.

120. *See, e.g.*, *Notice of Violation*, U.S. ENVTL. PROT. AGENCY (Sept. 18, 2015), http://www.epa.gov/sites/production/files/2015-10/documents/vw-nov-caa-09-18-15.pdf; *Learn About Volkswagen Violations*, U.S. ENVTL. PROT. AGENCY (Jan. 12, 2016), http://www.epa.gov/vw/learn-about-volkswagen-violations.

121. *See generally* David Auerbach, *Volkswagen's Villains*, SLATE.COM (Oct. 1, 2015), http://www.slate.com/articles/technology/bitwise/2015/10/volkswagen_s_emissions_scandal_has_a_villain_and_it_s_the_not_the_people.html.

122. Jeff Plungis & Dana Hull, *VW's Emissions Cheating Found by Curious Clean-Air Group*, BLOOMBERG BUS. (Sept. 19, 2015), http://www.bloomberg.com/news/articles/2015-09-19/volkswagen-emissions-cheating-found-by-curious-clean-air-group.

brands.[123] Volkswagen is now facing fines in the United States of up to eighteen billion dollars in civil penalties under federal statutes.[124] Remarkably, there remains some question whether Volkswagen will ever face any similar penalties in Europe because E.U. regulations state that "the settings of the engine and of the vehicle's controls shall be those prescribed by the *manufacturer*."[125] Regardless of what ultimately happens in Europe, the Volkswagen scandal drives home the importance of testing and monitoring for any effective performance-based regulatory regime. Perhaps if regulators do not hear only unqualifiedly enthusiastic messages in support of performance-based regulation, they might be more vigilant in the future about how they monitor compliance once regulated firms start to take advantage of the flexibility that performance standards offer.[126]

F. "Teaching to the test"

Previously unrecognized in the regulatory context is how performance-based regulation raises a concern similar to a well-known problem in the field of education called "teaching to the test." In education, this problem arises when students only learn strategies to score high on tests, and therefore fail to develop the underlying core skills that the tests are intended to measure.[127] As with students, regulated firms may use the flexibility afforded them under performance-based regulation to find ways to satisfy performance standards but depart from regulators' goals.

In 1980, the EPA established a transient test and required diesel engine manufacturers to pass it.[128] The manufacturers built engines that met the EPA's standards based on the testing protocol that the

123. Chris Ziegler, *Another Volkswagen Diesel Engine Is Cheating Emissions Tests, EPA Claims*, THE VERGE (Nov. 2, 2015, 1:59 PM), http://www.theverge.com/2015/11/2/9659382/volkswagen-diesel-audi-porsche-3-liter-emissions-cheat-defeat-device-epa; Press Release, EPA, California Notify Volkswagen of Additional Clean Air Act Violations (Nov. 2, 2015), https://www.epa.gov/newsreleases/epa-california-notify-volkswagen-additional-clean-air-act-violations.

124. Claudia Assis, *Volkswagen at Risk of $18 Billion EPA Fine*, CBS MARKETWATCH (Sept. 18, 2015, 4:06 PM), http://www.marketwatch.com/story/volkswagen-at-risk-of-18-billion-epa-fine-2015-09-18.

125. Danny Hakim & Claire Barthelemy, *VW's Emissions-Test Trickery May Not Be Illegal in Europe*, N.Y. TIMES (Nov. 11, 2015), http://www.nytimes.com/2015/11/12/business/international/vw-scandal-eu-emissions-tests.html?_r=0.

126. *See generally* Coglianese, *supra* note 18.

127. *See, e.g.*, W. James Popham, *Teaching to the Test?*, 58 EDUC. LEADERSHIP 16, 16 (2001); Linda Crocker, *Teaching for the Test: Validity, Fairness, and Moral Action*, 22 EDUC. MEASUREMENT 5, 5–6 (2003).

128. Standard for Emission of Particulate Regulation for Diesel-Fueled Light-Duty Vehicles and Light-Duty Trucks, 45 Fed. Reg. 14,496 (Mar. 5, 1980).

agency had established. Yet, the government later claimed in a lawsuit that the manufacturers "complied" in a way incompatible with the overarching regulatory goal of reducing NOx emissions.[129] The manufacturers allegedly designed engines that would optimize fuel mix to meet the performance test for the duration of the testing protocol, but when the trucks were in use on the roads the onboard computers would automatically adjust that mix afterwards to optimize engine performance for truck drivers, which diminished the emissions control.[130]

Performance-based regulation gives industry an opportunity to achieve its own goals within the constraints set forth by the regulation. With performance-based regulation, the command "Do not exceed the standard" may well translate to "You can proceed to market your products or operate your facilities however you see fit, just as long as you do not *technically* exceed the standard." Firms seek to meet the standard and still optimize their private interests, for instance by minimizing costs of compliance. There is nothing intrinsically wrong with this logic, but it does create the possibility that firms will find ways to meet regulators' tests that satisfy industry's goals, but not the goals of either the regulator or society.[131]

G. Incorrect proxies and causal factors

Even if performance standards are set based on some precursor to, or proxy for, the ultimate outcome of concern to society, and even if firms fully comply with both their letter and their spirit, the standards may still fail. For example, economists Maximilian Auffhammer and Ryan Kellogg have studied empirically the impact of EPA's performance standards for reformulated gasoline, finding that they failed to result in any demonstrable reductions in ground-level ozone—the problem they were supposed to solve.[132] The federal gasoline standards failed because they gave firms too much flexibility. Performance was defined broadly to include all volatile organic compounds (VOCs), and refiners responded by choosing to reduce butane, a VOC which is cheaper to control but not

129. Bruce Yandle, Andrew P. Morriss & Lea-Rachel Kosnik, *Heavy-Duty Diesel-Engine Litigation*, *in* REGULATION BY LITIGATION (Andrew P. Morriss, Bruce Yandle and Andrew Dorchak, eds., 2009).

130. Coglianese & Nash, *supra* note 116.

131. May, *supra* note 12, at 397.

132. Maximilian Auffhammer & Ryan Kellogg, *Clearing the Air? The Effects of Gasoline Content Regulation on Air Quality*, 101 AMER. ECON. REV. 2687, 2687 (2011).

strongly related to ground-level ozone. California, by contrast, established more narrow standards targeted at specific VOCs that are strongly related to ground-level ozone, and as a result the state standards led to substantial reductions in ozone.[133]

Just as with the federal reformulated gasoline standards, any performance standards can occur if there is a faulty or incomplete causal linkage between the performance specified in the regulation and the desired state of the world. If the performance required is unrelated to the desired outcomes, or if it is too broadly defined so that firms can comply in ways that will have no impact on the desired outcome, then these standards will fail. In addition, problems that performance standards seek to address may still persist if other factors, unaffected by the regulation, contribute to the problem or if the regulation fails to address the root causes of the problem.[134] Of course, this can also be true for means standards[135]—as can some of the other limitations reviewed in this section—but the possibility of poorly conceived and designed performance standards serves as a reminder that their performance-based nature makes them no panacea.

CONCLUSION

In calling attention to these limits and dangers of performance-based regulation, I do not mean to suggest that regulators should never use it. On the contrary, performance standards do hold certain advantages in appropriate circumstances, and they will sometimes be the best regulatory instrument available. But not always. Performance standards depend on the ability of government agencies to specify, measure, and monitor performance, and reliable and appropriate information about performance may sometimes be difficult or impossible to obtain. When crafted or implemented in the wrong way, or under the wrong conditions, performance-based regulation can perform badly (as can any regulatory instrument that is ineffectually deployed). The key question for decision makers is this: Are the problems associated with particular performance standards worse than the problems associated with their alternative technology or design standards?

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133. *Id.* at 2688–89.

134. May, *supra* note 131, at 383.

135. *See, e.g.*, David L. Strayer et al., *A Comparison of the Cell Phone Driver and the Drunk Driver*, 48 HUM. FACTORS 2, 381, 388 (2006) (showing that conversations on hands-free and hand-held devices are equally dangerous to drivers, and casting doubt on legislative efforts to mandate the former for use by drivers seeking to make phone calls).

If governments around the world are to rely more heavily on performance standards, regulators that design and implement them should do so fully aware of both their advantages and limitations. Successful regulation requires that regulators understand their options when choosing among different types of regulation and that they make their choices while fully cognizant of various features even within the same instrument type.[136] Rather than relying on general claims about the superiority of some regulatory types over others, regulators need to analyze carefully the likely consequences of each relevant design choice under the conditions anticipated.[137] They also need to review and reevaluate regulations after they are adopted to ensure that they are working as intended.[138] This is clearly true of performance-based regulation, which unfortunately has at times been implicated in regulatory tragedies that might have been avoided had regulators not focused so single-mindedly on the policy goal motivating the regulation. In the end, it should be clear that effective use of performance-based regulation calls for analytic sophistication: regulators must identify the major contributors to a regulatory problem, understand how these factors relate to each other and cause the problem, and determine which measures and monitoring techniques will effectively ensure compliance. At bottom, good performance-based regulation is no less, and is sometimes more, demanding of regulators than any other form of regulation.

136. *See generally* CARY COGLIANESE, PENN PROGRAM ON REG., LISTENING, LEARNING, AND LEADING: A FRAMEWORK FOR REGULATORY EXCELLENCE (2015), https://www.law.upenn.edu/live/files/4946-pprfinalconvenersreportpdf.

137. Dame Deidre Hutton, DBE, Chair, U.K. Civ. Aviation Authority, Keynote Address at the University of Pennsylvania Law School, Penn Program on Regulation International Dialogue on Defining and Measuring Regulatory Excellence (Mar. 19, 2015), https://www.law.upenn.edu/live/files/4727-hutton-keynote-address-penn-law-2015pdf.

138. Coglianese, *Measuring Regulatory Performance, supra* note 13.