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## **Performance-Based Regulation**

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# Performance-Based Regulation

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**Abstract:** Performance-based regulation has been adopted throughout the world for many regulatory sectors as a means for overcoming the restrictions of prescriptive approaches to regulation. The performance-based approach focuses regulatory attention on the achievement of regulatory objectives rather than carrying out prescribed actions. The ability of regulated entities to choose how to achieve those results provides greater flexibility and opens up possibilities for more cost-effective compliance solutions. Implementation of performance-based regulation requires meaningful performance standards, an ability to gauge adherence to them, and new skill sets for regulatory enforcement agencies. Given variation in regulatory comprehensiveness and different methods for implementation, there is a large array of potential performance-based regulatory regimes. Most of the criticisms that have been raised about the performance-based approach revolve around the uncertainties that are fostered by vague performance goals or standards, and the inability to adequately quantify or otherwise measure performance. Accountability issues loom greatly given the reliance of performance-based regimes on professional judgment and the exercise of professional responsibility. When such expertise is inadequate, as was the case in New Zealand's performance-based building safety regime, shortfalls in regulatory performance arise. Performance-based approaches should be embraced as one of the key elements of the regulatory toolkit. They hold much promise and provide a wide array of possibilities for innovative regulatory regimes when paired with the appropriate combination of prescriptive, systems-based, and risk-based regulatory provisions.

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## Performance-Based Regulation

Performance-based regulation is predicated on the notions that regulation should focus on achievement of regulatory objectives and leave it to regulated entities to determine how best to achieve them. In emphasizing objectives, the performance-based approach differs from other regulatory approaches that are based on specification of technologies (technology-based regulation), processes (systems-based regulation), or prescribed means (prescriptive regulation). The performance-based approach has been widely adopted throughout the world to regulate air and water quality, building and fire safety, consumer product safety, food safety, forest practices, nuclear power plant safety, pipeline safety, public health, transportation safety, energy utilization, and worker safety (see Deighton-Smith 2008, Organization for Economic Co-operation and Development 2002).

Any depiction of performance-based regulation is complicated by the fact that the concept can be and has been applied in a variety of ways and with different degrees of regulatory comprehensiveness. As discussed by Coglianese, Nash and Olmstead (2003), performance-based regulations differ with respect to the generality of the performance objective, the extent to which performance is quantified, and the mechanisms for monitoring or predicting performance. Regardless of the form it takes, performance-based regulation cannot be considered as separate from the broader regulatory system. Like other forms of regulation, performance-based regulation requires the setting of standards for compliance, establishing a monitoring and enforcement system, and applying sanctions when violations are detected. Given the variation in regulatory comprehensiveness and different methods for carrying out the implementation tasks, there is a large array of potential performance-based regulatory regimes.

A variety of claims have been made about the benefits of the performance-based approach, though few of these have been substantiated (see Coglianese, Nash and Olmstead 2003, Office of Technology Assessment 1995). The performance-based approach is appealing because it holds the prospects for increased flexibility in how regulated entities meet regulatory objectives. This, in turn, may promote more cost-effective and innovative solutions. Because particular methods or technologies are not prescribed, performance-based approaches provide a more level playing field in the choice of products or technologies. This means particular suppliers or producers are not favored over others.

Performance-based regulatory regimes alter key regulatory responsibilities. Regulated entities take the lead in determining compliance whereas traditionally regulatory enforcement personnel perform this function. This reversal of regulatory roles changes the required skills of regulatory enforcers from that of inspecting specific items to that of certifying performance. This also raises fundamental issues concerning regulatory accountability. Holding officials accountable for their actions is a key tenet of democratic governance (more generally see Behn 2001, Gormley and Balla 2004). At issue is how that accountability in performance-based regulatory regimes is achieved when non-governmental actors assume important roles that are normally undertaken by public officials.

This paper discusses various aspects of performance-based regulation. The variety of different forms of the approach is first discussed. This draws attention to variation in the degree of specificity of performance goals and the creation of hybrid regulatory regimes that blend performance-based and other forms of regulation. The subsequent review of experience with various forms of performance-based regulatory regimes suggests some of the potential pitfalls and issues involved in implementing this form of regulation. The conclusions consider the future prospects for performance-based regulation.

### **Varieties of performance-based regulation**

The variety of forms of performance-based regulation is a function of two sets of considerations. One is the different degrees of regulatory comprehensiveness and associated variation in specificity of regulatory performance. The second is brought about by the blending of performance-based approaches with combinations of traditional prescriptive regulation, systems-based approaches, and risk-based approaches. These are considered here with respect to variation in performance provisions and in regulatory mixes.

### **Variation in performance provisions**

Expectations regarding performance enter at multiple stages in performance-based regulatory regimes. The broadest level consists of statements about desired outcomes that constitute the goals to be achieved. Next is the characterization of desired levels of achievement of those goals that constitute acceptable performance—performance standards. Finally, there is the assessment of actual or expected performance—performance assessment. Each of these can differ in level of specificity and quantification.

Statements of outcomes provide the goals or intent of a regulation as would normally be specified in legislation or the regulation itself. These can be stated with varying degrees of comprehensiveness in referring to either a broad or narrow spatial

distribution (e.g., the scale of a given air quality attainment area), a system as a whole or parts of it (e.g., a building or building component), or a broad or narrower target group (e.g., all workers or particular classes of workers). There can be a single goal such as avoiding adverse health impacts. Or, there can be multiple goals of protecting life and property from harm. Each of the performance goals can be stated with differing levels of specificity.

The characterization of desired level of achievement is the standard against which compliance is gauged. Identifying relevant measures of performance and standards for desired levels of performance are much more difficult than stating performance objectives (see Gormley 2000). Numerous examples exist of the difficulties of translating vague performance objectives for regulations into meaningful standards. One example, which perhaps is the first quantitative performance standard in the United States, is the creation in 1914 of a voluntary federal drinking water quality standard that specified maximum coliform bacteria levels for municipal water supplies (see Gurian and Tarr 2001). As was the case for the original drinking water quality standard, the establishment of desired performance standards has engendered controversy within a variety of regulatory arenas in the United States. Marc Landy and his colleagues (1999, pp. 49-88; also see Powell 1999, pp. 267-284) discuss the difficulties in 1979 of revising the ozone standard to meet the legislative requirement under the Clean Air Act of protecting the public health with an adequate margin of safety. At issue were what constituted public health and relevant “sensitive populations,” what constituted an adequate margin of safety, and how any particular standard could be defended against likely legal challenges.

Standards can be expressed in quantitative or qualitative terms. The ozone standard illustrates use of a quantitative measure in that it specifies exposure levels for particular duration of time at particular measurement sites. The establishment of the standard engendered debate over the relevant metric for measuring exposure, the level at which exposure is harmful to health, and the duration of that exposure that would be harmful allowing for the legislatively mandated margin of safety. An example of a qualitative expression of a standard is the International Code Council’s performance-based fire-safety objective. The objective of preventing unwanted ignition by building equipment and systems is one of several performance requirements for which relevant equipment “shall be installed so that they will not become a source of ignition” (provision 601.3.2, International Code Council 2001, p. 21). This can be contrasted with prescriptive-code fire-safety provisions that specify particular shielding requirements, distances from walls, and so on.

A third set of considerations for performance-based regulations is the way that performance is assessed. The basic distinction is whether performance can be directly observed and measured, or whether it requires other forms of assessment. Direct observation requires actual measurement of performance to gauge adherence to a given performance standard. This is common practice for assessing potential contamination of drinking water, air quality emissions, and water quality effluents. For many instances it is not possible to undertake direct assessment of outcomes since they are unobservable harms to be prevented. For example, the safety of a nuclear power plant cannot be directly observed nor can the safety of a building with respect to earthquakes, fire, or other potential harms.

When performance cannot be observed, it must be predicted. One approach involves probabilistic risk assessment analysis as has been applied in the nuclear power industry. This entails tests or assessments of elements of the facility with particular attention to those elements that are most critical. Another approach is the use of computer models to simulate the performance of the system for varied situations. This requires an understanding of the performance characteristics of the system in question. The obvious issues for any prediction are the uncertainty associated with the prediction and the validity of the prediction method.

The fire-related life losses for the World Trade Towers after the terrorist attacks on 11 September 2001 underscore the lack of reliable methods for predicting the performance of fire protective systems as part of performance-based fire safety regulations. Although there are a number of computer programs for modeling the ignition and spread of fire and guidelines have been produced by the American Society of Fire Protection Engineers for carrying out such evaluations, much of the commentary in technical forums about predictive modeling underscores the difficulties and inherent limits. The prediction difficulties in part stem from the complexity of potential ignition sources, spread, and other physical and engineering factors. One complicating factor, particularly evident in the World Trade Towers 9/11 experience, is the unpredictability of human behavior in responding to fires.

### **An example: Building safety regulation**

One of the widest applications of the use of the performance-based approach across the world is the regulation of the safety of buildings. The primary emphasis of building regulation is protecting the health and safety of building occupants. This is typically accomplished through regulatory controls concerning the design and construction of buildings with respect to fire safety, structural integrity, energy use, heating and ventilation, and so on (see Meacham et al.

2005). Until the past decade, the regulation of building safety has developed throughout the world as one of the more rule-bound and prescriptive aspects of protective regulation.

Under the prescriptive approach, the typical prescriptive building code provision addresses requirements for a component (i.e., a wall, partition, or floor) in specifying required practice (i.e., nailing pattern, bolting or bracing), materials, or both. The complexity of prescriptive building codes has exacerbated code enforcement in that building inspectors cannot possibly enforce all provisions. As a consequence, inspectors must choose the provisions that they deem the most important to enforce. Inevitably this has led to inconsistencies in enforcement practices among jurisdictions and among inspectors that frustrate contractors (see May and Wood 2003). The cumbersome nature of the code provisions and their enforcement has been widely criticized within the building industry. Critics argue that the overly prescriptive and redundant code provisions add to the costs of construction and limit innovation in development of new building practices.

The use of performance-based codes is appealing because it provides greater flexibility in regulating the safety of non-traditional and older structures. Prescriptive fire and building codes are difficult to apply in these circumstances. Prescriptive code provisions are poorly suited for construction involving the use of exotic materials or for buildings that have odd configurations. Consider, for example, the pyramid shaped Luxor Hotel in Las Vegas that employed a non-traditional configuration and was built with non-standard building materials. Prescriptive seismic provisions of building codes are difficult to apply to the rehabilitation of buildings that were constructed prior to the advent of modern seismic codes. Performance-based codes are appealing for these circumstances because they provide an alternative framework for determining compliance with fire and building safety provisions.

Recognizing the deficiencies of the prescriptive approach and the increasing complexities of code provisions, a trickle of efforts that began in the 1970s and gathered momentum in a variety of forums since then has led to a rethinking of the philosophy of building and fire codes in the United States and a number of other countries. As discussed by Brian Meacham and his colleagues (2005), the basic framework in most countries employing this approach consists of a set of statements about goals, delineation of what this means in terms of “functional performance” for different types of structures, delineation of criteria for assessing performance (performance standards), and methods for verifying compliance with those standards. Compliance is gauged in terms of the degree to which a given structure adheres to the overall performance objectives as determined by compliance with the relevant

performance standards. This is far different than the traditional, prescriptive approach that gauges compliance in terms of use of prescribed materials and construction methods.

### **Variation in regulatory mixes**

Aspects of prescriptive, process-based, and risk-based approaches have been incorporated as part of performance-based approaches to create hybrid performance-based regulatory regimes. The process-based overlay focuses attention on aspects of production or management systems (see Coglianese and Lazer 2003). The risk-based overlay draws attention to those aspects of performance that relate to the greatest risks (see Black and Baldwin 2010). As with any performance-based approach, the main emphasis of the hybrid approaches is regulating for results. But, the compliance determinations and nature of the rules and standards differ in allowing or mandating alternative mechanisms. Table 1 summarizes the key elements of prescriptive-based regulatory regimes, performance-based regulatory regimes, and hybrid provisions that have been applied to performance-based regulatory regimes. The latter are discussed in what follows.

**Table 1. Variation in Performance-Based Regulatory Regimes**

<b>Regulatory Regimes</b>			
	<b>Prescriptive Regulation</b>	<b>Performance-Based Regulation</b>	<b>Hybrid Regulatory Provisions</b>
<b>Regulatory foci</b>	Prescribed actions	Objectives or outcomes	Mixed foci – aspects of actions, processes, and outcomes
<b>Compliance determination</b>	Adherence to prescribed actions	Achievement of desired results	<ul style="list-style-type: none"> <li>• “Deemed to comply” alternative provisions</li> <li>• Performance of production systems</li> <li>• Performance in reducing risks</li> </ul>
<b>Nature of rules and standards</b>	Particularistic and detailed specifications	Goal-oriented outcome specifications	<ul style="list-style-type: none"> <li>• Delineation of “acceptable alternatives” or “codes of practice”</li> <li>• Performance standards for production systems</li> <li>• Risk-based priorities for standard setting and</li> </ul>

Prescriptive provisions often serve as a backstop to the performance-related provisions. These help address situations that are relatively simple to assess and for which the conduct of a performance assessment would be inappropriate or overly expensive. Thus, for example, most performance-based building codes contain “deemed to comply” provisions that specify that use of a given material or following a particular approach meets the performance standard (see Meacham et al. 2005, Deighton-Smith 2008). Codes of practice, which have been employed in a number of countries, provide a similar “acceptable alternative” approach to performance-based approaches for such tasks as the regulation of worker health and safety (see Gunningham and Johnstone 1999, pp. 27-28).

Performance-based regulation has also been used in conjunction with process-based regulation, which is also known as system-based regulation and management-based regulation. Adherents of the system-based approach argue regulatory goals can be achieved by instituting the appropriate systems for monitoring production processes by firms rather than attempting to evaluate the outputs or outcomes of those processes (see Coglianese and Lazer 2003). The overall logic of this approach is prescriptive regulation falls short because the production systems of firms are too complicated to be able to effectively prescribe regulatory fixes. Combining performance-based and processed-based regulatory provisions leads to a hybrid regulatory regime that entails monitoring both the adequacy of production processes and the outputs of those processes.

An example of this is the Hazard Analysis and Critical Control Point (HACCP) approach to regulating meat and poultry safety in the United States as has been adopted in a number of other countries. Meat and poultry processors are required to identify potential sources of contamination within processing plants, to monitor those critical control points, to institute additional controls that are aimed at preventing contamination, and to test for the presence of *E. coli* and of *Salmonella* (see Coglianese and Lazer 2003). The process-based regulatory philosophy is evident in requiring firms to identify potential food-safety hazards and critical control points in meat and poultry production and processing. The performance-based approach is evident with the establishment by the firm of critical limits of a hazard for each critical control point and the requirements for testing for the presence of specified bacteria.

A different combination of regulatory approaches is the matching of performance-based and risk-based regulation as has been undertaken by the U.S. Nuclear Regulatory Commission in regulating the safety of nuclear power plants. The risk-informed approach is in essence a systems-based regulatory approach that also includes performance outcomes. It evolved from the efforts to develop and employ probability-based risk analyses in setting standards and evaluating nuclear power plant performance (see Golay 2000). The risk-informed approach shifts the emphasis from detailed inspections of nuclear power plants to greater emphasis on establishing adequate safety systems by nuclear power plant operators as overseen by Nuclear Regulatory Commission inspectors. A similar approach has been used in the United States for the regulation of aspects of chemical plant safety (see Chinander, Dleindorfer and Kunreuther 1998). More generally, Black and Baldwin (2010) discuss how “really responsive risk-based regulation” can be employed in selecting performance objectives, in specifying performance standards, and in choosing enforcement targets.

Each of the hybrid performance-based regulatory regimes highlights different aspects of risk, processes, and outcomes. Regardless of the specific form that a hybrid regime takes, the issues surrounding specification of desired performance and assessment of it loom greatly.

### **Experiences with performance-based regulation**

Despite the variety of ways that performance-based approaches have been incorporated into different regulatory provisions around the world, there have been limited systematic efforts to assess the approach. In summarizing the results of a workshop convened in 2002 of regulators from various federal agencies in the United States, Coglianese, Nash and Olmstead observe: “Participants noted a general absence of empirical studies evaluating the effectiveness of performance-based standards, let alone systematic work showing when, where, and how well performance-based standards work in various regulatory settings” (2003, p. 714). In reviewing a range of performance- and process-based regulatory regimes, Deighton-Smith (2008) suggests that the lack of critical assessment has led to indiscriminate adoption of these regulatory approaches.

### **Leaky buildings and performance-based regulation**

New Zealand’s performance-based regulation of building safety that was introduced in 1992 is instructive since it is one of the more extensive efforts to apply the performance-based approach. The experience with the New Zealand regime was not positive. A major crisis in

building quality that became known as “the leaky building” crisis was exacerbated by the change from a prescriptive to a performance-based regime. As documented by May (2003), the lack of accountability of key players was a key factor in undermining the effectiveness of the performance-based regulatory regime.

New Zealand’s *Building Act of 1991* provided broad objectives of protecting people, their health and safety, and the environment with more detailed sub-objectives that identified desirable building performance. These and other provisions embraced the New Right’s faith in the market and limited governmental intervention that were themes of a variety of reforms in New Zealand at the time. Consistent with the philosophy of reducing the dependency of citizens on the state, the Act introduced a strong dose of “buyer beware” provisions in requiring owners to acknowledge the presence of buildings in sites that may be vulnerable to natural hazards, in putting the responsibility of choosing those who certify compliance onto owners, and in not providing owners specific legal protections for building deficiencies. Market-like mechanisms were introduced by encouraging innovation in development of building materials and by allowing certification of compliance with desired building performance characteristics to be undertaken either by private inspectors or by local authorities.

As the *New Zealand Herald* labeled the problem in a series of two dozen articles appearing in 2002 and 2003, the “leaky building crisis” was not the typical story of shoddy construction or localized failures in building inspection that move the mundane aspects of building regulation into the public consciousness. The problems were pervasive and eventually fostered a crisis for many homebuyers, the central government, and the building industry. Beginning in the mid 1990s, condominiums and homes built with a particular type of exterior cladding revealed evidence of moisture entering into the membrane of a structure that led to cracking and, in some cases, eventual partial or total collapse of a building. Various investigations and media coverage suggest up to 20,000 homes and hundreds of multi-unit buildings were affected, many of which had to be abandoned as uninhabitable. A number of major construction firms were forced into receivership because of the anticipated costs of repairing damage to structures they built. The insurance market for professionals who certify building compliance dried up, leading to an implosion of private firms who performed this function including the second largest firm in Auckland. Numerous lawsuits were brought against builders and local councils by owners of damaged buildings, many of which still have not been resolved.

Shortfalls at each of three levels of accountability entered into the New Zealand “leaky building” case. One is a shortfall in legal accountability resulting from the specification of goals for which the goal of “durability of structures” was insufficiently precise (New Zealand Building Industry Authority, ‘Hunn Report’ 2002). This led to inconsistencies in interpretation of the provisions by local building authorities especially as they applied to new building materials that were the source of many of the leaks when improperly applied.

A second shortfall was a lapse in bureaucratic accountability that resulted from lessening reliance on the bureaucratic controls as a means for ensuring adequate construction of buildings. Indeed, the 1991 Act did not require inspections of building during construction although local governments could require them. Among other considerations, one of the major reviews highlighted how the new regime resulted in changes in responsibilities “with clarity of lines of responsibility now blurred” with respect to who is providing assurance to the public (New Zealand Building Industry Authority, ‘Hunn Report’ 2002, p. 38). The report specifically draws a contrast with clearer lines of responsibility and accountability under the previous regime. Not surprisingly, the *2004 Building Act* revisions tightened bureaucratic accountability with emphasis on greater specification of performance standards, stronger monitoring of building inspection practices, and tighter licensing provisions for professionals who certify building compliance.

The shortfall in bureaucratic oversight would not have been as problematic if builders and those who certify compliance with codes were fulfilling their professional obligations. Lapses in professional accountability—as fostered by professional associations, licensing boards, or peer reputations—provided a third source of accountability shortfalls. Reviews of the crisis highlighted the lack of licensing requirements for builders that exacerbated the weaknesses in regulatory oversight. The use of third-party inspectors for compliance with building provisions was particularly problematic as subsequent findings suggested they were not well trained or adequately certified by the Building Industry Authority.

### **Performance-based regulation and accountability**

Ensuring accountability is a fundamental issue for any form of regulation. The relevant foci are the mechanisms for guaranteeing that the responsibilities of various players, including regulated entities, are adequately carried out (see Behn 2001, Scott 2000). The accountability bases, limits, and biases differ among regulatory approaches. These are summarized in Table 2 for prescriptive and performance-based regulation. The latter accountability considerations

are of particular concern since, as illustrated by New Zealand's "leaky building" crisis, accountability can be the Achilles' heel of performance-based regulation.

**Table 2. Accountability Considerations**

		Form of Regulation			
Considerations		Prescriptive Regulation		Performance-based Regulation	
Primary basis for accountability		Monitoring adherence to prescribed rules		Monitoring adherence to performance goals	
Limits		Numerous rules that cannot all be enforced		Inability to observe or predict results	
Biases		Adherence to easily observable items		Reliance on experts and professional judgment	
Potential negative consequences		Haphazard and misplaced enforcement		Misjudged quality of regulatory performance	

Prescriptive-based regulatory regimes attempt to achieve accountability by mandating adherence to prescribed rules. The sheer number of rules that often exist serves as a limiting factor given that no inspector can ensure adherence with all of the rules. Instead, inspectors are typically biased towards monitoring adherence to rules for which compliance is easy to observe. As a consequence, accountability under such systems can be haphazard and misplaced with little attention to the end result (see Bardach and Kagan 1982, Sparrow 2000).

Performance-based approaches seek accountability for results. As discussed in this paper, determining compliance is difficult when regulatory outcomes cannot easily be observed or predicted. In such circumstances, much of the compliance determination rests on professional judgment (e.g., in modeling results or interpreting performance predictions) and the skills of experts who are knowledgeable about the subject. But, herein lies the rub. There is typically little basis for gauging the professional judgments or assessing the conclusions of experts. When such expertise is inadequate, as was the case in New Zealand's performance-

based building safety regime, shortfalls in regulatory performance arise. As observed by May (2003), the case of performance-based regulation of buildings in New Zealand illustrates a leaky regulatory regime. The regime allowed for flexibility without adequate accountability. The problems were systemic caused by a regulatory regime that placed too much faith on self-correction of the market place as a means of control and too little emphasis on accountability for results.

## **Conclusions**

Performance-based regulation has the prospects for overcoming the restrictions of prescriptive regulation. The attention to results, rather than prescribed actions, emphasizes achievement of regulatory objectives. The ability of regulated entities to choose how to achieve those results provides greater flexibility and opens up possibilities for more cost-effective compliance solutions. These prospects have led regulators across the globe to experiment with performance-based regulatory approaches, leading to wide adoption of the approach for many regulatory sectors.

Increasingly, public administration and regulatory scholars have suggested adoption of performance-based approaches for dealing with thorny problems. Karkkainen, Fung, and Sabel suggest “a model of environmental regulation that promises to be at once more flexible, democratic, and effective than the familiar methods of central command or market-based control” that is based on locally determined environmental performance standards (2000, p. 692). Jennifer Pomeranz and her colleagues (2009) suggest the use of performance targets regarding childhood obesity against which junk food manufacturers could be evaluated in contributing to the obesity epidemic. Similarly, Stephen Sugarman (2009) discusses how performance-based standards could be applied to food makers, retailers, or both in dealing with high levels of salt in humans and its contribution to high blood pressure.

Many of the efforts to employ performance-based regulatory approaches are still in their infancy. Few constitute standalone regulatory regimes. Most of the criticisms that have been raised about the performance-based approach revolve around the uncertainties that are fostered by vague performance goals or standards, and the inability to adequately quantify or otherwise measure performance (see Coglianese, Nash and Olmstead 2003, Deighton-Smith 2008). These criticisms mirror the challenges of moving from the concepts of performance-based regulation to workable performance-based regulatory regimes. Brian Meacham and his colleagues depict these challenges for performance-based approaches to building regulation as

follows: “There remain significant gaps in the knowledge, understanding and application of performance building regulatory and design concepts, and research and development is needed in several areas to increase their effectiveness, from the overall regulatory framework to addressing specific emerging issues” (2005, p. 103).

Implementation of performance-based regulation requires meaningful performance standards, an ability to gauge adherence to them, and new skill sets for regulatory enforcement agencies. As illustrated by the saga of leaky buildings in New Zealand, substantial gaps in regulatory compliance can result from weak performance-based regulatory regimes. Professional judgment and the exercise of professional responsibility are important accountability mechanisms for performance-based regimes. When such expertise is lacking, as was the case in New Zealand’s performance-based building safety regime, there is a clear mismatch in regulatory design. One challenge for regulatory designers is figuring out how to compensate for the lack of the requisite professional expertise. New Zealand officials added prescriptive requirements as part of their reform of the performance-based approach to building regulation without giving up on the basic performance notions. It may be possible to strengthen a sense of professional accountability through education programs or through increased legal liability for failure to meet codes of conduct.

These concerns about accountability underscore the importance of finding the right fit between the regulatory circumstances and the design of performance-based regulatory regimes. Coglianese and Lazer (2003) suggest performance-based approaches are more appropriate when it is possible to gauge regulatory outcomes and when there is a diversity of regulated entities. The former is a necessary condition for application of the approach. The latter reflects the comparative advantage of the approach in allowing diverse regulated entities to determine the best approach to regulatory compliance. When the requisite professional expertise is lacking, there may be little choice but to revert to a largely prescriptive regime.

Despite their appeal, it is doubtful that performance-based regulatory approaches will wholly supplant traditional regulation that is based on prescriptive requirements. Prescriptive provisions help address situations that are relatively simple to assess and for which the conduct of a performance assessment would be inappropriate or overly expensive. They are also a necessary backstop for situations for which the potential harm from failure to comply would be catastrophic as in the case of nuclear power plant safety. Nonetheless, performance-based approaches should be embraced as one of the key elements of the regulatory toolkit. They hold much promise and provide a wide array of possibilities for innovative regulatory

regimes when paired with the appropriate combination of prescriptive, systems-based, and risk-based provisions.

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